All India Coordinated Research Project on Cotton

Annual Report: 2024-25

Director

ICAR - Central Institute for Cotton Research

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Published by **Dr. Y. G. Prasad**
Director, ICAR - Central Institute for Cotton Research, Nagpur

Compiled and edited by

Dr. Y. G. Prasad, Director
Dr. G. T. Behere, Nodal Officer, AICRP on Cotton
Dr. S. Manickam, Principal Investigator (Breeding)
Dr. K. Sankaranarayanan, Principal Investigator (Agronomy)
Dr. Rishi Kumar, Principal Investigator (Entomology)
Dr. S. K. Sain, Principal Investigator (Plant Pathology)
Dr. A. S. M. Raja, Principal Investigator (Fibre Technology)
Dr. M. Sabesh, Principal Scientist, (Computer Applications)

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Preface

Cotton, often referred to as the "white gold," has been a vital component of India's agricultural landscape and economy for centuries. With its multifaceted applications ranging from textiles to industrial usage, cotton plays a crucial role in shaping not only the livelihoods of millions of farmers but also the fabric of our nation's economy. Currently India has the World's highest area of more than 11.4 M ha under cotton and is the 2nd largest producer and consumer. Over 6.0 million cotton farmers are engaged in cotton production, while around 50 million people are engaged in cotton processing and trade. Cotton contributes 59% of the raw material to the textile industry, 29.1% of total textile exports and 4.9% value of agriculture output.

Indian cotton scenario has been highly fluctuating due to biotic as well as abiotic stresses and competition from other crops in recent years. The area under cotton in the current year in the country decreased by 10.46% and cotton production decreased by 7.98% compared to last year. The cotton production in India during 2024-25 is estimated to produce 299.26 lakh bales of 170 kg from 113.6 lakh hectares with a productivity of 448 kg lint/ha. CICR with the support of network of AICRP on Cotton issued 34 weekly advisories in eight local languages for the timely management of biotic and abiotic stresses affecting the crop.

During the year, 7 non-Bt varieties/hybrids and 57 Bt varieties/hybrids were identified by the VIC. 10 non-Bt varieties/hybrids were notified. Cotton disease surveillance was conducted in 364 villages (5-10 fields in each village) of 42 districts in 9 cotton growing States for record and documentation of major diseases in each zone. During the year 2024-25 under NFSM - Commercial Crops, a total of 557 Front Line Demonstrations on Integrated Crop Management on cotton, 159 Front Line Demonstrations on Desi / ELS cotton / ELS cotton seed production and 149 Front Line Demonstrations on intercropping with cotton were conducted by twenty participating centers of ICAR – AICRP on Cotton.

During 2024-25, 3 genetic stocks were approved for registration, 1694 germplasm accessions were shared with researchers of SAUs/ Public sector. Handling fees has been fixed for 123 core collection and 14 registered genetic stocks for sharing with Private sector as per NBPGR guidelines/ITMU. Two MTAs were signed with private seed companies for sharing of 9 G. hirsutum accessions. Till date, 97 cotton varieties of public sector, 624 genotypes of private sector and one farmer variety were registered with PPV&FRA. During 2024-25, 205 private and 13 public cotton genotypes were registered with PPV& FRA.
Appreciable efforts have been made in improving knowledge-sharing, and fostering trans-disciplinary activities in the ICAR-AICRP cotton research ecosystem.

Guidance and constant encouragement received from Dr. Himanshu Pathak, Secretary, DARE and Director General, ICAR, New Delhi, Dr. T. R. Sharma, Former DDG(CS), ICAR and Dr. D.K. Yadava, DDG (Crop Sciences), ICAR is gratefully acknowledged. I am grateful for the support extended by Dr. P. K. Dash, Assistant Director General (Commercial Crops), ICAR. The Project Monitoring and Advisory Committee Headed by Dr. C. D. Mayee, and Members viz., Dr. S. V. Sarode, Dr. S. S. Siwach and Dr. M. S. Bhullar have given new direction in formulation of technical programme and taking the activities to next level.

I sincerely acknowledge the support and cooperation received from my colleagues Dr. S. Manickam, Principal Investigator (Plant Breeding), Dr. K. Sankaranarayanan, Principal Investigator (Agronomy), Dr. Rishi Kumar, Principal Investigator (Entomology), Dr. Satish Sain, Principal Investigator (Pathology), Dr. A. S. M. Raja, Principal Investigator (Fibre Technology). I also acknowledge the support of Dr. S. Usha Rani, Principal Scientist (Agricultural Extension) in coordinating the Front-Line Demonstrations in various cotton growing States under NFSM of DACFW and Dr. M. Sabesh, Principal Scientist (Computer Application), ICAR-CICR, RS, Coimbatore for periodical support in report compilation.

I also thank Dr. G. T. Behere, Nodal Officer, AICRP on Cotton for coordinating the various activities of the AICRP on Cotton and Sh. K. Vedavyas (Personal Assistant), ICAR-CICR, Nagpur for assisting in the regular correspondence. I express my gratitude to the ICAR-CICR Nagpur Administration and Finance team for the prompt distribution of funding to affiliated centers. Thanks are due to the Editorial Committee members for their unstinted work in bringing out this publication in time.

Dr. Y. G. Prasad
Director, ICAR-CICR, Nagpur

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Project Report

PROJECT REPORT

Introduction

Research on Cotton Improvement in the country under the All India Coordinated Research Project on Cotton (AICRP on Cotton) is coordinated by the Director, ICAR-CICR, Nagpur. The Director of CICR is supported by the Nodal Officer (AICRP on Cotton), Principal Investigators of Crop Improvement, Crop Production (including Agronomy, Plant Physiology and Biochemistry), Entomology, Plant Pathology, and Fiber Quality evaluation. Besides, Quinquennial Review Teams (QRT) and the program monitoring advisory and committee constituted by ICAR provide guidance and review of the AICRP on Cotton program. AICRP on Cotton has 19 centers spread across the North Zone (Punjab, Haryana, and Rajasthan), Central Zone (Gujarat, Maharashtra, Madhya Pradesh, and Odisha), South Zone (Andhra Pradesh, Karnataka, and Tamil Nadu) under 17 SAUs. The major activities of various centers include the development and evaluation of improved cotton varieties and hybrids, the development and evaluation of location-specific technologies for nutritional management, the management of biotic and abiotic stresses, and the development of economically and eco-friendly viable plant protection measures. Besides, conduct Front-line Demonstrations on improved and proven technologies in the farmers' field, the conduct of kisan melas for speedy dissemination of technologies to the cotton grower for enhanced productivity and optimal input usage.

Indian Cotton Scenario: 2024-25

Indian cotton scenario has been highly fluctuating due to biotic as well as abiotic stresses and competition from other crops in recent years. The cotton production in India during 2024-25 is estimated to produce 299.26 lakh bales of 170 kg from 113.6 lakh hectares with a productivity of 448 kg lint/ha as estimated by the Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare, New Delhi. The area under cotton in the current year in the country decreased by 10.46% and cotton production decreased by 7.98% compared to last year.

North zone states comprise Punjab, Haryana, and Rajasthan estimated to occupy 10.89% of the total cotton area in the country and to produce 11.04% cotton. The central zone comprises Maharashtra, Gujarat, and Madhya Pradesh to occupy 61.51% area and produce 61.12% of the country's production. In south zone comprised of Telangana, Andhra Pradesh, Karnataka, and Tamil Nadu occupy 26.03% area and produce 26.06% of the country's production. Besides Odisha is to produce 1.57% of the country's cotton production in the year 2024-25. In the current year, Gujarat, Maharashtra, and Telangana were the major cotton-growing and producing states in the country. These states are estimated to grow 72.64% area under cotton and are estimated to produce 72.76% of the country's cotton production. Significant area reduction in country estimated at 10.47% compared to last year, notably, in North zone it was 31.07% reduction; and 7.41% and 4.98% reduction in area under cotton in Central and South zone, respectively. The cotton production in the country reduced by 7.98%, significantly, in North zone it is estimated at 30.57% reduction.

State-wise Cotton Area (Lakh ha)

States	18-19	19-20	20-21	21-22	22-23	23-24	24-25*
Punjab	2.68	2.48	2.52	2.51	2.49	2.14	1.00
Haryana	7.08	7.23	7.40	6.36	5.75	5.78	4.76
Rajasthan	6.29	7.60	8.07	7.56	8.15	10.04	6.62
Gujarat	26.60	26.55	22.70	22.84	24.84	26.83	23.92
Maharashtra	42.18	44.91	45.44	44.10	41.82	42.34	40.84
Madhya Pradesh	6.14	6.50	5.88	5.60	5.95	6.30	5.12
Telangana	18.39	21.27	23.58	18.89	19.73	18.18	17.82
Andhra Pradesh	6.20	6.57	6.06	5.54	7.04	4.22	4.53
Karnataka	7.18	8.17	8.20	6.74	9.49	7.43	6.67
Tamil Nadu	1.33	1.70	1.12	1.48	1.73	1.30	0.56
Odisha	1.57	1.70	1.71	1.93	2.16	2.16	1.47
Others	0.50	0.09	0.17	0.17	0.12	0.16	0.03
Total	**126.14**	**134.77**	**132.85**	**123.72**	**129.27**	**126.88**	**113.6**

State-wise Cotton Production (Lakh bales of 170 kg)

State	18-19	19-20	20-21	21-22	22-23	23-24	24-25*
Punjab	12.22	12.06	10.23	6.46	4.44	6.29	2.40
Haryana	20.13	24.84	18.23	13.16	10.01	15.09	10.23
Rajasthan	20.26	27.88	32.07	24.81	27.74	26.22	20.42
Gujarat	62.79	86.17	72.18	75.09	87.95	90.57	84.01
Maharashtra	65.93	66.39	101.05	82.49	83.16	80.45	84.80
Madhya Pradesh	23.29	16.46	13.38	14.20	14.33	18.01	14.12
Telangana	38.47	68.33	57.97	48.78	57.45	50.80	48.95
Andhra Pradesh	14.91	25.08	16.00	17.08	15.41	7.37	9.41
Karnataka	14.00	23.30	21.20	19.55	25.68	20.59	18.56
Tamil Nadu	2.69	4.18	2.43	3.02	3.19	2.52	1.09
Odisha	4.55	5.79	5.51	6.26	7.05	7.05	4.72
Others	1.18	0.17	0.23	0.28	0.19	0.26	0.55
Total	**280.42**	**360.65**	**350.48**	**311.18**	**336.60**	**325.22**	**299.26**

State-wise Cotton Productivity (kg/ha)

State	18-19	19-20	20-21	21-22	22-23	23-24	24-25*
Punjab	775	827	690	437	303	500	409
Haryana	483	584	419	352	296	444	365
Rajasthan	548	624	676	558	579	444	524
Gujarat	401	552	541	559	602	574	597
Maharashtra	266	251	378	318	338	323	353
Madhya Pradesh	645	430	387	431	409	486	469
Telangana	356	546	418	439	495	475	467
Andhra Pradesh	409	649	449	524	372	297	353
Karnataka	331	485	440	493	460	471	473
Tamil Nadu	344	418	369	347	313	330	331
Odisha	493	579	548	551	555	555	544
Others	401	321	230	279	269	276	227
Total	**378**	**455**	**448**	**428**	**443**	**436**	**448**

*Source: P-Provisional; * - As estimated by Committee on Cotton Production and Consumption (COCPC) in its meeting held on 28.11.2024*

The cotton imports is estimated to increase 64.47% this year compared to last year i.e. 15.20 lakh bales last year to 25.00 lakh bales this year. Whereas the export estimated to decrease 36.53% this year compared to last year, i.e. decrease of 28.36 to 18.00 lakh bales. The cotton reserve (closing stock) in the country drastically reduced this year and estimated at 41.91% compared to last year.

Cotton Balance Sheet

Particulars	2020-2021	2021-22	2022-23	2023-24 (P)*	2024-25 (P)*
SUPPLY					
Opening Stock	120.79	71.84	39.48	61.16	47.10
Crop	352.48	311.17	336.60	325.22	299.26
Import	11.03	21.13	14.60	15.20	25.00
TOTAL SUPPLY	**484.30**	**404.14**	**390.68**	**401.58**	**371.36**
DEMAND					
Mill Consumption	297.45	284.93	197.80	214.83	215.00
S.S.I Consumption	22.42	21.48	99.83	95.29	95.00
Non-Textile	15.00	16.00	16.00	16.00	16.00
Export	77.59	42.25	15.89	28.36	18.00
TOTAL DEMAND	**412.46**	**364.66**	**329.52**	**354.48**	**344.00**
Closing Stock.	**71.84**	**39.48**	**61.16**	**47.10**	**27.36**

*P-Provisional; * - As estimated by Committee on Cotton Production and Consumption (COCPC) in its meeting held on 28.11.2024*

World Cotton Scenario: 2024-25

China is the leading producer of cotton in the world. It is estimated that 26.25% of the world cotton production produced in China, followed by India (20.67%), Brazil (14.05%) and the USA (11.92%). China Produces 31.75 million bales (480 Ib. /bale) from 2.90 million hectare with productivity of 2384 kg per hectare. Whereas India is the largest cultivating country in the world with 11.8 million Hectare, and produces 25.00 million bales with productivity of 461 kg per hectare. Brazil and the USA produces 17.00 and 14.41 Million bales, respectively. Regarding productivity, the productivity was highest in China (2384 kg/ha) followed by Australia (1960 kg/ha); Brazil (1879 kg/ha); and Turkey (1873 kg/ha). The average world productivity was 854 kg/ha.

Last year, Bangladesh was the largest imported of raw cotton and imports 8.20 million bales, followed by Vietnam (7.40 million bales); China (6.80 million bales); and Pakistan (5.50 Million bales). China reduced its import this year by 55% from 14.97 to 6.80 million bales compared to last year. India imports increased by 194% from 0.89 to 2.60 million bales. In raw cotton export scenario, the three countries Brazil, the USA, and Australia exports raw cotton to the tune of 69% of world exports. Brazil is the largest exporter of raw cotton in 2024-25, it exports 13.00 M bales which is 95% more compared to 2022-23. India is the

fourth largest exporter of raw cotton with 1.4 M Bales. China is the largest consumer of raw cotton in the world and consumes 32.18% of world consumption, followed by India (21.88%); Pakistan (8.84%); Bangladesh (7.12 %); Vietnam (6.35%); and Turkey (6.01%).

Overall, cotton is largely cultivated across 69 countries around the world in 30.84 M ha producing 120.96 M bales with average yield of 854 kg lint/ha.

World Cotton Status: 2024-25

Country	Area	Production	Imports	Export	Consumption	Yield
Argentina	600	1,675	0	700	750	608
Australia	600	5,400	0	5,400	10	1,960
Bangladesh	45	153	8,200	0	8,300	740
Benin	545	1,260	0	1,200	15	503
Brazil	1,970	17,000	10	13,000	3,300	1,879
Burkina Faso	345	600	0	600	15	379
Cameroon	230	680	0	675	20	644
Chad	170	165	0	150	10	211
China	2,900	31,750	6,800	100	37,500	2,384
Cote d'Ivoire	370	730	0	700	10	430
Egypt	130	425	625	300	725	712
India	11,800	25,000	2,600	1,400	25,500	461
Indonesia	1	2	2,000	10	2,000	435
Mali	625	1,070	0	1,050	25	373
Mexico	120	825	700	150	1,400	1,497
Pakistan	2,000	5,000	5,500	50	10,300	544
Turkey	465	4,000	4,200	1,000	7,000	1,873
Turkmenistan	500	800	0	150	750	348
United States	3,347	14,414	5	11,000	1,700	938
Vietnam	1	3	7,400	0	7,400	653
World	30,840	1,20,961	42,686	42,706	1,16,543	854

Area in 1000 Ha; Production, import, Export, consumption are in 1000 bales (480 lb./bales);
Yield in kg/ha. Source: USDA, accessed on 17.03.2025.

Varieties and hybrids identification and release during 2024-25.

During the year 2024-25, seven non-Bt cotton varieties and hybrids have been identified and 10 non-Bt cotton varieties and hybrids have been notified. During the year 2024-25, and 57 Bt varieties and hybrids from both public and private sectors have been identified. Details are provided in the following tables.

List of non-Bt Cotton varieties and hybrids identified by VIC in 2024

	Name of entry	Category	Zone	Situation
1	KR 149	Desi hybrid	North	Irrigated
2	KR 150	Desi hybrid	North	Irrigated
3	F 2743	Hirsutum	North	Irrigated
4	FDK 324	Arboreum	North	Irrigated
5	TSH 387	Hirsutum	South	Irrigated
6	CNH 17395 (color Cotton)	Hirsutum	Central	Rainfed
7	CNA 1092	Arboreum	Central	Rainfed

List of non-Bt Cotton varieties and hybrids notified in 2024-25

	Name of the variety	Category	Gazette no.	Date	Remark
1	TVH 007	*G. hirsutum*	S. O. 4388 (E)	08-10-2024	
2	PA 833	*G. arboreum*	S. O. 4388 (E)	08-10-2024	Long linted
3	PDKV Dhawal (AKA 2013-8)	*G. arboreum*	S. O. 4388 (E)	08-10-2024	
4	TSH 387 (SVPR 7)	*G. hirsutum*	S. O. 4388 (E)	08-10-2024	
5	PBD 88	*G. arboreum*	S. O. 4388 (E)	08-10-2024	
6	Shalini (CNH-17395) (CICR-H Cotton 58)	*G. hirsutum*	S. O. 4388 (E)	08-10-2024	Colour Cotton
7	CNH 18529 (CICR-H NC Cotton 64)	*G. hirsutum*	S. O. 4388 (E)	08-10-2024	Colour Cotton
8	CICR-A NC Cotton 67 (CNA 1092)	*G. arboreum*	S. O. 4388 (E)	08-10-2024	Colour Cotton
9	NH 677	*G. hirsutum*	S. O. 4388 (E)	08-10-2024	
10	VPT 2 (TVH 002)	*G. hirsutum*	S. O. 4388 (E)	08-10-2024	

List of Bt Cotton varieties and hybrids identified by VIC in 2024

S. No.	Name of entry	Category	Zone	Situation
1	ACH 559-2 BGII	HXH	North	Irrigated
2	DC 5417 BGII	HXH	North	Irrigated
3	KCH 9355 BGII	HXH	North	Irrigated
4	RCH997BGII	HXH	North	Irrigated
5	Rasi Max001BGII	HXH-C	North	Irrigated
6	Rasi Max003BGII	HXH-C	North	Irrigated
7	ACH 555-2 BGII	HXH	Central	Irrigated
8	DC 5100 BGII	HXH	Central	Irrigated
9	JKCH 18568 BGII	HXH	Central	Irrigated
10	RCH965BGII	HXH	Central	Irrigated
11	RCH999BGII	HXH	Central	Irrigated

12	SS 1188 BGII	HXH	Central	Irrigated
13	US 711 BGII	HXH	Central	Irrigated
14	ARCH 844 BGII	HXH	Central	Rainfed
15	BIO 6802 BGII	HXH	Central	Rainfed
16	DC 5100 BGII	HXH	Central	Rainfed
17	DC 5101 BGII	HXH	Central	Rainfed
18	Trumpcard BGII	HXH	Central	Rainfed
19	DC 5101 BGII	HXH	Central	Rainfed
20	Rasi Max033BGII	HXH-C	Central	Rainfed
21	ACH 981-2 BGII	HXH	South	Irrigated
22	ARCH 6651 BGII	HXH	South	Irrigated
23	BIO 6938 BGII	HXH	South	Irrigated
24	DC 5100 BGII	HXH	South	Irrigated
25	JKCH 18568 BGII	HXH	South	Irrigated
26	KCH 9111 BGII	HXH	South	Irrigated
27	KCH 9122 BGII	HXH	South	Irrigated
28	NBC-2020 BGII	HXH	South	Irrigated
29	RCH999BGII	HXH	South	Irrigated
30	VSCH 219 BGII	HXH	South	Irrigated
31	US 711 BGII	HXH	South	Irrigated
32	SS 1188 BGII	HXH	South	Irrigated
33	Rasi Max006BGII	HXH-C	South	Irrigated
34	DC 5100 BGII	HXH	South	Rainfed
35	SS-963 Bt2	HXH	South	Rainfed
36	BIO 6802 BGII	HXH	South	Rainfed
37	ARCH 3224 BGII	HXH-C	South	Rainfed
38	VSCH 139 BGII	HXH-C	South	Rainfed
39	Rasi Max033BGII	HXH-C	South	Rainfed
40	Rasi Max066BGII	HXH-C	South	Rainfed
41	PKV 081 Bt	Hirsutum	South	Rainfed
42	ARCH 2020 BGII	HXH-C	North	Irrigated
43	C9403 BG-II	HXH-C	North	Irrigated
44	Rasi Max039BGII	HXH-C	North	Irrigated
45	Rasi Max036BGII	HXH-C	North	Irrigated
46	ACH 27-2 BGII	HXH-C	Central	Irrigated
47	NCS 8022 Bt2	HXH-C	Central	Irrigated
48	Rasi Max069BGII	HXH-C	Central	Irrigated
49	VSCH 139 BGII	HXH-C	Central	Rainfed
50	KCH 9111 BGII	HXH-C	South	Irrigated
51	Rasi Max069BGII	HXH-C	South	Irrigated
52	ACH 27-2 BGII	HXH-C	South	Irrigated
53	ACH 999-2 BGII	HXH	North	Irrigated

54	ACH 981-2 BGII	HXH	Central	Irrigated
55	ACH 909-2 BGII	HXH	South	Irrigated
56	D 1199 BGII	HXH	South	Irrigated
57	US 707 BGII	HXH	South	Irrigated

Pest Scenario during 2024-25

- **Leafhopper**- In North zone, peak activity was recorded during 27th-32nd SMW except Faridkot (36th SMW) with a range of 0.00-14.40 jassids/3 leaves; in Central zone, 36th-46th SMW but at most of the locations it peaked between 42nd-46th SMW with a range of 0.00-33.30 jassids/3 leaves and between 39th-49th SMW; in south zone but at most of the locations it peaked between 46th-49th SMW with a range of 0.00-31.30 jassids/3 leaves.
- **Thrips**- in North zone peak activity was recorded during 29th-30th SMW with a range of 0.00-213.00 thrips/3 leaves, in Central zone peaked between 30th-43rd SMW but at most of the locations it was between 38th-41st SMW with a range of 0.00-49.60 thrips/3 leaves and peak activity between 38th-48th SMW, in south zone but it was between 38th-41st SMW at most of the locations with a range of 0.00-88.40 thrips/3 leaves.
- **Whitefly**- In North zone, peak activity was recorded during 29th SMW at most of the locations except, Hisar (39th SMW) & Sriganganagar (36th SMW) with a range of 0.53-120.90 whitefly/3 leaves;,37th-52nd SMW in central zone and at most of the locations it was between 40th-47th SMW with a range of 0.00-36.30 whitefly/3 leaves and peaked between 37th-51st SMW; in south zone but it was between 40th-45th SMW at most of the locations with a range of 0.00-48.87 whitefly/3 leaves.
- **Aphids**- peak activity in central zone was recorded during 30th-52nd SMW but at most of the locations it was between 51st-52nd SMW with a range of 0.00-117.65 aphids/3 leaves and between 34th-51st SMW with a range of 0.00-85.00 aphids/3 leaves in South zone.
- **Natural Enemies**- Maximum population was recorded during 29th-33rd SMW at all the locations except Srirganganagr (38th SMW) with a range of 0.00-25.50 predators/plant in North zone, highest population recorded between 49th-52nd SMW at majority locations of central zone with a range of 0.00-7.80 predator/plant and between 35th-38th SMW at majority locations of South zone with a range of 0.00-5.56 predator/plant.
- **North zone**- Negligible population and damage to fruiting bodies due to *Earias* spp. & *H. armigera* were recorded. Pink bollworm larval recovery & green boll damage (%) ranged between 0.00-20.00/50 green bolls & 0.00-27.00 percent respectively and were maximum at Sirsa.
- **Central zone**-larval population of *H. armigera, Earias* spp., & *S. litura* ranged between 0.00-2.20/5 plants, 0.00-3.25/5 plants & 0.00-2.00/5 plants, respectively. Fruiting body damage & green boll damage due to bollworms other than PBW ranged between 0.00-28.55 & 0.00-15.00 percent, respectively. Rosette flowers (%) due to PBW, larval recovery of pink bollworm (Nos.) and green boll damage (%) ranged between 0.00-23.83 percent (Highest at Nanded), 1.63-17.64/50 green bolls (Maximum at Akola) & 10.67-40.20 percent (Highest at Khandwa), respectively.

- **South zone**-larval population of *H. armigera, Earias* spp., & *S. litura* ranged between 0.00-5.20/5 plants, 0.00-1.33/5 plants & 0.00-1.00/5 plants, respectively. Fruiting body damage (%) ranged between 0.00-60.65. Rosette flowers due to pink bollworm, pink bollworm larval recovery (Nos) & green boll damage were recorded with a range of 0.00-39.30 percent, 8.01-28.25/50 green bolls & 7.41-66.88 percent highest at Raichur, respectively.

➢ **Bollworms dynamics (non-*Bt*)**

- **North zone**- Negligible population and damage to fruiting bodies due to *Earias* spp. & *H. armigera* were recorded. Pink bollworm larval recovery & green boll damage (%) ranged between 0.00-20.00/50 green bolls & 0.00-27.00 percent respectively and were maximum at Sirsa.
- **Central zone**-larval population of *H. armigera, Earias* spp., & *S. litura* ranged between 0.00-2.20/5 plants, 0.00-3.25/5 plants & 0.00-2.00/5 plants, respectively. Fruiting body damage & green boll damage due to bollworms other than PBW ranged between 0.00-28.55 & 0.00-15.00 percent, respectively. Rosette flowers (%) due to PBW, larval recovery of pink bollworm (Nos.) and green boll damage (%) ranged between 0.00-23.83 percent (Highest at Nanded), 1.63-17.64/50 green bolls (Maximum at Akola) & 10.67-40.20 percent (Highest at Khandwa), respectively.
- **South zone**-larval population of *H. armigera, Earias* spp., & *S. litura* ranged between 0.00-5.20/5 plants, 0.00-1.33/5 plants & 0.00-1.00/5 plants, respectively. Fruiting body damage (%) ranged between 0.00-60.65. Rosette flowers due to pink bollworm, pink bollworm larval recovery (Nos) & green boll damage were recorded with a range of 0.00-39.30 percent, 8.01-28.25/50 green bolls & 7.41-66.88 percent highest at Raichur, respectively.

➢ **Bollworms dynamics (*Bt*)**

- **North zone**-pink bollworm larval recovery (Nos) & green boll damage (%) ranged between 0.00-12.50/50 green bolls&0.00-21.00 percent respectively and were maximum at Sirsa.
- **Central zone**- larval population of *H. armigera, Earias* spp., & *S. litura* ranged between 0.00-0.60/5 plants, 0.00-0.90/5 plants & 0.00-1.20/5 plants, respectively. Fruiting body damage (%) & green boll damage (%) due to bollworms other than PBW ranged between 0.00-21.75 & 0.00-3.47 percent, respectively. Rosette flowers (%) due to PBW, larval recovery of pink bollworm (Nos) and green boll damage (%) ranged between 0.00-20.00 percent (Highest at Nanded), 2.00-15.42/50 green bolls (Maximum at Akola) & 3.00-37.50 percent (Highest at Khandwa), respectively.
- **South zone**-larval population of *H. armigera, Earias* spp., &*S. litura* ranged between 0.00-1.44/5 plants, 0.00-0.10/5 plants & 0.00-1.11/5 plants, respectively. Fruiting body damage (%) ranged between 0.00-42.41 percent. Rosette flowers (%) due to PBW, pink bollworm larval recovery (Nos) & green boll damage (%) were recorded highest at Raichur with a range of 0.00-34.71 percent, 3.85-23.22/50 green bolls & 2.90-43.49 percent, respectively.

Disease Scenario during 2024-25

Cotton disease surveillance conducted in **364 villages** (5-10 fields in each) **of 42 districts in 9 cotton growing states** covering all cotton growing zones of India revealed that the Zone wise major diseases observed during 2024-25 are:

- **North Zone**: Cotton Leaf Curl Disease (CLCuD) was low in Haryana (17.7%) and Rajasthan (19.1%) and severe in Punjab (35.8%) during mid-and late-seasons and root rot was low in Haryana (0.4-4.9%) during mid-and late-seasons.
- **Central Zone**: Grey mildew was moderate in Maharashtra (12.9%), Gujarat (11.6%) and Madhya Pradesh (12.3%) during mid-and late-seasons. Bacterial leaf blight (BLB) was moderate in Maharashtra (9.6%) and slightly high in Gujarat (11.6%) during mid-and late-seasons. *Alternaria* leaf spot (ALS) was moderate in Maharashtra (9.6%) and Gujarat (7%). Para wilt was low in Gujarat (5.9%) during mid-season. Target leaf spot (CoLS) was low in Gujarat (1.3%) and moderate in Madhya Pradesh (9.5%) in late season while boll rot was low in Maharashtra (1.2%) and moderate in Gujarat (7.6%) during late-season
- **South Zone***:* Grey mildew was moderate in Karnataka (10.2%) and Tamil Nadu (10.7%) during mid-and late-seasons. ALS was moderate in Tamil Nadu (9%) and Karnataka (16.7%) during mid-and late-seasons. BLB was moderate in Karnataka (7.5%) and to slightly high in Tamil Nadu (11.9%) during mid-and late-seasons. Root rot was moderate in Tamil Nadu (8.7%) during mid-and late-seasons, whereas boll rot was moderate in Tamil Nadu (5.1%) and slightly higher in Karnataka (13.1%) during late-season.
- **Crop loss estimation studies were conducted at on-station trials:** The average reduction of seed cotton yield (SCY) corresponding to CLCuD severity grades was estimated to be grade 1, 2, 3, 4, 5 and 6 was 7.8, 21.1, 37.4, 49.5, 53 and 80.2%, respectively in Haryana, Rajasthan and Punjab. The SCY reduction corresponding with TSV grades 1, 2, 3 and 4 was 29.5, 49.8, 53.1 and 41.7%, respectively in Rahuri, Guntur and Coimbatore.

Implementation of PVP legislation and DUS testing of cotton under ICAR and SAU system

The Protection of Plant Varieties and Farmers Rights Act enacted in the year 2001 enables crop varieties to be registered with PPVFR Authority, New Delhi and avail protection in the form of breeders' rights, researchers' rights and farmers rights. The varieties undergo test for Distinctness, Uniformity and Stability at selected DUS test centers and after completion of the test, depending on varietal status with regard to notification, they get registered as new variety, extant notified variety (ENV), extant varieties under common knowledge (VCK), farmer variety (FV) and essentially derived varieties (EDVs). The DUS test centres for cotton include PAU, Ludhiana and HAU, Hisar at north zone (for testing *G. arboreum* predominantly), CICR, Nagpur and MPKV, Rahuri at Central zone (for testing *G. hirsutum* predominantly) and CICR RS, Coimbatore and UAS, Dharwad at South zone (testing *G.barbadense*/H x B hybrids predominantly). Work on DUS test for cotton variety registration started in 2008, and till date, 97 public sector, 624 private sector and one farmer variety has been registered. CICR has facilitated in providing genome saviour award for one farmer in Jalpaiguri district of West Bengal. The guideline for DUS testing in cotton developed in 2010 includes 37 morphological characters for tetraploid cotton and 31 for diploid cotton.

The work on revising the guideline is under progress and characters to be modified or included/deleted has been finalized after consultation with breeders under AICRP. The revised and updated guideline will enable cotton DUS testing to be more authentic and accurate. During the year, the genotypes under DUS testing were grown alongside reference varieties which included example varieties that express a specific trait in its maximum level and 36 varieties gazette notified after 2017. The regional/zonal check varieties used in AICRP such as AKH-8828; AKH-081 and Suraj at Central; zone; Supriya, Suraksha and Suvin at South zone and H-1098 I at north zone are also grown alongside and DUS traits recorded. The trial also includes most popular Bt hybrids of the particular zone as check, seeds of which are purchased from open market viz. Ajeet 155 BG2, MRC 7390 BG-II, RCH 578 BG-II and RCH 386 BG-II in central zone; MRC-7918, MRC-7376 and MRC-7361 in South zone; ACH 177-2 BG-II and RCH-773 BG-II in north zone.

Front Line Demonstrations under National Food Security Mission (NFSM) (Commercial Crops)

Front Line Demonstrations (FLD) in Cotton is one of the first line extension programs which facilitates cotton growers to know about and adopt novel technologies to increase productivity, reduce production costs and increase net profitability in a responsible and sustainable manner. This novel program was implemented in 1996 for cotton crop to demonstrate cotton production technologies through the networking centers of Indian Council of Agricultural Research - All India Coordinated Research Project (ICAR-AICRP) on Cotton. Since then, ICAR-AICRP on cotton has been conducting FLD on cotton through its network centers and by the ICAR- Central Institute for Cotton Research, Nagpur and its regional stations in Coimbatore and Sirsa. Until 2013, these demonstrations were conducted on Production Technology, Integrated Pest Management and on Farm implements under Technology Mission on Cotton, Mini Mission II. Since 2014-15, FLDs have been conducted under National Food Security Mission (NFSM) – Commercial Crops (CC). During the year 2024-25 under NFSM - Commercial Crops, **590** FLDs on Integrated Crop Management (ICM), **194** Front Line Demonstrations on Desi / ELS cotton / ELS cotton seed production and **180** Front Line Demonstrations on intercropping with cotton were allotted to ICAR-AICRP on Cotton with a budget outlay of **INR 80.00 lakh.** Out of the allotted FLDs, a total of **557** Front Line Demonstrations on Integrated Crop Management on cotton, **159** Front Line Demonstrations on Desi / ELS cotton / ELS cotton seed production and **149** Front Line Demonstrations on intercropping with cotton were conducted by **twenty** participating centers of ICAR – AICRP on Cotton.

While conducting the FLDs, main emphasis was given to the demonstrations for enhancing the production of cotton in low productivity areas / problematic areas. A baseline survey was conducted by the participating centers to know the resource endowments of the farmers and the level of cotton productivity. For selecting the beneficiaries and identifying the priority areas, village level Institutions were actively utilized. A list of beneficiaries and their plot numbers were notified in the local Block Development / Panchayat Office. Farmers were selected in consultation with local Agricultural Officers and Panchayat Samiti. These officials formed part of the FLD team. Bench mark survey was conducted before taking up the demonstration which included information on the crops and cropping system of the area, inter cropping, the average yields of cotton and the local practices adopted in terms of irrigation, use of fertilizer, plant protection, etc., Information on the cost of cultivation was also collected for the area as a whole. An impact analysis after the harvest was carried out in the light of reduction in insecticide use, reduction in cost of cultivation, awareness of modern technology etc., Further in accordance with the decision of Government of India (GOI) regarding implementation of Special Component Plan (SCP) for

Scheduled Caste and Tribal Sub Plan (TSP) for Scheduled Tribes and Gender Budgeting, the beneficiaries were selected for the year's front-line demonstration program.

AICRP on Cotton Monitoring team during 2024-25

The monitoring team is constituted for evaluation of both ICAR-AICRP on Cotton trials and ICAR Bt cotton trials conducted by respective ICAR-AICRP on Cotton and Private R & D during 2024-25 cropping season. The teams after the monitoring visits submit its reports to the Director, CICR. The Team members are as follows: -

ICAR-AICRP Monitoring Report for Central Zone (Maharashtra, Odisha & Bhawanipatna)

Chairman (Breeder)	Dr. S. Manickam, Principal Scientist, & Principal Investigator (Plant Breeding), ICAR-Central Institute for Cotton Research, Regional Station, Coimbatore
Member (Agronomist)	Dr. N. Vadivel, Professor, Tamil Nadu Agricultural University, Coimbatore.
Member (Entomologist)	Dr. Satnam Singh, Senior Entomologist, Punjab Agricultural University, Regional Research Station, Faridkot.
Member (Pathologist)	Dr. Rupesh Kumar Arora, Plant Pathologist, Punjab Agricultural University, Regional Research Station, Bathinda.
Member (Related discipline)	Dr. S. Rajamani, Principal Scientist (Cotton) & Head, RARS, Acharya N.G. Ranga Agricultural University,Lam, Guntur
Member (Representative from Private Sector R&D)	Dr. Shyam Pardeshi, M/s. Nath Biogenes (I) Ltd. Dr. R. Kannan, M/s. Rasi Seeds Pvt. Ltd.

ICAR-AICRP Monitoring Report for North Zone (Punjab, Haryana & Rajasthan Sriganganagar)

Chairman (Breeder)	Dr. S. Manickam, Principal Scientist, & Principal Investigator (Plant Breeding), ICAR-Central Institute for Cotton Research, Regional Station, Coimbatore
Member (Agronomist)	Dr.K.Ashok Kumar,Senior Scientist & Head, Regional Agricultural Research Station, Acharya.N.G.Ranga Agricultural University, Nandyal, Kurnool (Dt), Andhra Pradesh
Member (Entomologist)	Dr.S.K.Parsai,Assistant Entomologist,ICAR-AICRP on Cotton, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya,Gwalior,Khandwa.
Member ((Pathologist)	Dr. Prashant Sandipan, Assistant Research Scientist, Navsari Agricultural University, Surat.
Member (Related discipline)	Dr. Subhash Chandra, Senior Scientist, ICAR-CICR, Regional Station, Sirsa.
Member (Representative from Private Sector R&D)	Dr. Manoj Phalak, Ankur Seeds Pvt. Ltd. Sh. Rohit Tiwari, Breeder (Cotton), Seed Works India Ltd.

ICAR-AICRP Monitoring Report for South Zone (Karnataka & Tamil Nadu)

Chairman (Entomologist)	Dr. Rishi Kumar, Principal Scientist & Principal Investigator (Entomology), ICAR-CICR, Regional Station, Sirsa.
Member (Breeder)	Dr. Paramjit Singh, Principal Cotton Breeder, Punjab Agricultural University, Regional Research Station, Bathinda.
Member (Agronomy)	Dr. Sanjay Kakade, Associate Professor, Cotton Research Unit, Dr. PDKV, Akola
Member (Plant Pathologist)	Dr. D. K. Davara, Assistant Professor, Cotton Research Station, Junagadh Agricultural University, Junagadh,
Member (Related Discipline)	Dr. Ramakrushna G.I, Senior Scientist, (Agronomy), ICAR-CICR, Nagpur.
Member (Representative from Private Sector R&D)	Sh. Basavaraj Huggi, M/s. Sri Rama Agrigenetics (I) Pvt Ltd, Hyderabad

ICAR-AICRP Monitoring Report for South Zone (Karnataka & Tamil Nadu)

Chairman (Agronomist)	Dr. K. Sankaranarayanan, Principal Scientist, & Principal Investigator (Agronomist), ICAR-CICR, Regional Station, Coimbatore
Member (Breeder)	Dr. A. Subramanian, Professor and Head, Tamil Nadu Agricultural University, Coimbatore.
Member (Entomologist)	Dr. N. K. Bhute, Professor, Mahatma Phule Krishi Vidyapeeth, Rahuri
Member (Plant Pathologist)	Dr. Anil Kumar Saini, Assistant Professor, Chaudhary Charan Singh Haryana Agricultural University, Hisar
Member (Related Discipline)	Dr Rahul Phuke, Scientist (Genetics & Plant Breeding), ICAR-CICR, Nagpur
Member (Representative from Private Sector R&D)	Mr. Hemang Baxi, M.s, Alpgiri Seeds Ltd., Mobile No.09426302931

ICAR-AICRP on Cotton Grant-in-aid General: Tribal Sub Plan (TSP) Funds

During the year as per revised Estimate an amount of Rs.15,00,000/- (Rupees Fifteen Lakhs Only) was allotted for year 2024-2025. Out of Total allocation, Rs.15,00,000/- (Rupees Twelve Lakhs Only) was released in respect of ICAR-AICRP on Cotton Grant-in-aid General TSP Funds for the financial year 2024-25.

The released amount details are as follows: -

Rs.5,00,000/-(Rupees Five Lakh Only) was remitted to Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Nanded, ICAR-AICRP on Cotton Nanded Centre, Rs.1,50,000/-(Rupees One Lakh Fifty Thousand Only) was remitted to Odisha University of Agriculture and Technology, Bhubaneswar, Odisha,

Bhawanipatna Centre, Rs.3,00,000/-(Rupees Three Lakh Only) was remitted to the Acharya N G Ranga Agricultural University, Guntur Centre and Rs.2.50,000/- (Rupees Two Lakh Fifty Thousand Only) was remitted to University of Agriculture Science, Raichur, and Rs.3,00,000/- (Rupees Three Lakhs Only) ICAR-Central Institute for Cotton Research, Nagpur (Nodal Cell) for carrying out different activities under the Tribal Sub Plan.

ICAR-AICRP on Cotton Grant -in aid General: Schedule Caste Sub Plan (SCSP) Funds

During the year as per revised Estimate an amount of Rs.31,00,000/- (Rupees Thirty-One Lakhs Only) was allotted for year 2024-2025. Out of Total allocation, Rs.29,06,500/- (Twenty-Nine Lakhs Six Thousand Five Hundred Only) was released in respect of ICAR-AICRP on Cotton Grant-in-aid General SCSP Funds for the financial year 2024-25.

The released amount details are as follows: -

Rs.5,00,000/- (Rupees Five Lakhs Only) was remitted to Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Nanded, ICAR-AICRP on Cotton Nanded Centre, Rs. 3,30,000/- (Rupees Three Lakh Thirty Thousand Only) was remitted to the Tamil Nadu Agricultural University, Coimbatore Centre, Rs.3,00,000/- (Rupees Three Lakh Only) was remitted to the Acharya N G Ranga Agricultural University, Guntur Centre, Rs.1,00,000/-(One Lakh Only) was remitted to the Odisha University of Agriculture and Technology, Bhubaneswar, Odisha, Bhawanipatna Centre, Rs.2,50,000/- (Rupees Two Lakh Fifty Thousand Only) was remitted to University of Agriculture Science, Raichur.Rs.2,00,000/-(Rupees Two Lakh Only) was remitted to University of Agriculture Science, Chamrajanagar, Rs.2,50,000/-(Rupees Two Lakhs Fifty Thousand Only) was remitted to Mahatma Phule Krishi Vidyapeeth, Rahuri center and Rs.4,16,500/-(Four Lakh Sixteen Thousand and Five Hundred Only) was remitted to ICAR- Central Institute for Cotton Research, Regional Station Coimbatore and Rs.7,53,500/-(Rupees Five Lakhs and Sixty Thousand Only) ICAR- Central Institute for Cotton Research, Nagpur (Nodal Cell) for carrying out different activities under the Schedule Caste Sub Plan.

Financial Statement of ICAR-AICRP on Cotton (2024-25)

ICAR-AICRP on Cotton Salary head (Including Arrears) and Other than Salary Head financial statement for the year 2024-2025				
S.No	**Name of Center**	**Salary Head (Rs in lakh)**	**Other Than Salary Head (Rs in lakh)**	**Total release for the Year 2024-25**
1	Guntur	132.36	10.77	143.13
2	Nandyal	58.59	6.61	65.20
3	Junagadh	63.00	8.82	71.82
4	Surat	120.95	13.09	134.04
5	Hisar	106.00	13.09	119.09
6	Chamrajanagar	60.00	4.41	64.41
7	Dharwad	126.38	13.13	139.51
8	Raichur	81.11	6.09	87.20
9	Khandwa	76.00	8.82	84.82
10	Akola	81.00	8.82	89.82
11	Nanded	197.11	8.82	205.93
12	Rahuri	71.15	6.62	77.77
13	Bhawanipatna	39.30	6.62	45.92
14	Bhatinda	106.85	8.82	115.67
15	Faridkot	368.67	8.82	377.49
16	Banswara	29.00	4.39	33.39
17	Sriganganagar	102.53	8.82	111.35
18	Coimbatore	94.01	8.82	102.83
19	Srivilliputhur	72.00	6.62	78.62
20	Kanpur	14.00	-	14.00
21	Sub total	**2000.00**	**162.00**	**2162.00**
22	Nodal Cell	0.00	29.00	29.00
23	**Grand Total**	**2000.00**	**191.00**	**2191.00**

Research Highlights

RESEARCH HIGHLIGHTS

CROP IMPROVEMENT

- In Initial evaluation trials of North Zone, *G. arboreum* culture PBD 161 (3186 kg/ha) in Br-22a and desi check hybrid KR 64 (3328 kg/ha) in Br 25a, topped in seed cotton yield in the respective trials and have been promoted to coordinated trials.
- Among *desi* cotton in coordinated trials, FDK 331 with a mean seed cotton yield of 3160 kg/ha was promising among varieties in Br-24a and KR 160 with a mean yield of 3520 kg/ha in Br-25a was promising hybrid in North zone.
- In the initial evaluation trial of hirsutum under organic condition, GSHV 271 was the best in Central zone and TCH 2001 was the best in South zone in Br-02c.
- In the initial evaluation trial of *G. arboreum* cultures, DAS 2451 was the best yielder with 1700 kg/ha in Central Zone and JLA 1913 was the best in South Zone with 1671 kg/ha.
- In the preliminary desi hybrid trial of central zone (Br-25b), none of the test entries showed promise.
- In the initial evaluation trial of *G. herbaceum*, GVhv 1338 was the best for yield with 1287 kg/ha.
- In Central Zone trials, among the coloured genotype 16301 DB was the best recording a mean seed cotton yield of 1476 kg/ha in Br-03 CC and have been promoted to coordinated trials.
- Among *G. hirsutum* cultures evaluated in organic conditions, all the cultures were showing Bt positive reactions and hence they were rejected.
- Among the hirsutum hybrids in organic conditions, KGHH-bio-2409 recorded the highest yield, whereas the hybrid GSHH 08/2019 was Bt positive and hence it was not considered.
- Similarly, among *G. arboreum* cultures, white linted JLA 1707 recorded the highest mean seed cotton yield of 1550 kg/ha in Br-24b.
- In South Zone trials, among coloured *hirsutum* genotypes, FC 4003 was the best for yield in Br-03 CC.
- In organic trials of G. hirsutum (both varieties and hybrids), no test cultures were better than check varieties.
- Among ELS barbadense cultures, CCB 22-2 with a mean seed cotton yield of 895 kg/ha was the best in Br-14a.
- In rainfed conditions, among arboreum cultures, CNA 1084 was the topper recording a mean seed cotton yield of 1515 kg/ha in Br-24b.
- In the pre-breeding activities, new crosses between cultivated species and wild species were attempted in different participating centres and different degree of success was reported.
- Introgressed segregating lines with different target characters were shared among the participating centres and their performance is reported.
- Similarly, the shared introgression lines were utilized as donor parents for target characters and crossed with agronomically superior varieties in participating centres.

CROP PRODUCTION

- Optimization of spacing and nutrient requirement is the pre-requisite for releasing of promising genotypes. Hence, agronomic requirements of pre-released arboreum hybrids KR-152 and CISAA 19-4 in North Zone, pre-released *G. arboreum* variety JLA 1204 and CAN 20402 in Central Zone and DDCC 2151 in South Zone were worked out.
- Agronomic requirement studies for sixty-two pre released genotypes comprised fifty-seven intra hirsutum Bt hybrids, three interspecific Bt hybrids and four hirsutum varieties were conducted as per the proposed environment
- In ELS cotton studies for assessing the performance of barbadense genotypes at Chamarajnagar, higher seed cotton yield was harvested in CICR B-45 than Suvin.
- Trails on Conservation agriculture in North zone revealed that 100% wheat residue incorporation by rotavator followed by sowing of cotton in kharif and 100% cotton residue incorporation after picking + sowing of wheat crop through Super seeder in one go during rabi registered higher seed cotton yield @ 16.3 and 31.3 percent and 33.0 and 20.4 per cent higher wheat grain yield respectively at Faridkot and Bathinda in cotton – wheat rotation.
- Yield maximization trial found that 35 per cent higher seed cotton yield was recorded in the package of Closer planting + Detopping + Pruning of monopodia +Two sprays of mepiquat chloride @ 25 g a.i. at 45 and 60 DAS +Drip fertigation + straw/crop residue mulch @5 t/ha at Bathinda (2573 kg/ha).
- Maximum Seed cotton yield was realised in Surat with adopting closer 90 x 30 cm + Detopping at 100 cm height +Two sprays of Mepiquat chloride @ 25g a.i. at 45 and 60 DAS (2819 kg/ha). In Junagadh, detopping at 100 cm height + pruning of monopodia at 45 DAS + two sprays of mepiquat chloride @ 25 g a.i. at 45 and 60 DAS + poly mulch was promising.
- Package that included Closer planting + Detopping + Pruning of monopodia + Two sprays of mepiquat chloride @ 25 g a.i. at 45 and 60 DAS +Drip fertigation+ polymulch was identified as yield maximization techniques for Rahuri (5138 kg/ha), Coimbatore (2426 kg/ha) and Srivilliputhur (2585 kg/ha)
- Rainfed trial of yield maximization found that 46.29, 48.67, 39.13 and 39.24 percent of higher seed cotton yield was realized by adopting of Closer planting +Detopping at 100 cm height + Pruning of monopodia at 45 DAS + Two sprays of Mepiquat chloride @ 25 g a.i. at 45 and 60 DAS at Akola (2879 kg/ha), Bhawanipatna (3824 kg/ha), LAM (2784 kg/ha) and Chamrajnagar (2019 kg/ha) respectively.
- In Nandyal 30.9 % higher seed cotton yield (2296 kg/ha) was registered with Closer planting +Detopping at 100 cm height + Two sprays of Mepiquat chloride @ 25 g a.i. at 45 and 60 DAS.

Closer planting +Detopping at 100 cm height + Pruning of monopodia at 45 DAS recorded 39.6 % higher seed cotton yield in Nanded (3425 kg/ha)

- Drought management strategy of Broad Bed Furrow with Glycine Betaine @100 ppm spray after depletion of 75 % soil moisture was promising at Dharwad (1784 kg/ha) and Bhawanipatna (2661 kg/ha).
- Adoption of Broad Bed Furrow with Salicylic acid @100ppm spray after depletion of 75 % soil moisture performed well in Akola (2810 kg/ha). In Khandwa (1870 kg/ha) and Chamrajnagar (1868 kg/ha), the results revealed that Ridges & Furrow with Salicylic acid @ 100 ppm single Spray after depletion of 75 % soil moisture was promising
- Land configuration of Broad Bed furrow followed by application of 20 kg/ha extra nitrogen and potassium after drainage of water logging field identified as waterlogging management techniques in Bathinda (2061 kg/ha), Junagadh (3545 kg/ha), Rahuri (2778 kg/ha). In Surat, land configuration with ridges and furrow and application of extra 20 kg/ha of nitrogen and potassium after drainage of water logging field out performed (1974 kg/ha).
- The results of Canopy management trial found that application of mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based) with Detopping registered 34.40, 29.33, 36.45, 23.7, 38.93, 21.35 and 26.9 percent higher seed cotton yield and reduced the plant height to 30.0, 29.7, 27.1, 4.30, 28.7, 24.0 and 36.8 per cent respectively in Sriganganagar, Junagadh, Bhawanipatnam, Khandwa Nandyal , Srivilliputhur and Raichur .
- Mepiquat chloride@45ppm at square initiation and 15 days after first spray + Detopping recorded 45.89, 13.7, 16.4,21.3,18.1and 36.8 percent higher seed cotton yield and reduced plant height to 11.7, 52.9,20.6, 27.3, 22.8 and 24.42 percent Rahuri, Nanded, Akola, Dharwad, Coimbatore and Chamrajnagar respectively
- Management of square shedding in cotton studies revealed that shedding percentage was reduced to 59.1 per cent and Seed cotton yield was increased of 12.0 per cent with IAA @25ppm+ kinetin@20ppm (955 kg/ha) in Bathinda. In Dharwad, the seed cotton yield (kg/ha) was increased to 31.4 % by Silver thiosulphate@7.5µM (2562 kg/ha) with fruit shedding percentage reduced to 19.7 %. In Sirsa, Glycine betaine @ 3 g /ha increased the yield at the rate of 27.4 % and reduced the fruit shedding to 38.6 %. IAA @25 ppm + kinetin @ 20 ppm application increased the yield @ 12.0 percent with fruit shedding percentage reduced to 11.9 % in Surat
- Drone application of KNO3 revealed that 8 % concentration is comparable with manual application of 2% KNO_3 in Surat and Dharwad
- Detopping on the 20th node performed well at Surat (911 kg/ha) and Homobrassinolide@0.2 ppm at 45 & 60 DAS along with Detopping on 20th node performed well at Dharwad (1294 kg/ha) with respect to late sown arboreum.

- Genotypes, HAU Bt 11 and HAU Bt 12 identified for drought tolerance in Hisar. Crude oil, crude protein and gossypol content decreased significantly under drought conditions in all the genotypes in Hisar. H 1353, HAU Bt 11 and HAU Bt 12 genotypes performed better under salinity condition in Hisar.
- Lower gossypol content was found in G. Cot-16 and GISV-419(0.65 %) under irrigated conditions. In rainfed conditions, GISV-419 and LRA-5166 showed lower gossypol. The highest protein content was observed in LRA-5166 (19.92%) in rainfed conditions in Surat
- Higher ethylene concentration (0.166) was found with Thidiazuron @500 ppm+ Diuron @400ppm (T10) spray, leading to the degradation of chlorophyll content in defoliant experiments. Low content of H_2O_2 and MDA in treatments sprayed with salicylic acid @ 0.5 mM indicated the recovery of plant from water logged conditions.
- Mepiquat chloride@45ppm at square initiation and 15 days after first spray followed by Detopping showed higher phenol content.
- Primary metabolites (carbohydrates and protein) secondary metabolites (tannin, phenols and flavonoid) were significantly increased by the application of salicylic acid @ 100 ppm and Glycine Betaine @ 100 ppm spray for drought management in Dharwad
- Significant positive correlation with phenol content with locule damage and green boll damage observed
- Biochemical parameters like Protein, Reducing sugar, Phenol, Tannin, Flavanol were increased in all the parts of the plants at peak periods of pink boll infestation in Dharwad

CROP PROTECTION-ENTOMOLOGY

Screening of breeding materials for resistance to insect-pests:

- **Promising sucking pest tolerant entries in preliminary screening (National & Zonal Trials)**

  - **North zone-** In *Arboreum* cotton, for leafhopper, 04 entries; for whitefly, 05 entries; for thrips, 06 entries were identified as highly resistant/tolerant.
  - **Central zone-** In *Hirsutum* cotton, for leafhopper, 11 entries; for whitefly, 16 entries; for thrips, 10 entries were identified as highly resistant/resistant and tolerant. In *Arboreum* cotton for leafhopper, 08 entries; for whitefly 08 entries; for thrips, 06 entries were identified as highly resistant/resistant and tolerant. In *Barbadense* cotton for leafhopper 01 entry; for whitefly, 01 entry; for thrips 01 entry was identified as highly resistant/resistant and tolerant.
  - **South zone**- In *Hirsutum* cotton, for leafhopper, 10 entries; for thrips, 06 entries were identified as highly resistant/resistant and tolerant. In *Arboreum* cotton for leafhopper, 05 entries; for whitefly

05 entries; for thrips, 05 entries were identified as highly resistant/ tolerant. In *Barbadense* cotton for leafhopper 01 entry; for whitefly, 01 entry was identified as highly resistant/resistant and tolerant.

- **Promising sucking pest & bollworm tolerant entries identified for development of repository through advance screening**

  - **North zone**- For leafhopper, 05 entries; for whitefly, 10 entries; for thrips, 01 entry were found promising.
  - **Central zone**- For leafhopper, 02 entries and for thrips, 01 entry were found promising.
  - **South zone**- For leafhopper, 02 entries were found promising; and South zone- 01 entry for PBW was found promising.

- **Promising sucking pest tolerant entries identified for development of repository through advance screening and basis of resistance/tolerance**

  - **North zone**- For whitefly, 08 entries and for thrips, 02 entries were found promising.
  - **Central zone**- For leafhopper, 08 entries and for thrips, 04 entries were found promising.
  - **South zone**- For leafhopper, 11 entries were found promising.

- **Seasonal dynamics of key pests in relation to climatic conditions** recorded at North, Central and South zone centres on N-*Bt* and *Bt* genotypes under unprotected conditions indicated that in case of Sucking pests (Non-*Bt* and *Bt*).

  - **Leafhopper**- In North zone, peak activity was recorded during 27th-32nd SMW except Faridkot (36th SMW) with a range of 0.00-14.40 jassid/3 leaves; in Central zone, 36th-46th SMW but at most of the locations it peaked between 42nd-46th SMW with a range of 0.00-33.30 jassid/3 leaves and between 39th-49th SMW; in south zone but at most of the locations it peaked between 46th-49th SMW with a range of 0.00-31.30 jassid/3 leaves.
  - **Thrips**- in North zone peak activity was recorded during 29th-30th SMW with a range of 0.00-213.00 thrips/3 leaves, in Central zone peaked between 30th-43rd SMW but at most of the locations it was between 38th-41st SMW with a range of 0.00-49.60 thrips/3 leaves and peak activity between 38th-48th SMW, in south zone but it was between 38th-41st SMW at most of the locations with a range of 0.00-88.40 thrips/3 leaves.
  - Whitefly- In North zone, peak activity was recorded during 29th SMW at most of the locations except, Hisar (39th SMW) & Sriganganagar (36th SMW) with a range of 0.53-120.90 whitefly/3 leaves;,37th-52nd SMW in central zone and at most of the locations it was between 40th-47th SMW with a range of 0.00-36.30 whitefly/3 leaves and peaked between 37th-51st SMW; in south zone but it was between 40th-45th SMW at most of the locations with a range of 0.00-48.87 whitefly/3 leaves.

- **Aphids**- peak activity in central zone was recorded during 30th-52nd SMW but at most of the locations it was between 51st-52nd SMW with a range of 0.00-117.65 aphids/3 leaves and between 34th-51st SMW with a range of 0.00-85.00 aphids/3 leaves in South zone.
- **Natural Enemies**- Maximum population was recorded during 29th-33rd SMW at all the locations except Sriganganar (38th SMW) with a range of 0.00-25.50 predators/plant in North zone, highest population recorded between 49th-52nd SMW at majority locations of central zone with a range of 0.00-7.80 predator/plant and between 35th-38th SMW at majority locations of South zone with a range of 0.00-5.56 predator/plant.

➢ **Bollworms dynamics (non-*Bt*)**

- **North zone**- Negligible population and damage to fruiting bodies due to *Earias* spp. & *H. armigera* were recorded. Pink bollworm larval recovery & green boll damage (%) ranged between 0.00-20.00/50 green bolls & 0.00-27.00 percent respectively and were maximum at Sirsa.
- **Central zone**-larval population of *H. armigera, Earias* spp., & *S. litura* ranged between 0.00-2.20/5 plants, 0.00-3.25/5 plants & 0.00-2.00/5 plants, respectively. Fruiting body damage & green boll damage due to bollworms other than PBW ranged between 0.00-28.55 & 0.00-15.00 percent, respectively. Rosette flowers (%) due to PBW, larval recovery of pink bollworm (Nos.) and green boll damage (%) ranged between 0.00-23.83 percent (Highest at Nanded), 1.63-17.64/50 green bolls (Maximum at Akola) & 10.67-40.20 percent (Highest at Khandwa), respectively.
- **South zone**-larval population of *H. armigera, Earias* spp., & *S. litura* ranged between 0.00-5.20/5 plants, 0.00-1.33/5 plants & 0.00-1.00/5 plants, respectively. Fruiting body damage (%) ranged between 0.00-60.65. Rosette flowers due to pink bollworm, pink bollworm larval recovery (Nos) & green boll damage were recorded with a range of 0.00-39.30 percent, 8.01-28.25/50 green bolls & 7.41-66.88 percent highest at Raichur, respectively.

➢ **Bollworms dynamics (*Bt*)**

- **North zone**-pink bollworm larval recovery (Nos) & green boll damage (%) ranged between 0.00-12.50/50 green bolls&0.00-21.00 percent respectively and were maximum at Sirsa.
- **Central zone**- larval population of *H. armigera, Earias* spp., & *S. litura* ranged between 0.00-0.60/5 plants, 0.00-0.90/5 plants & 0.00-1.20/5 plants, respectively. Fruiting body damage (%) & green boll damage (%) due to bollworms other than PBW ranged between 0.00-21.75 & 0.00-3.47 percent, respectively. Rosette flowers (%) due to PBW, larval recovery of pink bollworm (Nos) and green boll damage (%) ranged between 0.00-20.00 percent (Highest at Nanded), 2.00-15.42/50 green bolls (Maximum at Akola) & 3.00-37.50 percent (Highest at Khandwa), respectively.
- **South zone**-larval population of *H. armigera, Earias* spp., &*S. litura* ranged between 0.00-1.44/5 plants, 0.00-0.10/5 plants & 0.00-1.11/5 plants, respectively. Fruiting body damage (%) ranged between 0.00-42.41 percent. Rosette flowers (%) due to PBW, pink bollworm larval recovery (Nos) & green boll damage (%) were recorded highest at Raichur with a range of 0.00-34.71 percent, 3.85-23.22/50 green bolls & 2.90-43.49 percent, respectively.

- **Farmers' Field Survey** on key and emerging pests to issue weekly advisory.

  - **North zone**- Out of total 2234 surveyed locations, whitefly crossed ETL at 771 (34.51%); PBW at 456 (20.41%); Thrips at 278 (12.45%) & Leafhopper at 101 (4.52%) locations. Whitefly and pink bollworm were the key yield limiting pests during the season.
  - **Central zone**- Out of total 3699 locations surveyed, PBW crossed ETL at 880 (23.79%) locations; Aphids at 597 (16.14%) locations; Leafhopper at 478 (12.92%) locations; Thrips at 448 (12.11%) locations; Whitefly at 148 (4.00%) locations; Shoot weevil at 39 (1.05%) locations, *S. litura* at 12 (0.32%) locations & Mirid bugs at 08 (0.22%) locations. Pink bollworm and aphids were the key yield limiting pests during the season.
  - **South zone**- Out of total 3704 locations surveyed, PBW crossed ETL at 473 (12.77%) locations; Leafhopper at 435 (11.74%) locations; Thrips at 266 (7.18%) locations; Aphids at 85 (2.29%) locations; Mirid bugs at 68 (1.84%) locations; *S. litura* at 22 (0.59%) locations; Shoot weevil at 19 (0.52%) locations and Whitefly at 10 (0.27%) locations. Pink bollworm and leafhopper were the key yield limiting pests during the season.

- **In Evaluation of persistence of insecticides against PBW**

  - **North zone**-In North Zone, study revealed variations in insecticide persistence wherein at Sirsa, profenophos and at Hisar & Faridkot, spinetoram showed highest persistence. At Bathinda, emamectin benzoate had the highest persistence.
  - **Central zone**- In Field-cum-laboratory studies in the zone revealed varying insecticide persistence across different locations. Chlorantraniliprole at Akola, spinetoram at Junagadh, emamectin benzoate at Nanded, profenofos at Surat were most persistent insecticides for management of pink bollworm.
  - **South zone**- Field and pot-cum-laboratory studies in the zone revealed variations in insecticide persistence across locations. At Dharwad, cypermethrin & bifenthrin, at Coimbatore & Lam guntur, Chlorantraniliprole & spinetoram, at Raichur, fenpropathrin & cypermethrin showed the highest persistence. Similar trends were observed at higher application doses (10% & 25% above field dose) and under pot-cum-laboratory conditions.

- **Evaluation of persistence of insecticides against insect- pests of cotton (through conventional & drone application)**

  - **Central zone**- At majority of the locations, the different insecticide applied both through drone and conventional method was statistically non-significant to each other. But at Junagarh and Nagpur insecticide application with drone was more effective than conventional application. Among the tested insecticides, flonicamid in both drone and conventional application technique followed by profenophos in drone application technique and diafenthiuron in conventional application technique were most effective for sucking pests. Spinetoram was the most effective insecticide for PBW followed by emamectin benzoate in both drone and conventional application techniques.

Phytotoxicity was also observed at Nagpur when insecticides (profenofos & quinalphos) applied through drone in both field dose and more than 10 percent of field dose.

- **South zone**-Drone application provided better pest reduction than conventional spraying. Among the tested insecticides, spinetoram & diafenthiuron showed promising results in management of sucking pests in both drone and conventional method of application. Similarly in case of PBW, spinetoram followed by chlorpyriphos were found better in drone method of insecticides application whereas in conventional spraying, emamectin benzoate followed by profenophos were the most effective insecticide.

➢ **To Evaluate and identify suitable interventions for seed treatment in organic cotton production.**

- **North zone**-For all the sucking pests i.e. whitefly, leafhopper & thrips treatment T-10 (Seed treatment with insecticide) was found to be most effective. However, among non-chemical interventions T-7 (*Beauveria bassiana* + *Pseudomonas fluorescens*) was found most effective for whitefly, leafhopper& thrips at majority of the North zone locations.
- **Central zone**- For all the sucking pests i.e. whitefly, leafhopper & thrips treatment T-10 (Seed treatment with insecticide) was most effective. However, among the non-chemical methods, treatment T-3 (*Beauveria bassiana*) was most effective followed by T-1 (Soil application of neem cake) & T-2 (*Pseudomonas fluorescens*).
- **South zone**- For all the sucking pests i.e. whitefly, leafhopper & thrips treatmentT-10 (Seed treatment with insecticide) was most effective. However, among the non-chemical methods, treatment T-2 (*Pseudomonas fluorescens*) & T-6 (*Lecanicillium lecanii + Pseudomonas fluorescens*) were most effective followed by T-7 (*Beauveria bassiana + Pseudomonas fluorescens*).

➢ **Validation of IPM module based on existing interventions for organic cotton production**

- **North zone**- Module 4 (IPM) recorded lowest pest population and Module 1 (Completely on-farm resources) recorded highest predator's population. Among the three organic modules, Module 3 {Intensive Module, 30% on-farm, 70% off-farm external inputs (cost basis)} recorded with comparatively less insect-pest incidence.
- **Central zone**- Module 4 (IPM) recorded lowest pest population and gave highest yield. Module 1 (Completely on-farm resources) recorded highest predator's population. Among the three organic modules, Module 2 (LEISA module -low external 30% input sustainable model) recorded comparatively less insect-pest incidence.
- **South zone**- Module 4 (IPM) & Module 5 (FP) recorded lowest pest population and among the three organic modules, Module 3 {Intensive Module, 30% on-farm, 70% off-farm external inputs (cost basis)} recorded with comparatively less insect-pest incidence and gave the highest yield.

➢ **Evaluation of Mak Adjovol (Mineral & Paraffin Oil) as adjuvant with insecticides in all zones.**

- **For whitefly-** Flonicamid 50 WG + MakAdjuvol@1.5% was found to be most effective.
- **For thrips**- Spinetoram 11.7 SC + MakAdjovol@1.5%was found to be most effective.

- **For leafhopper-** Flonicamid 50 WG + MakAdjuvol@1.5% was found to be most effective.
- **For Aphid-** Flonicamid 50 WG + MakAdjuvol@1.5% was found to be most effective.
- MakAdjovol@ 0.75% & 1.5% added with insecticides has improved the efficacy up to some extent in comparison to insecticide application without adjovol.

➢ **Impact of Agronomic intervention on insect pest dynamics under HDPS**

- **North zone**- HDPS with IPM consistently recorded the lowest pest populations, least boll damage and the highest fruiting body retention at different locations. Similarly, the highest yield was observed in HDPS with IPM.
- HDPS (90x15cm) recorded lowest sucking pest population followed by IPM applied HDPS + De-topping (Sirsa). Lowest green boll damage (%) due to PBW was recorded in IPM applied De-topping at majority locations. While fruiting body retention was highest in cyclanilide + MC followed by De-topping (Sirsa) along with IPM interventions. Highest yield was obtained from IPM intervened HDPS + De-topping treatment.
- **Central zone**- HDPS with IPM consistently recorded the lowest pest population, least green boll damage due to PBW compared to HDPS alone. Similarly, fruiting body retention was significantly higher and highest yield was also obtained from HDPS with IPM.
- Among all canopy management treatments related to HDPS, De-topping was the most effective treatment in reducing the pest population & green boll damage (%) due to PBW. While highest fruiting body retention was recorded in IPM applied HDPS + chlormequat chloride. Among individual interventions of canopy management highest yield was obtained from IPM applied HDPS + De-topping treatment.
- **South zone**- HDPS with IPM consistently recorded lower pest populations compared to HDPS alone at majority locations. HDPS with IPM also resulted in lowest green boll damage (%) due to PBW, higher fruiting body retention and higher yield.
- Among all canopy management treatments related to HDPS, De-topping was the most effective treatment in reducing the pest population & green boll damage (%) due to PBW followed by cyclanilide + MC. While highest fruiting body retention was recorded in HDPS + chlormequat chloride along with HDPS. Highest yield was obtained from IPM applied HDPS + De-topping treatment.

CROP PROTECTION: PLANT PATHOLOGY

➢ **Cotton disease surveillance** conducted in **364 villages** (5-10 fields in each) **of 42 districts in 9 cotton growing states** covering all cotton growing zones of India revealed that the major diseases observed during 2024-25 are:

- **North Zone**: CLCuD was low in Haryana (17.7%) and Rajasthan (19.1%), severe in Punjab (35.8%) and root rot was low in Haryana (0.4-4.9%) during mid-and late-seasons.

- **Central Zone**: Grey mildew was moderate in Maharashtra (12.9%), Gujarat (11.6%) and Madhya Pradesh (12.3%). Bacterial leaf blight (BLB) was moderate in Maharashtra (9.6%) and slightly high in Gujarat (11.6%). *Alternaria* leaf spot (ALS) was moderate in Maharashtra (9.6%) and Gujarat (7%). Para wilt was low in Gujarat (5.9%) during mid-season. Target leaf spot (CoLS) was low in Gujarat (1.3%) and moderate in Madhya Pradesh (9.5%) in late season while boll rot was low in Maharashtra (1.2%) and moderate in Gujarat (7.6%)
- **South Zone***:* Grey mildew was moderate in Karnataka (10.2%) and Tamil Nadu (10.7%). ALS was moderate in Tamil Nadu (9%) and Karnataka (16.7%). BLB was moderate in Karnataka (7.5%) and to slightly high in Tamil Nadu (11.9%). Root rot was moderate in Tamil Nadu (8.7%), whereas boll rot was moderate in Tamil Nadu (5.1%) and slightly higher in Karnataka (13.1%).

- **Disease progress in relation to weather parameters** studied at on-station trials conducted and the regression equations developed and validated with the previous year's models.

- **Disease screening trials:** A total of 150 entries were evaluated under 15 National (5) and Zonal (10) trials showed different reactions against location-specific diseases. However, 14 genotypes including *G. hirsutum* (11), *G. barbadense* (2), *G. arboreum* (1) showed single and or multiple diseases resistance against CLCuD, ALS, BLB, GM and CoLS under confirmation field and artificial screening trials.

- **Multilocation field trials** were conducted and promising disease management treatments were recorded are-

  - Among endophytic BCAs, their combinations and recommended chemicals evaluated for management of seed and soil-borne diseases at 8 centers, the application of consortium ECN-1 @ 5g/kg seed + foliar spray @ 5g/lit water at 60 and 90 DAS was found superior compared to other treatments for root rot and foliar disease management.
  - Among six chemical treatments evaluated for management of TSV and its vector-thrips at three centers, the maximum reduction in TSV disease was recorded with need based spray applications of Tolfenpyrad 15 % EC (1000 ml/ha) followed by Spinetoram 11.70 % SC (420 ml/ha)and Dinotefuron 20 SG (150g/ha).
  - Among the 11 CIB&RC recommended chemicals evaluated as a spray application for the management of foliar diseases at Sriganganagar, Nanded, Khandwa and Coimbatore comparatively better treatments over control are:
  - **Bacterial leaf blight**- Copper sulphate 47.15% + Mancozeb 30% WDG @ 5 g/ liter of water, Fluxapyroxad 167 g/liter + Pyraclostrobin 333 g/liter SC @ 0.6 g/liter of water at Coimbatore.
  - **Alternaria leaf spot**- Fluxapyroxad 167 g/liter + Pyraclostrobin 333 g/liter SC @ 0.6 g/liter of water and Metiram 55% + Pyraclostrobin 5% WG @ 2 g/liter and Azoxystrobin + Difenoconazole @1 ml/L of water at Nanded and Coimbatore

- **Grey mildew**- Fluxapyroxad 167 g/liter + Pyraclostrobin 333 g/liter SC @ 0.6 g/liter, Kresoxim methyl 44.3% SC @ 1 ml/liter of water and Metiram + Pyraclostrobin@.2g/L and of water at Khandwa, Nanded and Coimbatore.
- **Target leaf spot-** Fluxapyroxad 167 g/liter + Pyraclostrobin 333 g/liter SC @ 0.6 g/liter of water and Azoxystrobin 18.2% w/w + Difenoconazole 11.4% w/w SC @ 1 ml/ liter of water at Khandwa
- **Boll rot**- Fluxapyroxad 167 g/Liter + Pyraclostrobin 333 g/Liter SC @ 0.6 g/L, Metiram 55% + Pyraclostrobin 5% WG @ 2 g/liter, and Propineb 70% WP @ 2.5 g/liter and Copper oxychloride @2.5 g/L of water at Sriganganagar, Khandwa, Nanded and Coimbatore

➢ **Crop loss estimation studies were conducted at on-station trials:** The average reduction of seed cotton yield (SCY) corresponding to CLCuD severity grades was estimated to be grade 1, 2, 3, 4, 5 and 6 was 7.8, 21.1, 37.4, 49.5, 53 and 80.2%, respectively in Haryana, Rajasthan and Punjab. The SCY reduction corresponding with TSV grades 1, 2, 3 and 4 was 29.5, 49.8, 53.1 and 41.7%, respectively in Rahuri, Guntur and Coimbatore.

➢ **Concluded Experiments/Recommendations**

- The pooled results of three year trails conducted at TNAU, Coimbatore (2022-23-2024-25) depicted need based spray application of Propineb 70% WP @ 2.5 g/liter, Fluxapyroxad + Pyroclostrobin @0.6 g/L and Azoxystrobin + Difenoconazole @1 ml/L of water was found promising that for *Alternaria* leaf blight management, while, for grey mildew management Kresoxim methyl 44.3% SC @ 1 ml/liter, Azoxystrobin + Difenoconazole @1 ml/L and Fluxapyroxad + Pyroclostrobin @0.6 g/L of water were found better than other treatments. Copper sulphate 47.15% + Mancozeb 30% WDG @ 5 g/ liter, Fluxapyroxad + Pyroclostrobin @0.6 g/L and Copper oxychloride @2.5 g/L of water for bacterial leaf blight and Fluxapyroxad + Pyroclostrobin @0.6 g/L, Metiram + Pyraclostrobin @2 g/L and Azoxystrobin + Difenoconazole @1 ml/L for minimizing boll rot diseases were found superior treatments at Coimbatore, Tamil Nadu.
- The pooled results of three year field experiments conducted at 8 centers in all 3 zones for management of seed and soil-borne diseases (2022-23-2024-25) showed that the highest reduction in plant mortality (65.7,62.7%) at 120 DAS was achieved with treatment T-5, 6 (*Trichoderma* spp. Rf-B/Th-11 as seed (5g.kg)+ soil treatment (1kg. acer) and foliar spray (2 ml/L) plus Mak Adjuvol @1.5% or 0.75% at 60 and 90 DAS) followed by T-4 (*Trichoderma* spp. Rf-B/Th-11 as seed + soil treatment and foliar spray at 60 and 90 DAS) and T-3 (*Trichoderma* spp. -Rf-B/Th-11 as seed + soil treatment). The seed germination ranged from 87.2 to 88% in treatment T-3 to T-7 (seed and soil treatment with *Trichoderma* spp. Rf-B/Th-11).

Crop Improvement Results

North Zone Trials

Br. 22a – Initial Evaluation Trial of *G. arboreum* (Irrigated)

Seed Cotton Yield (Kg/ha)

S. No.	1st Code	2nd Code	Entry	Sriganga-nagar	Faridkot	Bathinda	Hisar	Sirsa (CICR)	Mean NZ	Rank
1	10	401	CISA6-11	2866	251	1542		1449	**1527**	13
2	4	402	PBD 161	3183	3519	3804		2239	**3186**	1
3	13	403	**Local Check**	1891	3362	2858		2580	**2673**	8
4	1	404	RG 944	2675	2654	2069		1889	**2322**	10
5	7	405	PBD 166	3133	2905	3764		2634	**3109**	2
6	8	406	FDK 421	2276	3926	2785		2914	**2975**	4
7	11	407	RG 945	2267	2004	1289		1926	**1872**	12
8	3	408	FDK 354	2622	3498	3098		2663	**2970**	5
9	9	409	HD 584	2709	2819	2074		1716	**2330**	9
10	12	410	FDK 431	2682	3827	2367		1905	**2695**	6
11	6	411	HD 579	2918	3716	2689		2905	**3057**	3
12	2	412	**ZC (FDK 124)**	2826	3115	2727		2108	**2694**	7
13	5	413	CISA 8-1	2760	3498	1305		1477	**2260**	11
			CD @ 5 %	486	383	307		289		
			CV %	11	7.2	7.3		8		
			Local Checks	**RG 542**	**LD 949**	**LD 949**	**HD 432**	**CISA 310**		

- *Vitiated

Br. 22a – Initial Evaluation Trial of *G. arboreum* (Irrigated)

Lint Yield (kg/ha)

S. No.	1st Code	2nd Code	Entry	Sriganga-nagar	Faridkot	Bathinda	Sirsa (CICR)	Mean NZ
1	10	401	CISA6-11	1090	90	572	497	**562**
2	4	402	PBD 161	1205	1359	1467	806	**1209**
3	13	403	**Local Check**	649	1302	1096	955	**1001**
4	1	404	RG 944	934	1005	754	667	**840**
5	7	405	PBD 166	1165	1138	1467	922	**1173**
6	8	406	FDK 421	777	1511	1010	1000	**1075**
7	11	407	RG 945	810	759	450	687	**677**
8	3	408	FDK 354	985	1360	1112	941	**1100**
9	9	409	HD 584	973	1034	715	612	**834**
10	12	410	FDK 431	1001	1520	909	717	**1037**
11	6	411	HD 579	1013	1458	1069	1123	**1166**
12	2	412	**ZC(FDK 124)**	1020	1207	1024	801	**1013**
13	5	413	CISA 8-1	961	1403	485	566	**854**

Ginning outturn (%)

S. No.	1st Code	2nd Code	Entry	Sriganga-nagar	Faridkot	Bathinda	Sirsa (CICR)	Mean NZ
1	10	401	CISA6-11	38.0	35.6	37.1	34.3	**36.3**
2	4	402	PBD 161	37.9	38.5	38.6	36.0	**37.8**
3	13	403	**Local Check**	34.3	38.7	38.3	37.0	**37.1**
4	1	404	RG 944	34.9	37.8	36.4	35.3	**36.1**
5	7	405	PBD 166	37.2	39.2	39.0	35.0	**37.6**
6	8	406	FDK 421	34.1	38.5	36.3	34.3	**35.8**
7	11	407	RG 945	35.7	37.9	34.8	35.7	**36.0**
8	3	408	FDK 354	37.6	38.9	35.9	35.3	**36.9**
9	9	409	HD 584	35.9	36.7	34.4	35.7	**35.7**
10	12	410	FDK 431	37.3	39.7	38.4	37.7	**38.3**
11	6	411	HD 579	34.7	39.2	39.7	38.7	**38.1**
12	2	412	**ZC(FDK 124)**	36.1	38.7	37.5	38.0	**37.6**
13	5	413	CISA 8-1	34.8	40.1	37.2	38.3	**37.6**

Br. 22a – Initial Evaluation Trial of *G. arboreum* (Irrigated)

Bolls/plant

S. No.	1st Code	2nd Code	Entry	Sriganga-nagar	Faridkot	Bathinda	Sirsa (CICR)	Mean NZ
1	10	401	CISA6-11	32.0	34.7	57.8	25.8	**37.6**
2	4	402	PBD 161	34.0	53.3	72.4	32.5	**48.1**
3	13	403	**Local Check**	25.0	50.3	53.8	35.0	**41.0**
4	1	404	RG 944	30.0	44.0	53.3	29.2	**39.1**
5	7	405	PBD 166	41.0	39.6	70.0	32.9	**45.9**
6	8	406	FDK 421	23.0	52.2	60.6	37.3	**43.3**
7	11	407	RG 945	33.0	40.7	51.1	29.3	**38.5**
8	3	408	FDK 354	37.0	43.1	55.4	35.1	**42.7**
9	9	409	HD 584	31.0	45.9	46.4	28.2	**37.9**
10	12	410	FDK 431	30.0	48.9	57.7	28.3	**41.2**
11	6	411	HD 579	32.0	46.4	49.1	38.4	**41.5**
12	2	412	**ZC(FDK 124)**	29.0	38.1	48.7	28.8	**36.2**
13	5	413	CISA 8-1	36.0	43.1	59.0	29.5	**41.9**

Boll weight (g)

S. No.	1st Code	2nd Code	Entry	Sriganga-nagar	Faridkot	Bathinda	Sirsa (CICR)	Mean NZ
1	10	401	CISA6-11	2.2	2.6	2.1	1.9	**2.2**
2	4	402	PBD 161	2.4	2.9	2.8	2.2	**2.6**
3	13	403	**Local Check**	2.2	2.7	2.2	2.1	**2.3**
4	1	404	RG 944	2.0	2.7	2.7	2.2	**2.4**
5	7	405	PBD 166	2.1	2.3	2.7	2.3	**2.4**
6	8	406	FDK 421	2.4	2.5	2.6	2.3	**2.5**
7	11	407	RG 945	2.2	2.1	2.5	2.2	**2.3**
8	3	408	FDK 354	2.0	2.6	2.6	2.1	**2.3**
9	9	409	HD 584	2.4	2.8	2.3	2.3	**2.5**
10	12	410	FDK 431	2.3	2.6	2.7	2.0	**2.4**
11	6	411	HD 579	2.3	2.7	2.6	2.4	**2.5**
12	2	412	**ZC(FDK 124)**	2.2	2.3	2.6	2.1	**2.3**
13	5	413	CISA 8-1	2.0	2.7	2.5	2.1	**2.3**

Br 25a/b – Preliminary Hybrid Trial of Desi Hybrid

Seed Cotton Yield (Kg/ha)

S. No.	1st Code	2nd Code	Name of the entry	Sriganganagar	Bathinda	Hisar	Sirsa (CICR)	Arya Nagar (Shakti Vardhak)	Mean NZ	Rank
1	28	421	GVDH 111/22	1961	759		1150	1214	**1271**	8
2	22	422	CISAA 23-2	3768	3592		2354	3292	**3252**	3
3	25	423	CISAA 23-3	3065	3029		2749	3066	**2977**	5
4	29	424	**Local Check**	2370	3592		1864	2675	**2625**	6
5	21	425	KR 166	3552	3130		2626	3737	**3261**	2
6	24	426	GVDH 145/22	1859	258		1272	453	**961**	9
7	27	427	ZC (KR 64-NZ)	3612	3724		2868	3107	**3328**	1
8	23	428	AAH 51	3429	2447		3233	3284	**3098**	4
9	26	429	**AAH 53**	2826	1651		1401	3066	**2236**	7
			CD @ 5 %	466	400		241	461		
			CV %	10	9		6	10		
			Local Checks	**RAJ DH. 9**	**FMDH 9**	**AAH 1**	**CICR-2**	**AAH 1**		

*Vitiated

Lint Yield (kg/ha)

S. No.	1st Code	2nd Code	Name of the entry	Sriganganagar	Bathinda	Sirsa (CICR)	Arya Nagar (Shakti Vardhak)	Mean NZ
1	28	421	GVDH 111/22	651	224	362	353	**398**
2	22	422	CISAA 23-2	1344	1386	906	1294	**1233**
3	25	423	CISAA 23-3	1094	1194	1087	1161	**1134**
4	29	424	**Local Check**	825	1272	743	1038	**970**
5	21	425	KR 166	1322	1196	1024	1435	**1244**
6	24	426	GVDH 145/22	659	91	394	101	**311**
7	27	427	ZC (KR 64-NZ)	1355	1375	1116	1203	**1262**
8	23	428	AAH 51	1273	910	1285	1155	**1156**
9	26	429	**AAH 53**	948	583	494	1121	**787**

Br 25a/b – Preliminary Hybrid Trial of Desi Hybrid

Ginning outturn (%)

S. No.	1st Code	2nd Code	Name of the entry	Sriganga-nagar	Bathinda	Sirsa (CICR)	Arya Nagar (Shakti Vardhak)	Mean NZ
1	28	421	GVDH 111/22	33.2	29.6	31.3	29.0	**30.8**
2	22	422	CISAA 23-2	35.7	38.6	39.0	39.3	**38.2**
3	25	423	CISAA 23-3	35.7	39.5	39.3	38.8	**38.3**
4	29	424	**Local Check**	34.8	35.5	38.7	37.9	**36.7**
5	21	425	KR 166	37.2	38.2	38.7	38.4	**38.1**
6	24	426	GVDH 145/22	35.4	35.0	32.0	21.8	**31.1**
7	27	427	ZC (KR 64-NZ)	37.5	37.0	39.0	38.7	**38.1**
8	23	428	AAH 51	37.1	37.2	39.3	35.2	**37.2**
9	26	429	**AAH 53**	33.6	35.4	36.0	36.6	**35.4**

Bolls/plant

S. No.	1st Code	2nd Code	Name of the entry	Sriganga-nagar	Bathinda	Sirsa (CICR)	Arya Nagar (Shakti Vardhak)	Mean NZ
1	28	421	GVDH 111/22	38.0	50.9	18.7	10.0	**29.4**
2	22	422	CISAA 23-2	58.0	79.9	32.1	47.7	**54.4**
3	25	423	CISAA 23-3	52.0	72.6	34.3	57.0	**54.0**
4	29	424	**Local Check**	48.0	73.3	27.6	46.7	**48.9**
5	21	425	KR 166	66.0	67.2	32.9	61.0	**56.8**
6	24	426	GVDH 145/22	38.0	43.6	25.2	8.7	**28.9**
7	27	427	ZC (KR 64-NZ)	63.0	68.6	38.6	60.0	**57.6**
8	23	428	AAH 51	59.0	67.3	41.1	52.0	**54.9**
9	26	429	**AAH 53**	55.0	53.3	22.9	58.0	**47.3**

Boll weight (g)

S. No.	1st Code	2nd Code	Name of the entry	Sriganga-nagar	Bathinda	Sirsa (CICR)	Arya Nagar (Shakti Vardhak)	Mean NZ
1	28	421	GVDH 111/22	2.6	2.2	2.6	2.2	**2.4**
2	22	422	CISAA 23-2	2.8	3.0	2.5	2.5	**2.7**
3	25	423	CISAA 23-3	2.2	2.5	2.6	2.4	**2.4**
4	29	424	**Local Check**	2.1	2.3	2.5	2.7	**2.4**
5	21	425	KR 166	2.0	2.3	2.7	2.9	**2.5**
6	24	426	GVDH 145/22	2.3	2.7	2.4	2.3	**2.4**
7	27	427	ZC (KR 64-NZ)	2.5	2.4	2.8	2.9	**2.7**
8	23	428	AAH 51	2.0	2.3	2.8	2.6	**2.4**
9	26	429	**AAH 53**	2.3	2.7	2.6	2.8	**2.6**

Br 24a – Coordinated Variety Trial - *G. arboreum*

Seed Cotton Yield (Kg/ha)

S. No.	1st Code	2nd Code	Entries	Sriganga-nagar	Faridkot	Bathinda	Sirsa (CICR)	Hisar*	Mean NZ	Rank
1	103	4001	FDK 124(ZC)	3162	3101	2844	2386		**2873**	3
2	104	4002	FDK 331	2683	3840	3078	3040		**3160**	1
3	102	4003	RG 913	2880	3022	2263	2807		**2743**	4
4	105	4004	Local Check	1850	3160	2701	2667		**2595**	5
5	101	4005	FDK 341	2976	3699	3176	2772		**3156**	2
			CD @ 5 %	399	460	339	201			
			CV %	10	8.8	8	5			
			Local Checks	**RG 542**	**LD 949**	**LD 949**	**CISA 614**	**HD-432**		

*Vitiated

Lint Yield (kg/ha)

S. No.	1st Code	2nd Code	Entries	Sriganga-nagar	Faridkot	Bathinda	Sirsa (CICR)	Mean NZ
1	103	4001	FDK 124(ZC)	1151	1208	1068	915	**1086**
2	104	4002	FDK 331	859	1477	1103	1135	**1144**
3	102	4003	RG 913	985	1198	839	1076	**1025**
4	105	4004	Local Check	622	1236	989	1031	**970**
5	101	4005	FDK 341	1065	1462	1181	1044	**1188**

Ginning outturn (%)

S. No.	1st Code	2nd Code	Entries	Sriganga-nagar	Faridkot	Bathinda	Sirsa (CICR)	Mean NZ
1	103	4001	FDK 124(ZC)	36.4	38.9	37.6	38.3	**37.8**
2	104	4002	FDK 331	32.0	38.4	35.8	37.3	**35.9**
3	102	4003	RG 913	34.2	39.6	37.0	38.3	**37.3**
4	105	4004	Local Check	33.6	39.1	36.6	38.7	**37.0**
5	101	4005	FDK 341	35.8	39.6	38.2	37.7	**37.8**

Br 24a – Coordinated Variety Trial - *G. arboreum*

Bolls/plant

S. No.	1st Code	2nd Code	Entries	Sriganga-nagar	Faridkot	Bathinda	Sirsa (CICR)	Mean NZ
1	103	4001	FDK 124(ZC)	36.0	37.8	66.8	37.2	**44.5**
2	104	4002	FDK 331	34.0	45.2	62.5	37.4	**44.8**
3	102	4003	RG 913	32.0	39.8	55.6	36.5	**41.0**
4	105	4004	Local Check	28.0	39.2	57.6	37.1	**40.5**
5	101	4005	FDK 341	35.0	43.4	68.9	34.7	**45.5**

Boll weight (g)

S. No.	1st Code	2nd Code	Entries	Sriganga-nagar	Faridkot	Bathinda	Sirsa (CICR)	Mean NZ
1	103	4001	FDK 124(ZC)	2.2	2.7	2.5	2.2	**2.4**
2	104	4002	FDK 331	2.2	2.6	2.6	2.2	**2.4**
3	102	4003	RG 913	2.1	2.5	2.4	2.4	**2.4**
4	105	4004	Local Check	2.2	2.3	2.1	2.2	**2.2**
5	101	4005	FDK 341	2.1	2.8	2.8	2.2	**2.5**

Br 25a/b – Coordinated Hybrid Trial of Desi Hybrid (North Zone)

Seed Cotton Yield (Kg/ha)

S. No.	1st Code	2nd Code	Entries	Sriganga-nagar	Bathinda	Faridkot	Hisar*	Sirsa (CICR)	Arya Nagar (Shakti Vardhak)	Mean NZ	Rank
1	120	4011	**Local Check**	2800	2837	3331		1973	3302	**2849**	9
2	114	4012	CISAA 22-3	3239	2795	4008		2994	2973	**3202**	5
3	111	4013	CISAA 22-1	2549	2218	3108		2072	3156	**2621**	10
4	117	4014	KR 162	3780	2987	3762		2650	3724	**3381**	4
5	119	4015	KR 165	3157	3278	3911		3327	3911	**3517**	2
6	115	4016	KR 164	3661	3047	3867		2572	3874	**3404**	3
7	112	4017	KR 163	2985	2614	3432		3039	3899	**3194**	6
8	118	4018	KR 161	2441	2554	3352		2654	3984	**2997**	7
9	116	4019	**ZC (KR 64)**	3114	2919	3072		2340	3185	**2926**	8
10	113	4020	KR 160	3822	2842	3949		3049	3938	**3520**	1
			CD @ 5 %	465	486	485		430	537		
			CV %	9	10	7.4		9	9		
			Local Checks	**RAJ DH. 9**	**FMDH 9**	**FMDH 9**	**AAH 1**	**CISAA 2**	**CISAA 2**		

***Vitiated**

Lint Yield (kg/ha)

S. No.	1st Code	2nd Code	Entries	Sriganga-nagar	Bathinda	Faridkot	Sirsa (CICR)	Arya Nagar (Shakti Vardhak)	Mean NZ
1	120	4011	**Local Check**	932	1061	1343	783	1300	**1084**
2	114	4012	CISAA 22-3	1205	1091	1559	1177	1132	**1233**
3	111	4013	CISAA 22-1	948	870	1238	808	1208	**1014**
4	117	4014	KR 162	1387	1107	1553	1025	1416	**1298**
5	119	4015	KR 165	1070	1209	1610	1264	1531	**1337**
6	115	4016	KR 164	1252	1172	1558	1020	1518	**1304**
7	112	4017	KR 163	997	948	1360	1185	1473	**1193**
8	118	4018	KR 161	889	947	1354	1062	1511	**1153**
9	116	4019	**ZC (KR 64)**	1127	1148	1255	920	1538	**1198**
10	113	4020	KR 160	1387	1062	1606	1199	1510	**1353**

Br 25a/b – Coordinated Hybrid Trial of Desi Hybrid (North Zone)

Ginning outturn (%)

S. No.	1st Code	2nd Code	Entries	Sriganga-nagar	Bathinda	Faridkot	Sirsa (CICR)	Arya Nagar (Shakti Vardhak)	Mean NZ
1	120	4011	**Local Check**	33.3	37.4	40.4	39.7	39.4	**38.0**
2	114	4012	CISAA 22-3	37.2	39.0	38.9	39.3	38.1	**38.5**
3	111	4013	CISAA 22-1	37.2	39.3	39.8	39.0	38.3	**38.7**
4	117	4014	KR 162	36.7	37.1	41.2	38.7	38.0	**38.3**
5	119	4015	KR 165	33.9	36.8	41.1	38.0	39.1	**37.8**
6	115	4016	KR 164	34.2	38.5	40.3	39.7	39.2	**38.4**
7	112	4017	KR 163	33.4	36.3	39.6	39.0	37.8	**37.2**
8	118	4018	KR 161	36.4	37.2	40.3	40.0	37.9	**38.4**
9	116	4019	**ZC (KR 64)**	36.2	39.3	40.9	39.3	38.6	**38.9**
10	113	4020	KR 160	36.3	37.4	40.8	39.3	38.4	**38.4**

Bolls/plant

S. No.	1st Code	2nd Code	Entries	Sriganga-nagar	Bathinda	Faridkot	Sirsa (CICR)	Arya Nagar (Shakti Vardhak)	Mean NZ
1	120	4011	**Local Check**	66.0	77.7	41.2	36.3	50.3	**54.3**
2	114	4012	CISAA 22-3	63.0	86.6	49.8	37.9	47.7	**57.0**
3	111	4013	CISAA 22-1	46.0	64.7	36.3	37.8	48.0	**46.6**
4	117	4014	KR 162	54.0	63.2	45.7	38.3	57.3	**51.7**
5	119	4015	KR 165	49.0	64.9	47	43.8	63.0	**53.5**
6	115	4016	KR 164	67.0	59.0	50.1	37.8	64.0	**55.6**
7	112	4017	KR 163	48.0	57.3	41.9	39.3	61.0	**49.5**
8	118	4018	KR 161	46.0	53.1	41.1	42.2	62.3	**48.9**
9	116	4019	**ZC (KR 64)**	53.0	68.9	37.4	38.8	58.0	**51.2**
10	113	4020	KR 160	63.0	59.6	46.7	44.5	65.3	**55.8**

Br 25a/b – Coordinated Hybrid Trial of Desi Hybrid (North Zone)

Boll weight (g)

S. No.	1st Code	2nd Code	Entries	Sriganga-nagar	Bathinda	Faridkot	Sirsa (CICR)	Arya Nagar (Shakti Vardhak)	Mean NZ
1	120	4011	**Local Check**	2.3	2.3	2.3	2.6	2.4	**2.4**
2	114	4012	CISAA 22-3	2.3	2.4	2.8	2.8	2.3	**2.5**
3	111	4013	CISAA 22-1	2.2	2.5	2.9	2.4	2.4	**2.5**
4	117	4014	KR 162	2.5	2.3	3.1	2.7	3.0	**2.7**
5	119	4015	KR 165	2.8	2.7	2.9	2.6	2.9	**2.8**
6	115	4016	KR 164	2.2	2.3	2.9	2.8	2.8	**2.6**
7	112	4017	KR 163	2.7	2.7	2.9	2.5	2.9	**2.7**
8	118	4018	KR 161	2.5	2.2	2.7	2.5	3.0	**2.6**
9	116	4019	**ZC (KR 64)**	2.5	2.6	2.9	2.6	2.9	**2.7**
10	113	4020	KR 160	2.2	2.4	2.8	2.4	2.8	**2.5**

National Trials

Br 02c–Initial Evaluation Trial of *G. hirsutum* under organic condition

Seed Cotton Yield (Kg/ha)

S. No.	Code I	Code II	Entry	Khandwa (i)	Rahuri (I)	Bhawanipatna (i)	Talod (I)	Mean CZ [I]	Rank
1	11	431	**Suraksha (CC)**	1712	902	870	634	**1030**	10
2	9	432	CNH 3001	918	1015	815	692	**860**	24
3	5	433	L 1822	857	811	685	632	**746**	28
4	4	434	**ZC [Phule Yamuna (CZ)/ Suraj (SZ)]**	990	1772	1093	780	**1159**	6
5	6	435	NH768	1358	1152	833	711	**1014**	12
6	3	436	AKH 2009	1274	1543	1022	700	**1135**	7
7	8	437	CNH 2219	1111	909	630	579	**807**	27
8	1	438	TCH 2001	1530	1859	926	711	**1257**	4
9	23	439	L 1651	958	1118	796	627	**875**	23
10	19	440	GBHV 227	1437	1829	1000	853	**1280**	2
11	17	441	AKH 2018-6	1136	1586	722	540	**996**	13
12	14	442	CSH NB 101	1172	862	833	517	**846**	25
13	12	443	NH761	1656	1698	778	789	**1230**	5
14	7	444	GISV 419	1579	1088	981	831	**1120**	8
15	2	445	BS277-24	913	911	1074	1060	**990**	15
16	22	446	BS144-24	1278	1121	1204	509	**1028**	11
17	25	447	KGH 2411	1208	1048	778	607	**910**	21
18	24	448	RHC 2018	1723	1671	1056	666	**1279**	3
19	15	449	RHC 2107	1282	1249	852	587	**993**	14
20	20	450	TCH 1966	1191	1078	796	721	**947**	20
21	13	451	GSHV 271	1700	1568	1256	1069	**1398**	1
22	27	452	NDLH 2097	1201	1054	1019	546	**955**	18
23	18	453	RHC 1904	1145	1763	870	614	**1098**	9
24	28	454	NDLH 2092-3	1247	1208	759	659	**968**	16
25	21	455	CNH 3002	938	1051	852	518	**840**	26
26	10	456	AKH 2002	1118	1145	759	793	**954**	19
27	26	457	**Local Check**	812	1259	963	597	**908**	22
28	16	458	ADB755	931	1260	833	831	**964**	17
			CD @ 5 %	156	207	228	116		
			CV %	8	10	16	10		
			Local Checks	**JK 4**	**Phule 688**	**BS 30**	**G Cot. 40**		

Br 02c-Initial Evaluation Trial of *G. hirsutum* under organic condition

Seed Cotton Yield (Kg/ha)

S. No.	Code I	Code II	Entry	Akola [R]*	Nanded [R]*	Surat [R]	Mean CZ [R]	Rank	Overall Mean CZ	Rank
1	11	431	**Suraksha (CC)**			1107	1107	8	**1045**	10
2	9	432	CNH 3001			1123	1123	7	**913**	22
3	5	433	L 1822			745	745	26	**746**	28
4	4	434	**ZC [Phule Yamuna (CZ)/ Suraj (SZ)]**			1497	1497	1	**1226**	3
5	6	435	NH768			965	965	14	**1004**	11
6	3	436	AKH 2009			953	953	15	**1098**	8
7	8	437	CNH 2219			810	810	23	**808**	27
8	1	438	TCH 2001			1080	1080	10	**1221**	4
9	23	439	L 1651			725	725	28	**845**	24
10	19	440	GBHV 227			1080	1080	10	**1240**	2
11	17	441	AKH 2018-6			891	891	19	**975**	16
12	14	442	CSH NB 101			787	787	24	**834**	26
13	12	443	NH761			1130	1130	6	**1210**	6
14	7	444	GISV 419			895	895	17	**1075**	9
15	2	445	BS277-24			1049	1049	12	**1001**	13
16	22	446	BS144-24			895	895	17	**1001**	13
17	25	447	KGH 2411			1022	1022	13	**933**	20
18	24	448	RHC 2018			953	953	15	**1214**	5
19	15	449	RHC 2107			833	833	22	**961**	18
20	20	450	TCH 1966			748	748	25	**907**	23
21	13	451	GSHV 271			1150	1150	5	**1349**	1
22	27	452	NDLH 2097			876	876	20	**939**	19
23	18	453	RHC 1904			1181	1181	4	**1115**	7
24	28	454	NDLH 2092-3			745	745	26	**924**	21
25	21	455	CNH 3002			864	864	21	**845**	25
26	10	456	AKH 2002			1204	1204	2	**1004**	11
27	26	457	**Local Check**			1204	1204	2	**967**	17
28	16	458	ADB755			1084	1084	9	**988**	15
			CD @ 5 %			244				
			CV %			15				
			Local Checks	**AKH 8828**	**NH 545**	**GN. Cot. 26**				

***Vitiated**

Br 02c-Initial Evaluation Trial of *G. hirsutum* under organic condition

Seed Cotton Yield (Kg/ha)

S. No.	Code I	Code II	Entry	Raichur [I]	Coimbatore [I]	Lam [I]	Mean SZ [I]	Rank	Dharwad [R]	Perambalur [R]	Nandyal [R]	Adilabad [R]	Mean SZ [R]	Rank	Overall Mean SZ	Rank
1	11	431	**Suraksha (CC)**	313	473	450	**412**	25	389	1088	1659	1069	**1051**	17	**576**	24
2	9	432	CNH 3001	287	486	591	**455**	21	299	968	2104	1086	**1114**	13	**613**	20
3	5	433	L 1822	495	602	463	**520**	13	179	776	1398	819	**793**	27	**595**	22
4	4	434	**ZC [Phule Yamuna (CZ)/ Suraj (SZ)]**	453	845	541	**613**	3	422	887	1850	1373	**1133**	12	**803**	2
5	6	435	NH768	310	674	639	**541**	10	276	828	2076	1072	**1063**	16	**674**	16
6	3	436	AKH 2009	311	666	596	**524**	12	383	847	2334	1196	**1190**	5	**692**	12
7	8	437	CNH 2219	323	615	235	**391**	26	299	833	1349	1087	**892**	24	**565**	25
8	1	438	TCH 2001	469	917	639	**675**	1	529	1059	1783	1532	**1226**	3	**889**	1
9	23	439	L 1651	199	477	235	**304**	28	154	638	1231	907	**733**	28	**455**	28
10	19	440	GBHV 227	274	1192	117	**528**	11	235	909	2278	1214	**1159**	9	**699**	10
11	17	441	AKH 2018-6	507	675	672	**618**	2	403	700	2244	1210	**1139**	11	**766**	4
12	14	442	CSH NB 101	319	402	300	**340**	27	234	595	1767	1494	**1023**	18	**629**	18
13	12	443	NH761	453	882	124	**486**	18	308	761	2244	1281	**1149**	10	**685**	14
14	7	444	GISV 419	320	770	717	**602**	4	233	750	2489	1193	**1166**	7	**750**	8
15	2	445	BS277-24	251	701	323	**425**	23	195	586	2179	1045	**1001**	19	**580**	23
16	22	446	BS144-24	412	570	378	**453**	22	360	771	1043	1287	**865**	26	**662**	17
17	25	447	KGH 2411	614	582	518	**571**	7	372	771	1514	1235	**973**	21	**737**	9
18	24	448	RHC 2018	591	497	711	**600**	5	360	911	2086	1318	**1169**	6	**779**	3
19	15	449	RHC 2107	263	540	703	**502**	16	246	777	2139	1222	**1096**	14	**682**	15
20	20	450	TCH 1966	418	639	183	**413**	24	172	743	1769	1004	**922**	23	**561**	26
21	13	451	GSHV 271	364	591	600	**518**	14	285	834	2567	1498	**1296**	2	**763**	6
22	27	452	NDLH 2097	293	798	587	**559**	9	215	734	2803	1083	**1209**	4	**690**	13
23	18	453	RHC 1904	317	589	639	**515**	15	379	758	2020	1492	**1162**	8	**759**	7
24	28	454	NDLH 2092-3	453	688	577	**573**	6	229	756	1728	1057	**943**	22	**694**	11
25	21	455	CNH 3002	494	610	267	**457**	20	424	665	1731	1088	**977**	20	**615**	19
26	10	456	AKH 2002	369	655	444	**489**	17	288	673	2392	952	**1076**	15	**605**	21
27	26	457	**Local Check**	397	900	404	**567**	8	467	607	2764	1361	**1300**	1	**766**	5
28	16	458	ADB755	325	671	389	**462**	19	127	739	1990	637	**873**	25	**506**	27
			CD @ 5 %	71	107	83			80	356	342	222				
			CV %	20	10	11			16	16	11	12				
			Local Checks	**BGDS 1063**	**CO 14**	**NDLH 2051-1**			**Sahana**	**VPT 1**	**NDLH 1938**	**ADB 542**				

Br 02c-Initial Evaluation Trial of *G. hirsutum* under organic condition

Lint Yield (kg/ha)

S. No.	Code I	Code II	Entry	Khandwa (i)	Rahuri (I)	Bhawanipatna (i)	Talod (I)	Mean CZ [I]	Surat [R]	Mean CZ [R]	Overall Mean CZ
1	11	431	**Suraksha (CC)**	633	297	256	219	**351**	370	370	**355**
2	9	432	CNH 3001	337	348	271	234	**298**	375	375	**313**
3	5	433	L 1822	319	276	258	210	**266**	240	240	**261**
4	4	434	**ZC [Phule Yamuna (CZ)/ Suraj (SZ)]**	361	570	366	249	**387**	478	478	**405**
5	6	435	NH768	504	419	300	246	**367**	331	331	**360**
6	3	436	AKH 2009	459	535	359	246	**400**	326	326	**385**
7	8	437	CNH 2219	411	290	210	184	**274**	246	246	**268**
8	1	438	TCH 2001	541	641	323	244	**437**	349	349	**420**
9	23	439	L 1651	283	362	272	212	**282**	233	233	**272**
10	19	440	GBHV 227	516	627	334	293	**443**	361	361	**426**
11	17	441	AKH 2018-6	412	581	252	187	**358**	289	289	**344**
12	14	442	CSH NB 101	416	292	287	164	**290**	253	253	**282**
13	12	443	NH761	628	616	284	290	**455**	405	405	**445**
14	7	444	GISV 419	607	428	377	342	**439**	351	351	**421**
15	2	445	BS277-24	328	293	393	371	**346**	343	343	**346**
16	22	446	BS144-24	470	367	366	159	**341**	262	262	**325**
17	25	447	KGH 2411	435	379	277	211	**326**	342	342	**329**
18	24	448	RHC 2018	615	544	355	231	**436**	310	310	**411**
19	15	449	RHC 2107	455	415	301	202	**343**	276	276	**330**
20	20	450	TCH 1966	418	373	267	230	**322**	232	232	**304**
21	13	451	GSHV 271	604	508	411	360	**471**	374	374	**451**
22	27	452	NDLH 2097	435	353	330	171	**322**	298	298	**317**
23	18	453	RHC 1904	422	622	311	206	**390**	393	393	**391**
24	28	454	NDLH 2092-3	435	391	259	219	**326**	241	241	**309**
25	21	455	CNH 3002	340	339	284	165	**282**	267	267	**279**
26	10	456	AKH 2002	392	380	265	263	**325**	381	381	**336**
27	26	457	**Local Check**	292	404	311	209	**304**	394	394	**322**
28	16	458	ADB755	336	426	285	269	**329**	332	332	**330**

Br 02c-Initial Evaluation Trial of *G. hirsutum* under organic condition

Lint Yield (kg/ha)

S. No.	Code I	Code II	Entry	Raichur [I]	Coimbatore [I]	Lam [I]	Mean SZ [I]	Dharwad [R]	Perambalur [R]	Nandyal [R]	Adilabad [R]	Mean SZ [R]	Overall Mean SZ
1	11	431	**Suraksha (CC)**	102	162	132	**132**	132	350	548	369	**350**	**191**
2	9	432	CNH 3001	101	172	174	**149**	119	363	749	369	**400**	**204**
3	5	433	L 1822	181	222	136	**180**	69	286	464	278	**274**	**204**
4	4	434	**ZC [Phule Yamuna (CZ)/ Suraj (SZ)]**	160	309	159	**209**	161	334	629	499	**406**	**282**
5	6	435	NH768	107	247	188	**181**	110	339	778	379	**402**	**230**
6	3	436	AKH 2009	112	241	175	**176**	147	357	841	414	**440**	**236**
7	8	437	CNH 2219	113	211	69	**131**	100	284	464	337	**296**	**183**
8	1	438	TCH 2001	162	331	187	**227**	212	408	601	491	**428**	**293**
9	23	439	L 1651	71	164	69	**101**	58	256	416	306	**259**	**153**
10	19	440	GBHV 227	98	427	34	**186**	87	360	804	401	**413**	**240**
11	17	441	AKH 2018-6	175	248	197	**207**	156	266	808	401	**408**	**255**
12	14	442	CSH NB 101	111	140	88	**113**	87	223	679	518	**377**	**214**
13	12	443	NH761	151	335	36	**174**	125	307	808	457	**424**	**245**
14	7	444	GISV 419	100	291	210	**200**	103	289	968	488	**462**	**272**
15	2	445	BS277-24	69	252	95	**139**	70	209	763	352	**349**	**192**
16	22	446	BS144-24	126	183	111	**140**	121	251	367	376	**279**	**199**
17	25	447	KGH 2411	212	216	152	**193**	141	271	520	400	**333**	**245**
18	24	448	RHC 2018	181	162	209	**184**	132	319	751	448	**413**	**250**
19	15	449	RHC 2107	93	182	206	**160**	92	280	753	438	**391**	**230**
20	20	450	TCH 1966	139	221	54	**138**	66	259	595	342	**316**	**189**
21	13	451	GSHV 271	126	198	176	**167**	105	275	996	475	**463**	**244**
22	27	452	NDLH 2097	99	273	172	**181**	83	262	965	353	**416**	**224**
23	18	453	RHC 1904	104	192	188	**161**	145	287	731	511	**419**	**249**
24	28	454	NDLH 2092-3	141	235	169	**182**	86	271	579	343	**320**	**222**
25	21	455	CNH 3002	156	215	78	**150**	157	251	573	342	**331**	**198**
26	10	456	AKH 2002	127	231	130	**163**	105	229	801	297	**358**	**196**
27	26	457	**Local Check**	114	278	119	**170**	187	230	912	431	**440**	**236**
28	16	458	ADB755	106	228	114	**149**	44	272	649	188	**288**	**159**

Br 02c-Initial Evaluation Trial of *G. hirsutum* under organic condition

Ginning outturn (%)

S. No.	Code I	Code II	Entry	Khandwa (i)	Rahuri (I)	Bhawanipatna (i)	Talod (I)	Mean CZ [I]	Surat [R]	Mean CZ [R]	Overall Mean CZ
1	11	431	**Suraksha (CC)**	37.0	32.9	29.3	34.5	**33.4**	33.5	**33.5**	**33.4**
2	9	432	CNH 3001	36.7	34.2	33.3	33.8	**34.5**	33.4	**33.4**	**34.3**
3	5	433	L 1822	37.2	34.1	37.6	33.1	**35.5**	32.3	**32.3**	**34.9**
4	4	434	**ZC [Phule Yamuna (CZ)/ Suraj (SZ)]**	36.5	32.1	33.5	31.9	**33.5**	31.9	**31.9**	**33.2**
5	6	435	NH768	37.1	36.4	36.1	34.5	**36.0**	34.5	**34.5**	**35.7**
6	3	436	AKH 2009	36.0	34.7	35.1	35.2	**35.3**	34.2	**34.2**	**35.0**
7	8	437	CNH 2219	37.0	31.9	33.3	31.7	**33.5**	30.4	**30.4**	**32.9**
8	1	438	TCH 2001	35.4	34.5	34.9	34.3	**34.8**	32.2	**32.2**	**34.3**
9	23	439	L 1651	29.5	32.4	34.2	33.8	**32.5**	32.2	**32.2**	**32.4**
10	19	440	GBHV 227	35.9	34.3	33.3	34.4	**34.5**	33.2	**33.2**	**34.2**
11	17	441	AKH 2018-6	36.3	36.7	34.9	34.5	**35.6**	32.5	**32.5**	**35.0**
12	14	442	CSH NB 101	35.5	33.9	34.5	31.7	**33.9**	32.1	**32.1**	**33.5**
13	12	443	NH761	37.9	36.3	36.6	36.9	**36.9**	35.9	**35.9**	**36.7**
14	7	444	GISV 419	38.4	39.4	38.3	41.2	**39.3**	39.2	**39.2**	**39.3**
15	2	445	BS277-24	35.9	32.2	27.3	35.1	**32.6**	32.6	**32.6**	**32.6**
16	22	446	BS144-24	36.8	32.8	30.4	31.3	**32.8**	29.2	**29.2**	**32.1**
17	25	447	KGH 2411	36.0	36.1	35.6	34.9	**35.7**	33.4	**33.4**	**35.2**
18	24	448	RHC 2018	35.7	32.6	33.7	34.6	**34.2**	32.5	**32.5**	**33.8**
19	15	449	RHC 2107	35.5	33.2	35.4	34.5	**34.7**	33.1	**33.1**	**34.3**
20	20	450	TCH 1966	35.1	34.6	33.6	31.8	**33.8**	31.1	**31.1**	**33.2**
21	13	451	GSHV 271	35.5	32.4	32.8	33.7	**33.6**	32.5	**32.5**	**33.4**
22	27	452	NDLH 2097	36.2	33.5	32.3	31.2	**33.3**	34.1	**34.1**	**33.5**
23	18	453	RHC 1904	36.9	35.3	35.7	33.5	**35.4**	33.3	**33.3**	**34.9**
24	28	454	NDLH 2092-3	34.9	32.4	34.1	33.3	**33.7**	32.6	**32.6**	**33.5**
25	21	455	CNH 3002	36.3	32.3	33.4	31.9	**33.5**	30.9	**30.9**	**33.0**
26	10	456	AKH 2002	35.1	33.2	34.8	33.2	**34.1**	31.6	**31.6**	**33.6**
27	26	457	**Local Check**	35.9	32.1	32.3	35.1	**33.9**	32.8	**32.8**	**33.6**
28	16	458	ADB755	36.1	33.8	34.3	32.4	**34.2**	30.6	**30.6**	**33.4**

Br 02c-Initial Evaluation Trial of *G. hirsutum* under organic condition

Ginning outturn (%)

S. No.	Code I	Code II	Entry	Raichur [I]	Coimbatore [I]	Lam [I]	Mean SZ [I]	Dharwad [R]	Perambalur [R]	Nandyal [R]	Adilabad [R]	Mean SZ [R]	Overall Mean SZ
1	11	431	**Suraksha (CC)**	32.6	34.0	34.6	**33.7**	34.0	32.2	33.0	34.6	**33.5**	**34.0**
2	9	432	CNH 3001	34.8	35.3	34.4	**34.8**	39.6	37.5	35.6	34.0	**36.7**	**34.6**
3	5	433	L 1822	36.4	36.9	32.1	**35.1**	38.7	36.8	33.2	33.7	**35.6**	**34.8**
4	4	434	**ZC [Phule Yamuna (CZ)/ Suraj (SZ)]**	35.2	36.6	34.8	**35.5**	38.3	37.7	34.0	36.4	**36.6**	**35.8**
5	6	435	NH768	34.5	36.6	35.6	**35.6**	39.7	40.9	37.5	35.3	**38.4**	**35.5**
6	3	436	AKH 2009	36.0	36.0	24.9	**32.3**	38.3	42.1	36.0	34.5	**37.7**	**32.9**
7	8	437	CNH 2219	35.0	34.2	32.9	**34.0**	33.6	34.1	34.4	30.9	**33.3**	**33.3**
8	1	438	TCH 2001	34.7	36.1	34.6	**35.1**	40.1	38.5	33.7	32.1	**36.1**	**34.4**
9	23	439	L 1651	35.6	34.5	34.6	**34.9**	37.7	40.0	33.8	34.1	**36.4**	**34.7**
10	19	440	GBHV 227	36.0	35.8	32.4	**34.7**	36.8	39.6	35.3	33.0	**36.2**	**34.3**
11	17	441	AKH 2018-6	34.5	36.6	33.2	**34.8**	38.6	38.0	36.0	33.1	**36.4**	**34.4**
12	14	442	CSH NB 101	34.7	34.6	32.9	**34.1**	37.2	37.4	38.4	34.6	**36.9**	**34.2**
13	12	443	NH761	33.1	38.0	34.9	**35.3**	40.7	40.3	36.0	35.7	**38.2**	**35.4**
14	7	444	GISV 419	31.0	37.7	35.2	**34.6**	44.3	38.5	38.9	40.9	**40.7**	**36.2**
15	2	445	BS277-24	27.7	35.8	33.6	**32.4**	36.1	35.7	35.0	33.6	**35.1**	**32.7**
16	22	446	BS144-24	30.2	32.2	36.0	**32.8**	33.6	32.5	35.2	29.2	**32.6**	**31.9**
17	25	447	KGH 2411	34.3	37.1	34.8	**35.4**	37.8	35.1	34.3	32.4	**34.9**	**34.7**
18	24	448	RHC 2018	31.0	32.7	37.4	**33.7**	36.8	35.0	36.0	34.0	**35.5**	**33.8**
19	15	449	RHC 2107	35.4	33.6	37.7	**35.6**	37.3	36.1	35.2	35.7	**36.1**	**35.6**
20	20	450	TCH 1966	33.4	34.4	33.7	**33.8**	38.1	34.9	33.6	34.1	**35.2**	**33.9**
21	13	451	GSHV 271	34.7	33.6	37.1	**35.1**	36.9	32.9	38.8	31.7	**35.1**	**34.3**
22	27	452	NDLH 2097	33.8	34.0	35.4	**34.4**	38.5	35.8	34.4	32.5	**35.3**	**33.9**
23	18	453	RHC 1904	32.8	32.6	35.7	**33.7**	38.3	37.9	36.2	34.2	**36.7**	**33.8**
24	28	454	NDLH 2092-3	31.3	34.2	35.5	**33.7**	37.7	35.8	33.5	32.4	**34.9**	**33.4**
25	21	455	CNH 3002	31.6	35.3	32.9	**33.3**	37.0	37.8	33.1	31.7	**34.9**	**32.9**
26	10	456	AKH 2002	34.7	35.2	34.5	**34.8**	36.7	34.0	33.5	31.2	**33.9**	**33.9**
27	26	457	**Local Check**	29.0	31.0	36.1	**32.0**	40.0	37.9	33.0	31.6	**35.6**	**31.9**
28	16	458	ADB755	32.5	33.9	36.1	**34.2**	34.8	36.8	32.6	29.5	**33.4**	**33.0**

Br 02c-Initial Evaluation Trial of *G. hirsutum* under organic condition

Bolls/Plant

S. No.	Code I	Code II	Entry	Khandwa (i)	Rahuri (I)	Bhawanipatna (i)	Talod (I)	Mean CZ [I]	Surat [R]	Mean CZ [R]	Overall Mean CZ
1	11	431	**Suraksha (CC)**	24.0	31.4	15.7	20.9	**23.0**	18.0	**18.0**	**22.0**
2	9	432	CNH 3001	12.8	21.4	15.7	20.9	**17.7**	18.1	**18.1**	**17.8**
3	5	433	L 1822	12.9	24.7	15.3	17.9	**17.7**	12.6	**12.6**	**16.7**
4	4	434	**ZC [Phule Yamuna (CZ)/ Suraj (SZ)]**	14.1	40.6	16.3	27.5	**24.6**	29.9	**29.9**	**25.7**
5	6	435	NH768	16.4	29.0	15.7	24.6	**21.4**	18.6	**18.6**	**20.9**
6	3	436	AKH 2009	14.5	24.7	18.0	23.8	**20.3**	18.3	**18.3**	**19.9**
7	8	437	CNH 2219	13.8	24.5	13.3	15.6	**16.8**	12.3	**12.3**	**15.9**
8	1	438	TCH 2001	20.3	40.9	16.0	22.5	**24.9**	19.3	**19.3**	**23.8**
9	23	439	L 1651	13.4	31.7	13.7	30.7	**22.4**	16.7	**16.7**	**21.2**
10	19	440	GBHV 227	17.5	40.4	17.3	27.2	**25.6**	19.1	**19.1**	**24.3**
11	17	441	AKH 2018-6	13.8	34.0	15.0	17.6	**20.1**	16.1	**16.1**	**19.3**
12	14	442	CSH NB 101	13.1	32.8	15.3	17.5	**19.7**	14.5	**14.5**	**18.6**
13	12	443	NH761	21.6	32.9	17.0	25.6	**24.3**	21.5	**21.5**	**23.7**
14	7	444	GISV 419	20.1	27.6	15.0	26.3	**22.3**	16.7	**16.7**	**21.1**
15	2	445	BS277-24	12.9	32.2	18.0	34.3	**24.4**	20.1	**20.1**	**23.5**
16	22	446	BS144-24	16.1	28.3	19.0	17.7	**20.3**	15.1	**15.1**	**19.2**
17	25	447	KGH 2411	14.5	29.0	15.0	21.1	**19.9**	15.7	**15.7**	**19.1**
18	24	448	RHC 2018	24.2	35.5	18.7	24.3	**25.7**	17.2	**17.2**	**24.0**
19	15	449	RHC 2107	17.3	30.7	16.3	14.8	**19.8**	12.7	**12.7**	**18.4**
20	20	450	TCH 1966	16.1	35.6	16.0	22.9	**22.7**	12.6	**12.6**	**20.6**
21	13	451	GSHV 271	23.4	33.9	20.3	32.2	**27.5**	19.2	**19.2**	**25.8**
22	27	452	NDLH 2097	16.9	31.0	18.3	20.2	**21.6**	14.3	**14.3**	**20.1**
23	18	453	RHC 1904	13.9	38.7	15.0	23.5	**22.8**	21.8	**21.8**	**22.6**
24	28	454	NDLH 2092-3	17.2	30.9	16.3	19.5	**21.0**	13.2	**13.2**	**19.4**
25	21	455	CNH 3002	12.4	29.7	17.0	19.5	**19.7**	17.2	**17.2**	**19.2**
26	10	456	AKH 2002	13.3	28.5	16.7	23.3	**20.5**	19.8	**19.8**	**20.3**
27	26	457	**Local Check**	12.6	29.9	17.3	20.8	**20.2**	22.4	**22.4**	**20.6**
28	16	458	ADB755	12.3	29.2	17.0	26.3	**21.2**	20.1	**20.1**	**21.0**

Br 02c-Initial Evaluation Trial of *G. hirsutum* under organic condition

Bolls/Plant

S. No.	Code I	Code II	Entry	Raichur [I]	Coimbatore [I]	Lam [I]	Mean SZ [I]	Dharwad [R]	Perambalur [R]	Nandyal [R]	Adilabad [R]	Mean SZ [R]	Overall Mean SZ
1	11	431	**Suraksha (CC)**	3.9	20.0	27.5	**17.1**	4.0	16.6	10.5	17.8	**12.2**	**17.3**
2	9	432	CNH 3001	5.0	19.6	23.6	**16.1**	3.8	17.3	12.3	19.7	**13.3**	**17.0**
3	5	433	L 1822	5.8	25.1	28.9	**19.9**	3.6	18.2	16.7	23.0	**15.4**	**20.7**
4	4	434	**ZC [Phule Yamuna (CZ)/ Suraj (SZ)]**	5.0	21.1	30.3	**18.8**	3.3	13.9	12.1	20.5	**12.5**	**19.2**
5	6	435	NH768	6.8	24.1	38.0	**23.0**	3.7	17.0	14.3	17.7	**13.2**	**21.7**
6	3	436	AKH 2009	7.0	22.9	40.0	**23.3**	3.8	16.6	16.2	17.6	**13.6**	**21.9**
7	8	437	CNH 2219	5.1	22.8	40.5	**22.8**	3.1	15.2	11.3	16.8	**11.6**	**21.3**
8	1	438	TCH 2001	4.6	20.6	40.8	**22.0**	4.0	17.1	13.2	21.7	**14.0**	**21.9**
9	23	439	L 1651	7.8	25.3	40.7	**24.6**	4.0	14.0	12.5	16.2	**11.7**	**22.5**
10	19	440	GBHV 227	7.8	30.9	35.1	**24.6**	3.6	13.7	13.7	17.6	**12.2**	**22.9**
11	17	441	AKH 2018-6	7.6	30.7	38.7	**25.7**	4.1	16.8	14.4	17.6	**13.2**	**23.7**
12	14	442	CSH NB 101	6.7	21.0	29.2	**19.0**	4.5	19.1	15.8	18.5	**14.5**	**18.9**
13	12	443	NH761	5.9	23.1	32.1	**20.4**	3.5	15.7	12.9	21.1	**13.3**	**20.6**
14	7	444	GISV 419	4.4	26.9	36.3	**22.5**	2.4	17.4	14.6	22.4	**14.2**	**22.5**
15	2	445	BS277-24	4.2	24.6	33.9	**20.9**	3.6	18.4	15.1	23.4	**15.1**	**21.5**
16	22	446	BS144-24	4.6	25.6	32.1	**20.8**	3.3	17.8	9.8	19.7	**12.7**	**20.5**
17	25	447	KGH 2411	5.9	24.1	34.0	**21.3**	4.1	18.8	11.2	20.9	**13.8**	**21.2**
18	24	448	RHC 2018	7.4	19.9	40.1	**22.5**	3.5	13.6	12.2	20.7	**12.5**	**22.0**
19	15	449	RHC 2107	7.3	22.8	39.3	**23.1**	3.0	13.0	11.7	17.8	**11.4**	**21.8**
20	20	450	TCH 1966	5.6	24.1	38.1	**22.6**	3.4	12.1	12.3	19.6	**11.9**	**21.9**
21	13	451	GSHV 271	5.1	21.1	38.7	**21.6**	3.9	15.9	22.3	20.1	**15.6**	**21.3**
22	27	452	NDLH 2097	4.6	23.6	35.9	**21.4**	4.3	14.0	25.0	18.3	**15.4**	**20.6**
23	18	453	RHC 1904	4.3	26.3	37.3	**22.6**	4.7	14.1	12.5	21.3	**13.2**	**22.3**
24	28	454	NDLH 2092-3	4.4	21.2	38.0	**21.2**	2.7	16.6	13.6	17.4	**12.6**	**20.3**
25	21	455	CNH 3002	3.4	23.1	32.8	**19.8**	4.3	16.2	11.9	16.7	**12.3**	**19.0**
26	10	456	AKH 2002	4.4	17.6	41.9	**21.3**	4.6	16.9	16.5	18.6	**14.2**	**20.6**
27	26	457	**Local Check**	4.9	15.8	33.8	**18.2**	3.2	16.4	21.0	17.0	**14.4**	**17.9**
28	16	458	ADB755	2.9	21.6	35.2	**19.9**	2.7	18.6	12.8	19.1	**13.3**	**19.7**

Br 02c-Initial Evaluation Trial of *G. hirsutum* under organic condition

Boll Weight (g/boll)

S. No.	Code I	Code II	Entry	Khandwa (i)	Rahuri (I)	Bhawanipatna (i)	Talod (I)	Mean CZ [I]	Surat [R]	Mean CZ [R]	Overall Mean CZ
1	11	431	**Suraksha (CC)**	4.6	4.1	4.0	2.9	**3.9**	3.3	**3.3**	**3.8**
2	9	432	CNH 3001	3.4	4.0	3.9	3.1	**3.6**	3.4	**3.4**	**3.6**
3	5	433	L 1822	3.3	4.1	3.8	3.3	**3.6**	3.2	**3.2**	**3.5**
4	4	434	**ZC [Phule Yamuna (CZ)/ Suraj (SZ)]**	3.4	5.0	3.6	2.7	**3.7**	2.7	**2.7**	**3.5**
5	6	435	NH768	3.3	3.9	3.4	2.8	**3.4**	2.8	**2.8**	**3.2**
6	3	436	AKH 2009	3.7	4.2	3.7	2.8	**3.6**	2.8	**2.8**	**3.4**
7	8	437	CNH 2219	3.4	4.4	4.1	3.6	**3.9**	3.6	**3.6**	**3.8**
8	1	438	TCH 2001	3.9	4.9	4.2	3.0	**4.0**	3.0	**3.0**	**3.8**
9	23	439	L 1651	3.5	4.7	3.4	2.0	**3.4**	2.3	**2.3**	**3.2**
10	19	440	GBHV 227	3.8	5.1	4.0	3.0	**4.0**	3.0	**3.0**	**3.8**
11	17	441	AKH 2018-6	4.0	4.7	3.8	3.0	**3.9**	3.0	**3.0**	**3.7**
12	14	442	CSH NB 101	3.6	4.4	3.2	2.8	**3.5**	2.9	**2.9**	**3.4**
13	12	443	NH761	4.1	4.5	3.2	3.0	**3.7**	2.8	**2.8**	**3.5**
14	7	444	GISV 419	4.2	5.6	4.2	3.0	**4.3**	2.9	**2.9**	**4.0**
15	2	445	BS277-24	3.2	4.6	3.6	3.0	**3.6**	2.8	**2.8**	**3.4**
16	22	446	BS144-24	4.0	5.5	4.5	2.7	**4.2**	3.2	**3.2**	**4.0**
17	25	447	KGH 2411	3.6	5.0	4.1	2.8	**3.9**	3.5	**3.5**	**3.8**
18	24	448	RHC 2018	4.7	5.2	3.8	2.7	**4.1**	3.0	**3.0**	**3.9**
19	15	449	RHC 2107	3.9	5.4	3.9	3.8	**4.3**	3.6	**3.6**	**4.1**
20	20	450	TCH 1966	3.7	4.7	4.4	3.0	**4.0**	3.2	**3.2**	**3.8**
21	13	451	GSHV 271	4.5	5.7	4.2	3.2	**4.4**	3.2	**3.2**	**4.2**
22	27	452	NDLH 2097	3.8	5.1	4.1	2.6	**3.9**	3.3	**3.3**	**3.8**
23	18	453	RHC 1904	3.8	4.9	4.1	2.5	**3.8**	2.9	**2.9**	**3.6**
24	28	454	NDLH 2092-3	4.0	4.8	4.5	3.2	**4.1**	3.1	**3.1**	**3.9**
25	21	455	CNH 3002	3.1	3.7	3.7	2.5	**3.3**	2.7	**2.7**	**3.1**
26	10	456	AKH 2002	3.6	3.7	3.6	3.2	**3.5**	3.3	**3.3**	**3.5**
27	26	457	**Local Check**	3.3	3.8	4.1	2.8	**3.5**	2.9	**2.9**	**3.4**
28	16	458	ADB755	3.5	3.1	3.9	3.0	**3.4**	2.9	**2.9**	**3.3**

Br 02c-Initial Evaluation Trial of *G. hirsutum* under organic condition

Boll Weight (g/boll)

S. No.	Code I	Code II	Entry	Raichur [I]	Coimbatore [I]	Lam [I]	Mean SZ [I]	Dharwad [R]	Perambalur [R]	Nandyal [R]	Adilabad [R]	Mean SZ [R]	Overall Mean SZ
1	11	431	**Suraksha (CC)**	2.7	3.7	4.2	**3.5**	3.4	3.3	4.5	3.9	**3.8**	**3.6**
2	9	432	CNH 3001	3.3	3.9	4.2	**3.8**	3.4	3.1	3.9	4.2	**3.7**	**3.9**
3	5	433	L 1822	2.6	3.6	3.5	**3.2**	4.0	3.8	3.7	4.1	**3.9**	**3.5**
4	4	434	**ZC [Phule Yamuna (CZ)/ Suraj (SZ)]**	3.3	4.4	4.6	**4.1**	3.6	3.4	3.9	4.2	**3.8**	**4.1**
5	6	435	NH768	2.8	3.7	3.5	**3.3**	3.0	3.2	3.5	3.3	**3.3**	**3.3**
6	3	436	AKH 2009	2.8	3.7	3.8	**3.4**	3.5	3.3	3.9	3.6	**3.6**	**3.5**
7	8	437	CNH 2219	2.9	4.5	4.2	**3.9**	3.9	4.3	3.7	4.0	**4.0**	**3.9**
8	1	438	TCH 2001	2.9	4.3	4.2	**3.8**	3.4	4.2	4.5	4.3	**4.1**	**3.9**
9	23	439	L 1651	2.3	3.3	3.6	**3.1**	2.6	3.4	3.3	3.8	**3.3**	**3.3**
10	19	440	GBHV 227	2.8	4.3	3.9	**3.7**	3.2	3.1	3.1	4.0	**3.4**	**3.8**
11	17	441	AKH 2018-6	3.0	4.1	3.7	**3.6**	3.7	3.4	4.1	4.0	**3.8**	**3.7**
12	14	442	CSH NB 101	2.7	3.6	3.5	**3.3**	3.1	3.9	3.8	4.1	**3.7**	**3.5**
13	12	443	NH761	2.7	3.7	3.2	**3.2**	3.2	3.3	3.3	3.9	**3.4**	**3.4**
14	7	444	GISV 419	2.7	3.7	3.7	**3.4**	3.1	3.0	3.7	3.7	**3.4**	**3.5**
15	2	445	BS277-24	2.6	3.3	4.2	**3.4**	2.8	3.5	4.0	3.5	**3.5**	**3.4**
16	22	446	BS144-24	3.0	3.7	5.0	**3.9**	3.6	3.6	3.3	4.6	**3.8**	**4.1**
17	25	447	KGH 2411	3.4	4.3	4.8	**4.2**	4.1	3.7	3.9	4.4	**4.0**	**4.2**
18	24	448	RHC 2018	3.8	3.9	4.1	**3.9**	3.4	3.5	3.9	4.0	**3.7**	**4.0**
19	15	449	RHC 2107	2.8	4.4	4.8	**4.0**	3.8	3.9	4.5	4.6	**4.2**	**4.2**
20	20	450	TCH 1966	2.8	4.0	4.4	**3.7**	3.4	3.4	4.1	4.1	**3.8**	**3.8**
21	13	451	GSHV 271	3.0	4.4	4.9	**4.1**	3.5	3.8	4.3	4.3	**4.0**	**4.2**
22	27	452	NDLH 2097	3.0	3.9	4.7	**3.9**	3.5	4.1	4.1	4.5	**4.1**	**4.0**
23	18	453	RHC 1904	2.6	3.6	4.3	**3.5**	3.4	3.7	3.7	5.0	**4.0**	**3.9**
24	28	454	NDLH 2092-3	3.6	4.1	4.4	**4.0**	3.3	3.3	4.3	4.3	**3.8**	**4.1**
25	21	455	CNH 3002	3.0	3.9	3.7	**3.5**	3.6	3.0	3.5	4.2	**3.6**	**3.7**
26	10	456	AKH 2002	3.2	4.5	4.5	**4.1**	4.0	4.2	3.9	4.1	**4.1**	**4.1**
27	26	457	**Local Check**	3.3	4.4	3.7	**3.8**	3.6	3.3	4.1	4.7	**3.9**	**4.0**
28	16	458	ADB755	3.1	3.7	4.0	**3.6**	3.2	2.8	3.7	4.0	**3.4**	**3.7**

Br 22b-Initial Evaluation Trial of *G. arboreum*

Seed Cotton Yield (kg/ha)

S. No.	Code I	Code II	Entry	Khandwa	Amreli	Bharuch	Akola [R]*	Jalgaon	Nagpur	Parbhani	Mean CZ	Rank
1	17	461	**Local Check**	984	1843	2339		1250	1753	1273	**1574**	4
2	21	462	NDLA 3167-1	1156	1135	1523		1100	1328	738	**1163**	16
3	8	463	GAM 316	1133	1197	1562		1149	1673	1811	**1421**	10
4	12	464	JLA 1518	974	1297	1697		967	1485	1184	**1267**	15
5	2	465	GBAV 173	1188	1139	1560		895	1313	659	**1126**	19
6	18	466	DAS 2451	1205	1275	1676		1519	2631	1891	**1700**	1
7	15	467	AKA 2016-1	1198	1377	1693		1269	1903	1522	**1494**	9
8	16	468	GAM 327	973	1467	2058		1019	1515	950	**1330**	12
9	6	469	PA 963	988	1275	1676		1021	1450	1345	**1293**	14
10	20	470	KGA- VS 2412	1253	876	1538		1024	1023	1197	**1152**	17
11	19	471	GBAV 179	985	1160	1561		949	954	635	**1041**	22
12	7	472	CNA 1089	1001	1378	1746		1241	1465	2295	**1521**	6
13	1	473	JLA 1913	971	1450	1878		1373	2105	1551	**1555**	5
14	11	474	DAS 2452	993	1462	1819		1351	2335	2172	**1689**	2
15	4	475	HD 579	1171	803	1496		1102	1221	653	**1074**	21
16	14	476	**ZC (CZ: CNA 1032/SZ: DLSa 17)**	971	1210	1664		1056	1750	1233	**1314**	13
17	10	477	CNA 1090	1266	1420	1812		1002	2440	1742	**1614**	3
18	5	478	AKA 2018-1	1335	1361	1774		1253	1898	1503	**1521**	7
19	22	479	NDLA 3163	1164	1670	2150		1102	2086	875	**1508**	8
20	9	480	HD 584	1167	942	1524		986	1336	794	**1125**	20
21	3	481	KGA- VS 2413	1162	1137	1533		1086	1780	1600	**1383**	11
22	13	482	PA 986	919	1198	1681		979	1374	714	**1144**	18
			CD @ 5 %	130	289	315.2		193	215	222		
			CV %	8	14	12.8		10	12	10		
			Local Checks	**JK 5**	**G Cot 19**	**GN Cot 29**	**AKA 8**	**JLA 505**	**AKA 8**	**PA 740**		

***Vitiated**

Br 22b-Initial Evaluation Trial of *G. arboreum*

Seed Cotton Yield (kg/ha)

S. No.	Code I	Code II	Entry	Dharwad [R]	Nandyal [R]	Mean SZ [R]	Rank
1	17	461	**Local Check**	286	1452	**869**	15
2	21	462	NDLA 3167-1	207	1907	**1057**	7
3	8	463	GAM 316	143	1878	**1011**	10
4	12	464	JLA 1518	340	2104	**1222**	3
5	2	465	GBAV 173	82	1372	**727**	19
6	18	466	DAS 2451	363	1708	**1036**	8
7	15	467	AKA 2016-1	348	1711	**1030**	9
8	16	468	GAM 327	176	1297	**737**	17
9	6	469	PA 963	194	904	**549**	21
10	20	470	KGA- VS 2412	223	900	**562**	20
11	19	471	GBAV 179	32	874	**453**	22
12	7	472	CNA 1089	348	1815	**1082**	6
13	1	473	JLA 1913	515	2826	**1671**	1
14	11	474	DAS 2452	445	1809	**1127**	5
15	4	475	HD 579	127	1803	**965**	13
16	14	476	**ZC (CZ: CNA 1032/SZ: DLSa 17)**	331	1610	**971**	12
17	10	477	CNA 1090	339	1964	**1152**	4
18	5	478	AKA 2018-1	459	1531	**995**	11
19	22	479	NDLA 3163	177	2336	**1257**	2
20	9	480	HD 584	86	1651	**869**	16
21	3	481	KGA- VS 2413	241	1217	**729**	18
22	13	482	PA 986	255	1661	**958**	14
			CD @ 5 %	67	324		
			CV %	16	12		
			Local Checks	**AKA 235**	**Yaganti**		

Br 22b-Initial Evaluation Trial of *G. arboreum*

Lint yield (kg/ha)

S. No.	Code I	Code II	Entry	Khandwa	Amreli	Bharuch	Jalgaon	Nagpur	Parbhani	Mean CZ	Dharwad [R]	Nandyal [R]	Mean SZ [R]
1	17	461	**Local Check**	384	632	819	477	610	460	**564**	97	479	**288**
2	21	462	NDLA 3167-1	464	411	520	412	454	271	**422**	74	688	**381**
3	8	463	GAM 316	446	451	547	441	563	646	**516**	51	646	**349**
4	12	464	JLA 1518	360	473	552	327	477	426	**436**	121	684	**403**
5	2	465	GBAV 173	432	405	507	312	408	234	**383**	28	450	**239**
6	18	466	DAS 2451	471	458	574	558	868	662	**599**	128	567	**348**
7	15	467	AKA 2016-1	447	514	597	477	657	551	**541**	128	618	**373**
8	16	468	GAM 327	353	570	737	386	532	358	**489**	64	461	**263**
9	6	469	PA 963	369	457	592	346	485	471	**453**	67	312	**190**
10	20	470	KGA- VS 2412	497	287	494	341	302	382	**384**	70	311	**191**
11	19	471	GBAV 179	374	406	526	366	302	219	**366**	11	301	**156**
12	7	472	CNA 1089	371	479	582	441	470	812	**526**	124	628	**376**
13	1	473	JLA 1913	381	533	626	536	690	552	**553**	194	967	**581**
14	11	474	DAS 2452	385	563	652	506	802	758	**611**	161	652	**407**
15	4	475	HD 579	460	333	607	436	456	259	**425**	53	678	**366**
16	14	476	**ZC (CZ: CNA 1032/SZ: DLSa 17)**	383	423	571	380	576	434	**461**	115	515	**315**
17	10	477	CNA 1090	491	491	584	346	773	570	**543**	113	689	**401**
18	5	478	AKA 2018-1	482	496	642	488	681	575	**561**	182	560	**371**
19	22	479	NDLA 3163	455	624	730	401	674	295	**530**	64	752	**408**
20	9	480	HD 584	458	361	597	379	473	316	**431**	34	561	**298**
21	3	481	KGA- VS 2413	466	367	493	355	520	513	**452**	76	414	**245**
22	13	482	PA 986	332	414	547	355	435	242	**388**	85	570	**328**

Br 22b-Initial Evaluation Trial of *G. arboreum*

Ginning Outturn (%)

S. No.	Code I	Code II	Entry	Khandwa	Amreli	Bharuch	Jalgaon	Nagpur	Parbhani	Mean CZ	Dharwad [R]	Nandyal [R]	Mean SZ [R]
1	17	461	**Local Check**	36.1	34.3	35.0	38.2	34.8	36.1	**35.8**	33.9	33.0	**33.5**
2	21	462	NDLA 3167-1	37.2	36.2	34.2	37.5	34.2	36.7	**36.0**	35.8	36.1	**36.0**
3	8	463	GAM 316	36.4	37.7	35.0	38.4	33.7	35.7	**36.2**	35.6	34.4	**35.0**
4	12	464	JLA 1518	34.2	36.5	32.5	33.8	32.1	36.0	**34.2**	35.7	32.5	**34.1**
5	2	465	GBAV 173	33.7	35.5	32.5	34.9	31.1	35.5	**33.9**	33.6	32.8	**33.2**
6	18	466	DAS 2451	36.2	35.9	34.3	36.7	33.0	35.0	**35.2**	35.4	33.2	**34.3**
7	15	467	AKA 2016-1	34.5	37.4	35.3	37.6	34.6	36.2	**35.9**	36.9	36.1	**36.5**
8	16	468	GAM 327	33.6	38.9	35.8	37.9	35.1	37.7	**36.5**	36.5	35.5	**36.0**
9	6	469	PA 963	34.6	35.8	35.4	33.9	33.4	35.0	**34.7**	34.7	34.5	**34.6**
10	20	470	KGA- VS 2412	36.7	32.8	32.1	33.3	29.6	31.9	**32.7**	31.5	34.5	**33.0**
11	19	471	GBAV 179	35.2	35.0	33.7	38.6	31.7	34.7	**34.8**	35.1	34.4	**34.8**
12	7	472	CNA 1089	34.3	34.8	33.3	35.6	32.1	35.4	**34.3**	35.5	34.6	**35.1**
13	1	473	JLA 1913	36.3	36.7	33.3	39.1	32.8	35.6	**35.6**	37.8	34.2	**36.0**
14	11	474	DAS 2452	35.9	38.5	35.8	37.5	34.3	34.8	**36.1**	36.1	36.0	**36.1**
15	4	475	HD 579	36.4	41.5	40.6	39.6	37.4	39.7	**39.2**	41.4	37.6	**39.5**
16	14	476	**ZC (CZ: CNA 1032/SZ: DLSa 17)**	36.5	35.1	34.3	36.0	32.9	35.1	**35.0**	34.8	32.0	**33.4**
17	10	477	CNA 1090	36.7	34.6	32.2	34.6	31.7	32.7	**33.8**	33.3	35.1	**34.2**
18	5	478	AKA 2018-1	37.1	36.5	36.2	38.9	35.9	38.2	**37.1**	39.7	36.6	**38.2**
19	22	479	NDLA 3163	36.2	37.4	34.0	36.4	32.3	33.8	**35.0**	36.0	32.2	**34.1**
20	9	480	HD 584	36.3	38.5	39.2	38.4	35.4	39.8	**37.9**	39.5	34.0	**36.8**
21	3	481	KGA- VS 2413	37.1	32.4	32.1	32.7	29.2	32.1	**32.6**	31.8	34.0	**32.9**
22	13	482	PA 986	33.5	34.5	32.6	36.2	31.7	33.8	**33.7**	33.4	34.3	**33.9**

Br 22b-Initial Evaluation Trial of *G. arboreum*

Bolls/Plant

S. No.	Code I	Code II	Entry	Khandwa	Amreli	Bharuch	Jalgaon	Nagpur	Parbhani	Mean CZ	Dharwad [R]	Nandyal [R]	Mean SZ [R]
1	17	461	**Local Check**	29.5	29.3	31.2	15.6	27.9	11.7	**24.2**	4.7	21.7	**13.2**
2	21	462	NDLA 3167-1	37.5	24.7	20.3	12.8	21.7	7.3	**20.7**	4.5	28.4	**16.5**
3	8	463	GAM 316	35.4	23.0	20.3	13.7	30.5	11.3	**22.4**	4.0	19.9	**12.0**
4	12	464	JLA 1518	28.3	21.3	20.6	11.4	30.1	12.0	**20.6**	5.8	24.7	**15.3**
5	2	465	GBAV 173	33.0	24.3	19.5	10.2	27.6	7.3	**20.3**	3.5	23.0	**13.3**
6	18	466	DAS 2451	34.4	20.2	20.0	17.6	32.3	15.3	**23.3**	4.9	20.0	**12.5**
7	15	467	AKA 2016-1	33.1	25.1	23.3	13.2	28.7	14.7	**23.0**	4.1	20.0	**12.1**
8	16	468	GAM 327	32.2	28.3	26.0	11.6	31.5	8.3	**23.0**	4.0	18.0	**11.0**
9	6	469	PA 963	30.5	19.5	20.9	10.6	25.2	12.3	**19.8**	4.0	17.0	**10.5**
10	20	470	KGA- VS 2412	35.2	14.3	18.4	11.0	26.5	8.7	**19.0**	4.0	18.0	**11.0**
11	19	471	GBAV 179	32.1	20.0	17.8	11.2	24.3	4.7	**18.4**	2.3	19.0	**10.7**
12	7	472	CNA 1089	29.0	20.3	23.9	14.1	34.7	18.0	**23.3**	6.5	21.5	**14.0**
13	1	473	JLA 1913	25.5	21.2	23.5	15.3	27.9	14.0	**21.2**	5.8	32.3	**19.1**
14	11	474	DAS 2452	24.4	18.0	23.0	15.9	26.3	15.7	**20.6**	5.7	19.8	**12.8**
15	4	475	HD 579	31.3	20.3	19.3	13.2	25.5	7.3	**19.5**	3.2	20.0	**11.6**
16	14	476	**ZC (CZ: CNA 1032/SZ: DLSa 17)**	24.5	20.3	23.9	12.6	28.4	11.7	**20.2**	6.2	18.2	**12.2**
17	10	477	CNA 1090	35.3	20.0	25.0	11.0	27.1	13.0	**21.9**	5.2	19.7	**12.5**
18	5	478	AKA 2018-1	35.5	18.0	18.6	14.5	21.6	13.0	**20.2**	4.3	20.5	**12.4**
19	22	479	NDLA 3163	26.1	18.3	28.3	11.4	27.5	8.7	**20.1**	3.8	28.9	**16.4**
20	9	480	HD 584	27.3	16.3	19.4	7.6	23.7	7.0	**16.9**	3.0	22.8	**12.9**
21	3	481	KGA- VS 2413	27.4	20.5	20.2	11.6	29.9	15.0	**20.8**	4.5	16.8	**10.7**
22	13	482	PA 986	25.1	17.3	18.3	8.2	27.5	8.3	**17.5**	4.6	16.7	**10.7**

Br 22b-Initial Evaluation Trial of *G. arboreum*

Boll weight (g/boll)

S. No.	Code I	Code II	Entry	Khandwa	Amreli	Bharuch	Jalgaon	Nagpur	Parbhani	Mean CZ	Dharwad [R]	Nandyal [R]	Mean SZ [R]
1	17	461	**Local Check**	3.7	2.1	2.0	1.9	2.9	2.8	**2.6**	2.5	2.4	**2.5**
2	21	462	NDLA 3167-1	3.5	2.1	2.0	2.1	2.6	2.3	**2.4**	2.1	2.5	**2.3**
3	8	463	GAM 316	3.8	2.1	2.1	2.0	2.7	2.5	**2.5**	2.8	2.7	**2.8**
4	12	464	JLA 1518	3.9	2.1	2.2	1.8	2.2	2.4	**2.4**	2.3	2.4	**2.4**
5	2	465	GBAV 173	3.1	2.1	2.2	1.5	2.9	2.4	**2.4**	2.7	2.5	**2.6**
6	18	466	DAS 2451	3.4	2.4	2.3	1.9	3.0	2.9	**2.7**	2.8	2.9	**2.9**
7	15	467	AKA 2016-1	4.2	2.4	2.0	1.8	2.7	2.9	**2.7**	2.9	2.5	**2.7**
8	16	468	GAM 327	3.5	2.2	2.1	1.9	2.7	2.6	**2.5**	2.7	2.7	**2.7**
9	6	469	PA 963	3.4	2.3	2.2	1.9	2.6	2.6	**2.5**	2.5	2.5	**2.5**
10	20	470	KGA- VS 2412	3.5	2.3	2.3	1.8	3.1	2.5	**2.6**	2.6	2.7	**2.7**
11	19	471	GBAV 179	4.3	2.6	2.4	1.5	2.9	2.8	**2.8**	2.9	2.3	**2.6**
12	7	472	CNA 1089	4.3	2.3	2.0	2.0	2.4	3.0	**2.7**	2.6	2.5	**2.6**
13	1	473	JLA 1913	3.6	2.2	2.2	1.8	2.6	2.6	**2.5**	2.6	2.7	**2.7**
14	11	474	DAS 2452	4.2	2.2	2.1	1.6	2.7	2.9	**2.6**	2.8	2.4	**2.6**
15	4	475	HD 579	3.9	1.8	2.1	1.7	3.2	2.5	**2.5**	3.3	2.7	**3.0**
16	14	476	**ZC (CZ: CNA 1032/SZ: DLSa 17)**	3.9	2.0	1.9	1.8	2.6	2.4	**2.4**	2.5	2.7	**2.6**
17	10	477	CNA 1090	3.1	2.1	2.0	1.9	2.6	2.7	**2.4**	2.6	2.7	**2.7**
18	5	478	AKA 2018-1	4.0	2.7	2.6	1.8	4.3	2.9	**3.1**	3.3	2.9	**3.1**
19	22	479	NDLA 3163	3.9	2.4	2.1	1.8	2.7	2.5	**2.6**	2.6	2.9	**2.8**
20	9	480	HD 584	3.6	1.8	2.1	1.5	2.8	2.4	**2.4**	2.6	2.8	**2.7**
21	3	481	KGA- VS 2413	3.5	2.1	2.1	1.8	3.0	2.8	**2.6**	2.6	2.4	**2.5**
22	13	482	PA 986	3.9	2.5	2.5	2.0	2.8	2.5	**2.7**	2.7	2.8	**2.8**

Br 25a/b – Preliminary Hybrid Trial of Desi Hybrid

Seed Cotton Yield (Kg/ha)

S. No.	Code I	Code II	New Entries	Amreli	Akola*	Parbhani	Viramgam	Mean CZ	Rank
1	3	491	AAH 53	1709		927	942	**1193**	6
2	8	492	KR 166	2237		1700	1100	**1679**	2
3	5	493	GVDH 111/22	1684		1015	1304	**1334**	4
4	2	494	**ZC (NACH 560)**	2001		2507	1058	**1855**	1
5	6	495	AAH 51	2215		1111	1154	**1493**	3
6	4	496	CISAA 23-2	1632		751	827	**1070**	7
7	1	497	GVDH 145/22	374		700	1168	**747**	8
8	7	498	**Local Check**	1814		811	1008	**1211**	5
			CD @ 5 %	354		234	250		
			CV %	12		11	13		
			Local Checks	**G Cot MDH 11**	**PKV DH 1**	**PKV DH 1**	**G Cot MDH 11**		

***Vitiated**

Lint Yield (kg/ha)

S. No.	Code I	Code II	New Entries	Amreli	Parbhani	Viramgam	Mean CZ
1	3	491	AAH 53	687	378	359	**475**
2	8	492	KR 166	923	683	438	**681**
3	5	493	GVDH 111/22	576	320	351	**416**
4	2	494	**ZC (NACH 560)**	736	936	388	**687**
5	6	495	AAH 51	866	458	448	**591**
6	4	496	CISAA 23-2	676	306	324	**435**
7	1	497	GVDH 145/22	124	244	345	**238**
8	7	498	**Local Check**	643	299	340	**427**

Br 25a/b – Preliminary Hybrid Trial of Desi Hybrid

Ginning outturn (%)

S. No.	Code I	Code II	New Entries	Amreli	Parbhani	Viramgam	Mean CZ
1	3	491	AAH 53	40.2	40.8	38.1	**40**
2	8	492	KR 166	41.3	40.1	39.9	**40**
3	5	493	GVDH 111/22	34.2	31.5	26.9	**31**
4	2	494	**ZC (NACH 560)**	36.8	37.3	36.7	**37**
5	6	495	AAH 51	39.2	41.2	38.8	**40**
6	4	496	CISAA 23-2	41.4	40.6	39.1	**40**
7	1	497	GVDH 145/22	33.3	35.0	29.6	**33**
8	7	498	**Local Check**	35.5	36.8	33.7	**35**

Bolls/plant

S. No.	Code I	Code II	New Entries	Amreli	Parbhani	Viramgam	Mean CZ
1	3	491	AAH 53	21.7	11.0	85.0	**39**
2	8	492	KR 166	28.3	15.0	63.0	**35**
3	5	493	GVDH 111/22	26.0	11.0	97.0	**45**
4	2	494	**ZC (NACH 560)**	19.7	17.0	41.0	**26**
5	6	495	AAH 51	31.7	12.3	91.0	**45**
6	4	496	CISAA 23-2	24.8	8.7	68.0	**34**
7	1	497	GVDH 145/22	11.3	10.7	86.0	**36**
8	7	498	**Local Check**	24.7	9.7	66.0	**33**

Boll weight (g)

S. No.	Code I	Code II	New Entries	Amreli	Parbhani	Viramgam	Mean CZ
1	3	491	AAH 53	2.5	2.5	2.7	**3**
2	8	492	KR 166	2.4	2.8	2.3	**3**
3	5	493	GVDH 111/22	2.2	2.5	2.5	**2**
4	2	494	**ZC (NACH 560)**	3.1	2.9	2.5	**3**
5	6	495	AAH 51	2.2	2.6	2.3	**2**
6	4	496	CISAA 23-2	2.4	2.5	2.7	**3**
7	1	497	GVDH 145/22	2.3	2.5	2.5	**2**
8	7	498	**Local Check**	2.2	2.5	2.5	**2**

Br 32b – Initial Evaluation Trial of *G. herbaceum*

Seed Cotton Yield (Kg/ha)

S. No.	Code I	Code II	New Entries	Surat	Bharuch	Viramgam	Kukada	Dhanduka	Mean CZ	Rank
1	6	501	GVhv 1338	668	1714	1451	1249	1352	1287	1
2	9	502	GBhv 391	590	1254	927	729	927	885	10
3	7	503	GShv 836/17	848	1459	974	742	902	985	5
4	2	504	GBhv 402	671	1338	1143	941	638	946	8
5	11	505	**Local Check**	787	1287	878	603	561	823	12
6	4	506	GShv 918/17	671	1428	893	819	832	929	9
7	12	507	GVhv 1350	767	1157	1232	1101	1226	1097	3
8	3	508	**ZC (GN Cot 25)**	715	1284	1035	1163	942	1028	4
9	5	509	GBhv 401	625	1369	933	771	1094	958	7
10	8	510	GVhv 1073	561	1592	1257	1215	1173	1160	2
11	10	511	DDhc -2451	862	1211	941	890	965	974	6
12	1	512	GVhv 1262	657	1123	1037	1047	454	864	11
			CD @ 5 %	140	301	180	134	238		
			CV %	12	10	10	8.45	15		
			Local Checks	**GN. Cot.27**	**GN.Cot.27**	**GADC 3**	**GN.Cot.27**	**GADC 3**		

Lint Yield (kg/ha)

S. No.	Code I	Code II	New Entries	Surat	Bharuch	Viramgam	Kukada	Dhanduka	Mean CZ
1	6	501	GVhv 1338	206	555	559	481	408	442
2	9	502	GBhv 391	186	445	368	244	258	300
3	7	503	GShv 836/17	249	485	341	250	237	312
4	2	504	GBhv 402	216	531	416	330	179	334
5	11	505	**Local Check**	236	474	331	196	168	281
6	4	506	GShv 918/17	196	499	330	281	237	309
7	12	507	GVhv 1350	228	435	394	401	314	354
8	3	508	**ZC (GN Cot 25)**	214	471	345	432	238	340
9	5	509	GBhv 401	196	487	326	262	328	320
10	8	510	GVhv 1073	161	496	476	459	332	385
11	10	511	DDhc -2451	268	418	355	309	284	327
12	1	512	GVhv 1262	197	457	378	376	132	308

Br 32b – Initial Evaluation Trial of *G. herbaceum*

Ginning outturn (%)

S. No.	Code I	Code II	New Entries	Surat	Bharuch	Viramgam	Kukada	Dhanduka	Mean CZ
1	6	501	GVhv 1338	30.8	32.4	38.5	38.5	30.3	34.1
2	9	502	GBhv 391	31.5	35.5	39.9	33.4	27.8	33.6
3	7	503	GShv 836/17	29.3	33.3	35.0	33.8	26.3	31.5
4	2	504	GBhv 402	32.2	39.7	36.4	35.2	28.0	34.3
5	11	505	**Local Check**	30.1	36.8	37.8	32.6	30.0	33.5
6	4	506	GShv 918/17	29.3	35.0	36.9	34.3	28.6	32.8
7	12	507	GVhv 1350	29.7	37.6	32.0	36.5	25.6	32.3
8	3	508	**ZC (GN Cot 25)**	29.9	36.7	33.3	37.1	25.3	32.5
9	5	509	GBhv 401	31.3	35.6	35.3	34.0	30.0	33.2
10	8	510	GVhv 1073	28.7	31.2	37.8	37.8	28.3	32.8
11	10	511	DDhc -2451	31.1	34.5	37.7	34.7	29.4	33.5
12	1	512	GVhv 1262	29.9	40.7	36.4	35.9	29.1	34.4

Bolls/plant

S. No.	Code I	Code II	New Entries	Surat	Bharuch	Viramgam	Kukada	Dhanduka	Mean CZ
1	6	501	GVhv 1338	20.4	42.6	77.0	34.5	52.7	45.4
2	9	502	GBhv 391	18.2	31.4	61.0	19.7	42.5	34.6
3	7	503	GShv 836/17	28.1	39.9	73.0	18.3	39.8	39.8
4	2	504	GBhv 402	22.8	36.4	63.0	24.2	29.8	35.2
5	11	505	**Local Check**	23.0	37.5	61.0	14.7	25.1	32.3
6	4	506	GShv 918/17	23.8	36.6	73.0	20.9	34.9	37.8
7	12	507	GVhv 1350	26.9	31.7	64.0	27.7	36.6	37.4
8	3	508	**ZC (GN Cot 25)**	18.9	29.2	61.0	29.7	31.4	34.0
9	5	509	GBhv 401	17.4	34.2	63.0	19.9	41.3	35.2
10	8	510	GVhv 1073	17.1	40.3	55.0	31.9	41.4	37.1
11	10	511	DDhc -2451	33.3	32.5	55.0	22.6	41.0	36.9
12	1	512	GVhv 1262	23.0	28.4	64.0	24.6	22.1	32.4

Boll weight (g)

S. No.	Code I	Code II	New Entries	Surat	Bharuch	Viramgam	Kukada	Dhanduka	Mean CZ
1	6	501	GVhv 1338	1.8	2.2	2.5	2.7	2.2	2.3
2	9	502	GBhv 391	1.8	2.2	1.5	1.9	1.9	1.9
3	7	503	GShv 836/17	1.6	2.0	2.3	2.0	2.0	2.0
4	2	504	GBhv 402	1.6	2.0	2.3	2.2	2.1	2.0
5	11	505	**Local Check**	1.9	1.9	1.7	1.9	2.1	1.9
6	4	506	GShv 918/17	1.5	2.1	2.3	2.1	2.2	2.0
7	12	507	GVhv 1350	1.6	2.0	1.9	2.4	2.6	2.1
8	3	508	**ZC (GN Cot 25)**	2.0	2.4	2.3	2.5	2.5	2.3
9	5	509	GBhv 401	2.0	2.2	2.5	2.0	2.1	2.2
10	8	510	GVhv 1073	1.8	2.1	2.1	2.6	2.3	2.2
11	10	511	DDhc -2451	1.4	2.0	1.5	2.1	2.1	1.8
12	1	512	GVhv 1262	1.5	2.1	1.7	2.3	2.1	1.9

Central Zone Trials

Br 03a – Preliminary Varietal Trial –Coloured *G. hirsutum* (Central Zone)

Seed Cotton Yield (Kg/ha)

S. No.	Code-I	Code -II	Entry	Khandwa (I)	Junagadh (I)	Talod (I)	Surat (R)	Akola [R]*	Nagpur (R)	Mean CZ	Rank
1	3	4141	FC4001	1607	1196	921	760		1702	**1237**	4
2	6	4142	CNH-22196 (CC)	1428	1042	474	784		1105	**967**	7
3	1	4143	CNH-22197 (CC)	1520	810	159	1020		577	**817**	8
4	5	4144	FC 4002	1553	1029	858	803		1421	**1133**	6
5	7	4145	FC 4003	1334	1106	924	758		1668	**1158**	5
6	4	4146	**Local Check**	1202	1967	1230	960		2082	**1488**	2
7	2	4147	**Phule Yamuna (ZC)**	1259	2315	1152	1334		2225	**1657**	1
8	8	4148	16301 DB	1553	1646	535	1571		2074	**1476**	3
			CD @ 5 %	194	412	149	219		581		
			CV %	6	17	11	13				
			Local Checks	**JK 4**	**G Cot 38**	**G Cot 38**	**GN Cot 22**	**AKH 8828**	**AKH 8828**		

***Vitiated**

Lint Yield (kg/ha)

S. No.	Code -I	Code - II	Entry	Khandwa (I)	Junagadh (I)	Talod (I)	Surat (R)	Nagpur (R)	Mean CZ
1	3	4141	FC4001	593	386	290	223	531	**405**
2	6	4142	CNH-22196 (CC)	488	299	134	214	313	**290**
3	1	4143	CNH-22197 (CC)	544	263	47	295	171	**264**
4	5	4144	FC 4002	558	297	252	216	390	**343**
5	7	4145	FC 4003	458	328	279	208	476	**350**
6	4	4146	**Local Check**	418	673	441	302	669	**501**
7	2	4147	**Phule Yamuna (ZC)**	444	756	378	414	702	**539**
8	8	4148	16301 DB	539	579	188	503	678	**497**

Br 03a – Preliminary Varietal Trial –Coloured *G. hirsutum* (Central Zone)

Ginning outturn (%)

S. No.	Code-I	Code - II	Entry	Khandwa (I)	Junagadh (I)	Talod (I)	Surat (R)	Nagpur (R)	Mean CZ
1	3	4141	FC4001	34.1	32.2	31.5	29.3	31.2	**31.7**
2	6	4142	CNH-22196 (CC)	28.0	28.7	28.3	27.4	28.3	**28.1**
3	1	4143	CNH-22197 (CC)	31.5	32.3	30.0	28.9	29.7	**30.5**
4	5	4144	FC 4002	31.8	29.0	29.5	26.9	27.4	**28.9**
5	7	4145	FC 4003	27.5	29.7	30.2	27.6	28.6	**28.7**
6	4	4146	**Local Check**	26.5	34.3	35.8	31.2	32.1	**32.0**
7	2	4147	**Phule Yamuna (ZC)**	28.5	32.7	32.8	31.0	31.6	**31.3**
8	8	4148	16301 DB	32.1	35.2	35.1	32.1	32.7	**33.4**

Bolls/plant

S. No.	Code-I	Code - II	Entry	Khandwa (I)	Junagadh (I)	Talod (I)	Surat (R)	Nagpur (R)	Mean CZ
1	3	4141	FC4001	23.2	17.9	22.7	17.6	19.6	**20.2**
2	6	4142	CNH-22196 (CC)	17.2	17.0	10.9	18.6	20.9	**16.9**
3	1	4143	CNH-22197 (CC)	18.7	14.6	4.7	24.0	19.5	**16.3**
4	5	4144	FC 4002	19.2	15.4	18.7	17.6	19.2	**18.0**
5	7	4145	FC 4003	15.1	18.3	20.8	17.7	20.1	**18.4**
6	4	4146	**Local Check**	13.7	28.4	23.7	19.3	24.3	**21.9**
7	2	4147	**Phule Yamuna (ZC)**	14.0	31.9	24.5	28.2	28.0	**25.3**
8	8	4148	16301 DB	21.7	23.2	12.5	29.4	21.3	**21.6**

Boll weight (g)

S. No.	Code-I	Code - II	Entry	Khandwa (I)	Junagadh (I)	Talod (I)	Surat (R)	Nagpur (R)	Mean CZ
1	3	4141	FC4001	4.7	4.1	2.9	3.1	3.5	**3.7**
2	6	4142	CNH-22196 (CC)	4.2	3.7	3.2	2.7	3.8	**3.5**
3	1	4143	CNH-22197 (CC)	4.1	3.6	2.4	2.7	3.5	**3.3**
4	5	4144	FC 4002	4.0	4.3	3.3	3.0	3.7	**3.7**
5	7	4145	FC 4003	4.2	3.7	3.2	3.1	3.8	**3.6**
6	4	4146	**Local Check**	4.2	4.0	3.8	3.0	3.6	**3.7**
7	2	4147	**Phule Yamuna (ZC)**	4.7	4.2	3.4	2.8	3.2	**3.7**
8	8	4148	16301 DB	4.7	4.2	3.1	3.0	3.8	**3.8**

Br 03c – Preliminary Varietal Trial –*G. hirsutum* under organic condition

Seed Cotton Yield (Kg/ha)

S. No.	Code I	Code II	Entry	Khandwa (i)	Rahuri (I)	Bhawanipatna (i)	Talod (I)	Akola [R]	Parbhani [R]	Nagpur [R]	Surat [R]
1	10	4101	AKH 1514	1456	976	917	906			1150	1305
2	4	4102	GSHV 269	1042	483	1000	815			1303	821
3	2	4103	**ZC [Phule Yamuna]**	1648	1055	1102	558			1204	1156
4	7	4104	**Local Check**	1716	1255	935	770			1281	1183
5	6	4105	GBHV 257	1660	1019	1259	681			1353	1230
6	1	4106	AKH 2018-7	1558	1208	963	782			1147	1053
7	9	4107	**Suraksha (CC)**	1759	861	954	668			962	897
8	5	4108	GSHV 266	927	567	741	815			1291	874
9	8	4109	TCH 1999	1738	1176	1148	680			864	899
10	3	4110	AKH 10-3	1087	587	917	597			1101	786
			CD @ 5 %	320	287	196	121			281	206
			CV %	9	18	11	10			9	12
			Local Checks	**JK 4**	**Phule 688**	**BS 30**	**GN.Cot. 32**	**AKH 8828**	**NH 545**	**AKH 8828**	**GN. Cot. 26**

***Vitiated**

All entries were Bt positive as tested in ICAR-CICR, Nagpur and hence rejected

Code	Replication	Cry 1Ac positive/no. of plant tested
4101	1	4-10
4101	2	7-10
4102	1	7-10
4102	2	5-10
4103	1	7-10
4103	2	7-10
4104	1	1-7
4104	2	1-10
4105	1	9-10
4105	2	8-10
4106	1	6-10
4106	2	10-10
4107	1	1-10
4107	2	1-10
4108	1	10-10
4108	2	10-10
4109	1	1-10
4109	2	0/10
4110	1	3-10
4110	2	4-10

Br 05c – Coordinated Hybrid Trial of HXH hybrids in organic situation (Central Zone)

Seed Cotton Yield (Kg/ha)

S. No.	Code I	Code II	Entries	Khandwa (i)	Rahuri (I)	Bhawanipatna (i)	Talod (I)	Mean CZ [I]	Rank	Akola [R]*	Nanded [R]*	Nagpur [R]	Surat [R]	Mean CZ [R]	Rank	Overall Mean CZ	Rank
1	5	4121	KGHH-bio-2409	1534	1422	1194	1021	**1293**	2			1241	1770	**1506**	6	**1364**	1
2	10	4122	KGHH -VS-2318-1	1063	1583	1019	924	**1147**	9			1401	1404	**1403**	10	**1069**	9
3	7	4123	GSHH 08/2019#	1540	1444	1130	1052	**1292**	3			1588	1618	**1603**	4	**1208**	3
4	1	4124	Partech 29	1725	-	731	1179	**1212**	7			1619	1827	**1723**	2	**1186**	4
5	9	4125	Partech 30	1747	1387	991	1063	**1297**	1			1817	1595	**1706**	3	**1237**	2
6	2	4126	**Bunny (CC)**	1736	1453	981	873	**1261**	5			1511	1479	**1495**	7	**1162**	6
7	8	4127	**ZC (NHH 44)**	938	1322	861	862	**996**	10			1412	1415	**1414**	9	**977**	10
8	4	4128	Partech 30 Plus	1556	1079	981	987	**1151**	8			1614	2013	**1814**	1	**1174**	5
9	6	4129	Partech 28	1756	1249	935	985	**1231**	6			1578	1461	**1520**	5	**1150**	8
10	3	4130	KGHH- bio- 2408	1602	1320	1247	880	**1262**	4			1478	1463	**1471**	8	**1157**	7
			CD @ 5 %	410	322	189	NS					332	347				
			CV %	10	14	11	13					8	13				

***Vitiated**
#Bt positive and hence rejected

Lint Yield (kg/ha)

S. No.	Code I	Code II	Entries	Khandwa (i)	Rahuri (I)	Bhawanipatna (i)	Talod (I)	Mean CZ [I]	Nagpur [R]	Surat [R]	Mean CZ [R]	Overall Mean CZ
1	5	4121	KGHH-bio-2409	565	524	432	381	**476**	447	635	**541**	**497**
2	10	4122	KGHH -VS-2318-1	387	532	359	304	**396**	464	412	**438**	**408**
3	7	4123	GSHH 08/2019	568	492	352	358	**443**	542	530	**536**	**469**
4	1	4124	Partech 29	621	-	224	370	**405**	511	539	**525**	**445**
5	9	4125	Partech 30	638	460	333	337	**442**	576	471	**524**	**465**
6	2	4126	**Bunny (CC)**	623	484	365	287	**440**	484	436	**460**	**446**
7	8	4127	**Zonal Check (NHH 44)**	344	489	298	302	**358**	494	469	**482**	**393**
8	4	4128	Partech 30 Plus	557	366	320	318	**390**	504	574	**539**	**433**
9	6	4129	Partech 28	634	379	328	301	**411**	468	404	**436**	**418**
10	3	4130	KGHH- bio- 2408	604	462	494	313	**468**	521	492	**507**	**479**

Br 05c – Coordinated Hybrid Trial of HXH hybrids in organic situation (Central Zone)

Ginning outturn (%)

S. No.	Code I	Code II	Entries	Khandwa (i)	Rahuri (I)	Bhawanipatna (i)	Talod (I)	Mean CZ [I]	Nagpur [R]	Surat [R]	Mean CZ [R]	Overall Mean CZ
1	5	4121	KGHH-bio-2409	36.8	36.8	37.4	37.3	**37.1**	36.0	35.9	**36.0**	**36.7**
2	10	4122	KGHH -VS-2318-1	36.4	33.6	33.7	32.8	**34.1**	33.1	29.4	**31.3**	**33.2**
3	7	4123	GSHH 08/2019	36.9	34.1	33.4	34.0	**34.6**	34.1	32.8	**33.5**	**34.2**
4	1	4124	Partech 29	36.0	-	31.7	31.4	**33.0**	31.6	29.5	**30.6**	**32.0**
5	9	4125	Partech 30	36.5	33.2	31.5	31.7	**33.2**	31.7	29.5	**30.6**	**32.4**
6	2	4126	**Bunny (CC)**	36.1	33.3	32.9	32.8	**33.8**	32.0	29.5	**30.8**	**32.8**
7	8	4127	**Zonal Check (NHH 44)**	36.7	37.0	31.5	35.0	**35.1**	35.0	33.2	**34.1**	**34.7**
8	4	4128	Partech 30 Plus	36.2	34.0	31.2	32.1	**33.4**	31.2	28.6	**29.9**	**32.2**
9	6	4129	Partech 28	36.1	30.3	31.7	30.6	**32.2**	29.7	27.4	**28.6**	**31.0**
10	3	4130	KGHH- bio- 2408	37.7	35.0	34.3	35.6	**35.7**	35.2	33.7	**34.5**	**35.3**

Bolls/plant

S. No.	Code I	Code II	Entries	Khandwa (i)	Rahuri (I)	Bhawanipatna (i)	Talod (I)	Mean CZ [I]	Nagpur [R]	Surat [R]	Mean CZ [R]	Overall Mean CZ
1	5	4121	KGHH-bio-2409	21.6	28.4	21.6	22.4	**23.5**	14.9	25.5	**20.2**	**22.4**
2	10	4122	KGHH -VS-2318-1	18.3	28.3	19.9	19.6	**21.5**	16.5	19.4	**18.0**	**20.3**
3	7	4123	GSHH 08/2019	22.1	33.7	20.1	22.8	**24.7**	20.2	24.5	**22.4**	**23.9**
4	1	4124	Partech 29	22.3	-	15.7	26.9	**21.6**	18.8	26.2	**22.5**	**22.0**
5	9	4125	Partech 30	23.8	30.9	16.7	22.5	**23.5**	21.7	23.8	**22.8**	**23.2**
6	2	4126	**Bunny (CC)**	23.6	27.2	16.5	19.5	**21.7**	16.5	20.6	**18.6**	**20.7**
7	8	4127	**Zonal Check (NHH 44)**	18.5	28.4	18.4	23.5	**22.2**	22.4	25.0	**23.7**	**22.7**
8	4	4128	Partech 30 Plus	22.0	30.0	20.0	20.9	**23.2**	16.3	27.4	**21.9**	**22.8**
9	6	4129	Partech 28	25.5	30.1	18.9	22.0	**24.1**	17.9	20.6	**19.3**	**22.5**
10	3	4130	KGHH- bio- 2408	21.7	31.7	23.1	19.9	**24.1**	21.1	24.0	**22.6**	**23.6**

Br 05c – Coordinated Hybrid Trial of HXH hybrids in organic situation (Central Zone)

Boll weight (g)

S. No.	Code I	Code II	Entries	Khandwa (i)	Rahuri (I)	Bhawanipatna (i)	Talod (I)	Mean CZ [I]	Nagpur [R]	Surat [R]	Mean CZ [R]	Overall Mean CZ
1	5	4121	KGHH-bio-2409	4.5	5.1	3.9	4.2	**4.4**	3.8	3.7	**3.8**	**4.2**
2	10	4122	KGHH -VS-2318-1	4.3	5.9	4.1	4.4	**4.7**	4.0	3.9	**4.0**	**4.4**
3	7	4123	GSHH 08/2019	4.6	4.2	4.0	4.3	**4.3**	3.8	3.6	**3.7**	**4.1**
4	1	4124	Partech 29	5.1	-	3.6	4.0	**4.2**	3.7	3.8	**3.8**	**4.0**
5	9	4125	Partech 30	5.4	5.1	4.1	4.3	**4.7**	4.4	3.6	**4.0**	**4.5**
6	2	4126	**Bunny (CC)**	5.3	5.3	3.9	4.2	**4.7**	3.9	3.9	**3.9**	**4.4**
7	8	4127	**Zonal Check (NHH 44)**	4.2	5.1	3.6	3.4	**4.1**	3.0	3.1	**3.1**	**3.7**
8	4	4128	Partech 30 Plus	4.8	5.9	3.3	4.4	**4.6**	4.6	4.0	**4.3**	**4.5**
9	6	4129	Partech 28	5.1	4.2	4.0	4.1	**4.4**	4.0	3.8	**3.9**	**4.2**
10	3	4130	KGHH- bio- 2408	4.7	4.4	3.7	4.1	**4.2**	3.5	3.3	**3.4**	**4.0**

Br 24b – Coordinated Variety Trial - *G. arboreum* - (Central Zone)

Seed Cotton Yield (Kg/ha)

S. No.	Code-I	Code -II	Entries	Amreli	Khandwa	Nagpur	Akola*	Jalgaon	Parbhani	Mean CZ	Rank
1	6	4151	**ZC (CNA1032)**	1528	1213	1667		1167	1532	**1421**	4
2	7	4152	CNA 1085	1731	1124	1965		1180	1715	**1543**	2
3	5	4153	JLA 1707	1958	1131	2196		1243	1223	**1550**	1
4	1	4154	GAM 296	1525	1010	1432		949	802	**1144**	7
5	4	4155	**Local Check**	1865	900	1792		1314	1101	**1394**	5
6	3	4156	CNA 2248	1482	1111	1594		1047	1025	**1252**	6
7	8	4157	AKA 2016-3	1703	1253	1690		1093	1631	**1474**	3
8	2	4158	CNA - 2249 (CC)	904	1337	1105		984	953	**1057**	8
			CD @ 5 %	217	181	621		183	203		
			CV %	9	7	17		11	9		
			Local Checks	**G Cot 19**	**JK 5**	**AKA 8**	**AKA 8**	**JLA 505**	**PA 740**		

***Vitiated**

Lint Yield (kg/ha)

S. No.	Code-I	Code -II	Entries	Amreli	Khandwa	Nagpur	Jalgaon	Parbhani	Mean CZ
1	6	4151	**ZC (CNA1032)**	562	442	552	413	542	**502**
2	7	4152	CNA 1085	587	404	648	424	580	**529**
3	5	4153	JLA 1707	695	414	723	444	431	**541**
4	1	4154	GAM 296	541	377	468	342	277	**401**
5	4	4155	**Local Check**	648	318	642	460	386	**491**
6	3	4156	CNA 2248	540	402	535	370	367	**443**
7	8	4157	AKA 2016-3	618	465	583	408	604	**536**
8	2	4158	CNA - 2249 (CC)	305	492	344	316	325	**356**

Br 24b – Coordinated Variety Trial - *G. arboreum* - (Central Zone)

Ginning outturn (%)

S. No.	Code-I	Code -II	Entries	Amreli	Khandwa	Nagpur	Jalgaon	Parbhani	Mean CZ
1	6	4151	**ZC (CNA1032)**	36.8	36.4	33.1	35.4	35.3	**35.4**
2	7	4152	CNA 1085	34.0	35.9	33.0	35.9	33.8	**34.5**
3	5	4153	JLA 1707	35.5	36.6	32.9	35.6	35.4	**35.2**
4	1	4154	GAM 296	35.5	37.3	32.7	36.1	34.4	**35.2**
5	4	4155	**Local Check**	34.8	35.3	35.8	35.0	35.1	**35.2**
6	3	4156	CNA 2248	36.5	36.2	33.6	35.4	35.7	**35.5**
7	8	4157	AKA 2016-3	36.3	37.1	34.5	37.3	37.1	**36.5**
8	2	4158	CNA - 2249 (CC)	33.8	36.8	31.1	32.1	34.1	**33.6**

Bolls/plant

S. No.	Code-I	Code -II	Entries	Amreli	Khandwa	Nagpur	Jalgaon	Parbhani	Mean CZ
1	6	4151	**ZC (CNA1032)**	30	28.2	30.1	13.4	15.7	**23.5**
2	7	4152	CNA 1085	29	33.3	27.4	11.7	13.7	**23.0**
3	5	4153	JLA 1707	30	36.0	30.0	14.2	12.0	**24.5**
4	1	4154	GAM 296	35	26.3	34.9	12.2	11.3	**24.0**
5	4	4155	**Local Check**	38	22.7	26.8	17.8	13.0	**23.7**
6	3	4156	CNA 2248	27	31.1	35.9	12.2	13.7	**24.0**
7	8	4157	AKA 2016-3	34	36.3	28.6	13.6	14.7	**25.5**
8	2	4158	CNA - 2249 (CC)	21	39.2	31.7	11.6	10.7	**22.9**

Br 24b – Coordinated Variety Trial - *G. arboreum* - (Central Zone)

Boll weight (g)

S. No.	Code-I	Code -II	Entries	Amreli	Khandwa	Nagpur	Jalgaon	Parbhani	Mean CZ
1	6	4151	**ZC (CNA1032)**	2.1	4.1	2.7	2.0	2.9	**2.8**
2	7	4152	CNA 1085	2.2	4.1	2.6	2.3	2.8	**2.8**
3	5	4153	JLA 1707	2.1	4.1	2.6	1.9	2.5	**2.6**
4	1	4154	GAM 296	2.1	4.3	3.3	1.9	2.4	**2.8**
5	4	4155	**Local Check**	1.9	3.9	3.2	2.0	2.7	**2.7**
6	3	4156	CNA 2248	2.0	3.9	3.5	2.1	2.5	**2.8**
7	8	4157	AKA 2016-3	2.1	3.8	2.8	1.7	2.9	**2.7**
8	2	4158	CNA - 2249 (CC)	1.8	4.0	2.1	1.8	2.4	**2.4**

SOUTH ZONE TRIALS

Br 03 – Preliminary Varietal Trial - Coloured *G. hirsutum*

Seed Cotton Yield (Kg/ha)

S. No.	Code-I	Code -II	Entries	Raichur (I)	Srivilliputhur (I)	Lam (I)	Dharwad (R)	Nandyal (R)	Mean SZ	Rank
1	5	4221	**Local Check**	936	1161	722	529	1646	**999**	3
2	7	4222	DHCC 2351	837	1019	778	998	1416	**1010**	2
3	6	4223	CNH-22196 (CC)	760	1013	774	378	1334	**852**	7
4	1	4224	FC 4003	896	1084	802	671	1813	**1053**	1
5	4	4225	FC 4001	435	941	708	631	1805	**904**	6
6	2	4226	**Suraj (ZC)**	701	1130	770	622	1537	**952**	4
7	8	4227	FC 4002	439	940	769	602	1912	**932**	5
8	3	4228	CNH-22197 (CC)	462	964	674	98	689	**577**	8
			CD @ 5 %	108	82	NS	79	312		
			CV %	19	5	14	8	12		
			Local Checks	**BGDS 1063**	**SVPR 6**	**Sivanandi**	**ARBH-813**	**Sivanandi**		

Lint Yield (kg/ha)

S. No.	Code-I	Code -II	Entries	Raichur (I)	Srivilliputhur (I)	Lam (I)	Dharwad (R)	Nandyal (R)	Mean SZ
1	5	4221	**Local Check**	315	402	220	423	543	**381**
2	7	4222	DHCC 2351	270	347	228	658	481	**397**
3	6	4223	CNH-22196 (CC)	234	354	227	227	446	**298**
4	1	4224	FC 4003	278	372	235	436	580	**380**
5	4	4225	FC 4001	140	323	208	430	623	**345**
6	2	4226	**Suraj (Zonal Check)**	252	391	226	467	569	**381**
7	8	4227	FC 4002	141	325	226	386	631	**342**
8	3	4228	CNH-22197 (CC)	148	334	183	65	223	**191**

Ginning outturn (%)

S. No.	Code-I	Code -II	Entries	Raichur (I)	Srivilliputhur (I)	Lam (I)	Dharwad (R)	Nandyal (R)	Mean SZ
1	5	4221	**Local Check**	33.7	34.6	35.6	37.0	33.0	**34.8**
2	7	4222	DHCC 2351	32.2	34.1	35.5	30.5	34.0	**33.3**
3	6	4223	CNH-22196 (CC)	30.7	35.00	34.5	27.9	33.4	**32.3**
4	1	4224	FC 4003	31.1	34.3	35.7	30.1	32.0	**32.6**
5	4	4225	FC 4001	32.1	34.3	34.1	31.5	34.5	**33.3**
6	2	4226	**Suraj (Zonal Check)**	35.9	34.6	34.3	34.8	37.0	**35.3**
7	8	4227	FC 4002	32.0	34.6	34.6	29.7	33.0	**32.8**
8	3	4228	CNH-22197 (CC)	32.0	34.6	35.5	30.9	32.3	**33.1**

Br 03 – Preliminary Varietal Trial - Coloured *G. hirsutum* (South Zone)

Bolls/plant

S. No.	Code-I	Code -II	Entries	Raichur (I)	Srivilliputhur (I)	Lam (I)	Dharwad (R)	Nandyal (R)	Mean SZ
1	5	4221	**Local Check**	8.8	39.7	34.4	8.1	25.3	**23.3**
2	7	4222	DHCC 2351	5.5	39.2	26.4	11.4	20.0	**20.5**
3	6	4223	CNH-22196 (CC)	10.7	36.8	24.3	5.8	21.7	**19.9**
4	1	4224	FC 4003	4.6	41.7	21.1	8.6	23.9	**20.0**
5	4	4225	FC 4001	5.8	38.9	33.0	11.2	25.2	**22.8**
6	2	4226	**Suraj (Zonal Check)**	3.0	36.2	24.1	8.0	20.7	**18.4**
7	8	4227	FC 4002	2.9	35.3	28.9	10.2	25.5	**20.6**
8	3	4228	CNH-22197 (CC)	3.7	34.9	30.1	3.8	20.5	**18.6**

Boll weight (g)

S. No.	Code-I	Code -II	Entries	Raichur (I)	Srivilliputhur (I)	Lam (I)	Dharwad (R)	Nandyal (R)	Mean SZ
1	5	4221	**Local Check**	4.3	4.2	3.9	4.1	4.2	**4.1**
2	7	4222	DHCC 2351	3.4	4.1	3.7	4.1	3.5	**3.8**
3	6	4223	CNH-22196 (CC)	3.6	4.3	3.2	3.5	3.5	**3.6**
4	1	4224	FC 4003	3.4	4.4	3.6	3.9	4.1	**3.9**
5	4	4225	FC 4001	4.1	4.2	3.7	4.0	3.7	**3.9**
6	2	4226	**Suraj (Zonal Check)**	4.3	4.0	3.9	4.3	4.3	**4.2**
7	8	4227	FC 4002	3.9	3.7	3.8	3.8	3.9	**3.8**
8	3	4228	CNH-22197 (CC)	3.6	3.8	3.5	3.8	3.5	**3.6**

Br 03c – Preliminary Varietal Trial - *G. hirsutum* in organic situation

Seed Cotton Yield (Kg/ha)

S. No.	Code-I	Code -II	Entry	Raichur [I]	Coimbatore [I]	Lam [I]	Mean SZ [I]	Rank	Dharwad [R]	Perambalur [R]	Nandyal [R]	Mean SZ [R]	Rank	Overall Mean SZ	Rank
1	2	4201	**Zonal check (Suraj)**	665	770	614	**683**	3	383	700	2169	**1084**	1	**884**	1
2	5	4202	**Suraksha (CC)**	726	664	481	**624**	4	238	708	1693	**880**	5	**752**	4
3	4	4203	AKH 10-3	649	567	318	**511**	5	225	443	1996	**888**	4	**700**	5
4	3	4204	**Local Check**	830	679	593	**701**	2	383	463	1915	**920**	2	**811**	3
5	1	4205	GBHV 257	732	711	1031	**825**	1	184	542	2000	**909**	3	**867**	2
			CD @ 5 %	75	96	151			47	391	266				
			CV %	11	8	13			11	22	9				
			Local Checks	**BGDS 1063**	**CO 14**	**NDLH 1938**			**Sahana**	**KC3**	**NDLH 1938**				

Lint Yield (kg/ha)

S. No.	Code-I	Code -II	Entry	Raichur [I]	Coimbatore [I]	Lam [I]	Mean SZ [I]	Dharwad [R]	Perambalur [R]	Nandyal [R]	Mean SZ [R]	Overall Mean SZ
1	2	4201	**Zonal check (Suraj)**	204	283	180	**222**	148	267	829	**415**	**319**
2	5	4202	**Suraksha (CC)**	249	237	140	**209**	84	244	564	**297**	**253**
3	4	4203	AKH 10-3	195	201	93	**163**	81	158	705	**315**	**239**
4	3	4204	**Local Check**	245	247	174	**222**	149	164	651	**321**	**272**
5	1	4205	GBHV 257	234	252	302	**263**	70	207	732	**336**	**300**

Br 03c – Preliminary Varietal Trial - *G. hirsutum* in organic situation

Ginning outturn (%)

S. No.	Code-I	Code -II	Entry	Raichur [I]	Coimbatore [I]	Lam [I]	Mean SZ [I]	Dharwad [R]	Perambalur [R]	Nandyal [R]	Mean SZ [R]	Overall Mean SZ
1	2	4201	**Zonal check (Suraj)**	30.9	36.6	34.7	**34.1**	38.7	38.1	38.2	**38.3**	**36.2**
2	5	4202	**Suraksha (CC)**	34.3	35.6	34.4	**34.8**	35.2	34.5	33.3	**34.3**	**34.6**
3	4	4203	AKH 10-3	30.0	35.4	34.1	**33.2**	36.1	35.7	35.3	**35.7**	**34.4**
4	3	4204	**Local Check**	29.8	36.4	34.9	**33.7**	38.8	35.4	34.0	**36.1**	**34.9**
5	1	4205	GBHV 257	32.6	35.3	34.8	**34.2**	38.1	38.2	36.6	**37.6**	**35.9**

Bolls/plant

S. No.	Code-I	Code -II	Entry	Raichur [I]	Coimbatore [I]	Lam [I]	Mean SZ [I]	Dharwad [R]	Perambalur [R]	Nandyal [R]	Mean SZ [R]	Overall Mean SZ
1	2	4201	**Zonal check (Suraj)**	3.6	14.2	33.7	**17.2**	3.7	14.1	22.6	**13.5**	**15.3**
2	5	4202	**Suraksha (CC)**	3.9	20.1	31.7	**18.6**	3.3	17.3	12.8	**11.1**	**14.9**
3	4	4203	AKH 10-3	3.8	18.7	36.2	**19.6**	5.2	16.8	17.2	**13.1**	**16.3**
4	3	4204	**Local Check**	4.5	25.0	38.3	**22.6**	3.7	20.6	13.8	**12.7**	**17.7**
5	1	4205	GBHV 257	5.5	24.7	33.4	**21.2**	3.1	17.8	20.3	**13.7**	**17.5**

Boll weight (g)

S. No.	Code-I	Code -II	Entry	Raichur [I]	Coimbatore [I]	Lam [I]	Mean SZ [I]	Dharwad [R]	Perambalur [R]	Nandyal [R]	Mean SZ [R]	Overall Mean SZ
1	2	4201	**Zonal check (Suraj)**	3.2	4.5	4.1	**3.9**	3.6	3.7	4.1	**3.8**	**3.9**
2	5	4202	**Suraksha (CC)**	3.6	4.2	4.0	**3.9**	3.6	3.8	3.7	**3.7**	**3.8**
3	4	4203	AKH 10-3	3.4	4.6	4.1	**4.0**	3.8	3.7	4.0	**3.8**	**3.9**
4	3	4204	**Local Check**	4.0	4.2	4.2	**4.1**	3.8	3.4	3.5	**3.6**	**3.9**
5	1	4205	GBHV 257	3.3	3.5	3.5	**3.4**	2.8	3.3	3.9	**3.3**	**3.4**

Br 05c – Preliminary Hybrid Trial – HXH hybrids in organic situation

Seed Cotton Yield (Kg/ha)

S. No.	Code-I	Code -II	New Entry	Raichur [I]*	Coimbatore [I]	Lam [I]	Mean SZ [I]	Rank	Dharwad [R]	Perambalur [R]	Nandyal [R]	Mean SZ [R]	Rank	Overall Mean SZ	Rank
1	4	4211	Partech 28		841	666	**754**	5	506	519	1581	**869**	2	**823**	4
2	5	4212	**Zonal Check (Mallika)**		843	566	**705**	6	527	600	1362	**830**	3	**780**	5
3	2	4213	**Bunny (CC)**		1258	1209	**1234**	1	598	585	1225	**803**	4	**975**	1
4	6	4214	Partech 29		1127	863	**995**	3	532	425	1804	**920**	1	**950**	2
5	3	4215	KGHH-VS-2318-1		856	1136	**996**	2	516	401	1441	**786**	5	**870**	3
6	1	4216	Partech 30 Plus		889	690	**790**	4	580	435	1236	**750**	6	**766**	6
			CD @ 5 %		181	120			104	260	197				
			CV %		11	8			13	17	9				

***Trial not conducted**

Lint Yield (kg/ha)

S. No.	Code-I	Code -II	New Entry	Coimbatore [I]	Lam [I]	Mean SZ [I]	Dharwad [R]	Perambalur [R]	Nandyal [R]	Mean SZ [R]	Overall Mean SZ
1	4	4211	Partech 28	281	195	**238**	184	172	541	**299**	**275**
2	5	4212	**ZC (Mallika)**	297	166	**232**	189	199	437	**275**	**258**
3	2	4213	**Bunny (CC)**	437	355	**396**	218	209	416	**281**	**327**
4	6	4214	Partech 29	386	253	**320**	194	149	608	**317**	**318**
5	3	4215	KGHH-VS-2318-1	308	334	**321**	188	145	514	**282**	**298**
6	1	4216	Partech 30 Plus	294	202	**248**	219	136	408	**254**	**252**

Br 05c – Preliminary Hybrid Trial – HXH hybrids in organic situation

Ginning outturn (%)

S. No.	Code-I	Code -II	New Entry	Coimbatore [I]	Lam [I]	Mean SZ [I]	Dharwad [R]	Perambalur [R]	Nandyal [R]	Mean SZ [R]	Overall Mean SZ
1	4	4211	Partech 28	33.5	33.7	**33.6**	36.5	33.1	34.2	**34.6**	**34.2**
2	5	4212	**ZC (Mallika)**	35.2	34.5	**34.9**	35.9	33.2	32.1	**33.7**	**34.2**
3	2	4213	**Bunny (CC)**	34.7	34.7	**34.7**	36.5	35.8	34.0	**35.4**	**35.1**
4	6	4214	Partech 29	34.3	35.5	**34.9**	36.5	35.0	33.7	**35.1**	**35.0**
5	3	4215	KGHH-VS-2318-1	36.2	33.2	**34.7**	36.4	36.3	35.7	**36.1**	**35.6**
6	1	4216	Partech 30 Plus	33.1	33.5	**33.3**	37.8	31.2	33.0	**34.0**	**33.7**

Bolls/plant

S. No.	Code-I	Code -II	New Entry	Coimbatore [I]	Lam [I]	Mean SZ [I]	Dharwad [R]	Perambalur [R]	Nandyal [R]	Mean SZ [R]	Overall Mean SZ
1	4	4211	Partech 28	30.9	35.8	**33.4**	4.9	21.1	25.4	**17.1**	**23.6**
2	5	4212	**ZC (Mallika)**	21.4	37.7	**29.6**	5.1	22.0	22.6	**16.6**	**21.8**
3	2	4213	**Bunny (CC)**	25.0	39.3	**32.2**	3.4	19.7	24.2	**15.8**	**22.3**
4	6	4214	Partech 29	29.3	37.7	**33.5**	5.9	17.7	33.0	**18.9**	**24.7**
5	3	4215	KGHH-VS-2318-1	28.1	34.9	**31.5**	3.2	15.9	25.0	**14.7**	**21.4**
6	1	4216	Partech 30 Plus	28.0	34.8	**31.4**	4.4	16.2	22.2	**14.3**	**21.1**

Br 05c – Preliminary Hybrid Trial – HXH hybrids in organic situation

Boll weight (g)

S. No.	Code-I	Code -II	New Entry	Coimbatore [I]	Lam [I]	Mean SZ [I]	Dharwad [R]	Perambalur [R]	Nandyal [R]	Mean SZ [R]	Overall Mean SZ
1	4	4211	Partech 28	4.4	5.0	**4.7**	4.0	3.8	4.4	**4.1**	**4.3**
2	5	4212	**ZC (Mallika)**	4.5	5.1	**4.8**	4.0	4.9	4.6	**4.5**	**4.6**
3	2	4213	**Bunny (CC)**	4.3	4.6	**4.5**	4.0	3.9	4.3	**4.1**	**4.2**
4	6	4214	Partech 29	4.1	4.7	**4.4**	4.0	3.9	4.8	**4.2**	**4.3**
5	3	4215	KGHH-VS-2318-1	4.8	4.3	**4.6**	4.0	4.0	4.6	**4.2**	**4.3**
6	1	4216	Partech 30 Plus	4.4	5.0	**4.7**	4.1	4.3	4.4	**4.3**	**4.4**

Br 14a – Coordinated Varietal Trial - *G. barbadense*

Seed Cotton Yield (Kg/ha)

S. No.	Code-I	Code -II	Entries	Rahuri	Dharwad	Chamrajnagara	Coimbatore	Mean SZ	Rank
1	8	4231	CCB 22-1	208	270	1217	835	**774**	8
2	6	4232	SIMA B-8	242	157	1492	924	**858**	4
3	1	4233	CCB 23-1	407	269	1500	907	**892**	2
4	3	4234	CCB 22-2	193	171	1611	903	**895**	1
5	7	4235	CCB 24-1	255	311	1124	1058	**831**	5
6	2	4236	**ZC (Rhcb-011-CZ; CCB 37-SZ)**	730	290	1394	952	**879**	3
7	4	4237	**QC (Suvin)**	281	204	1263	937	**801**	7
8	5	4238	CCB-24-2	274	44	1291	1072	**802**	6
			CD @ 5 %	103	59	180	149		
			CV %	16	16	8	9		

Br 14a – Coordinated Varietal Trial - *G. barbadense*

Lint Yield (kg/ha)

S. No.	Code-I	Code -II	Entries	Rahuri	Dharwad	Chamrajnagara	Coimbatore	Mean SZ
1	8	4231	CCB 22-1	66	84	402	269	**252**
2	6	4232	SIMA B-8	79	54	522	296	**291**
3	1	4233	CCB 23-1	165	89	510	292	**297**
4	3	4234	CCB 22-2	65	58	580	294	**311**
5	7	4235	CCB 24-1	82	103	382	371	**285**
6	2	4236	**ZC (Rhcb-011-CZ; CCB 37-SZ)**	244	92	460	332	**295**
7	4	4237	**QC (Suvin)**	87	67	417	299	**261**
8	5	4238	CCB-24-2	84	13	426	359	**266**

Ginning outturn (%)

S. No.	Code-I	Code -II	Entries	Rahuri	Dharwad	Chamrajnagara	Coimbatore	Mean SZ
1	8	4231	CCB 22-1	31.8	31.2	33.0	32.2	**32**
2	6	4232	SIMA B-8	32.7	34.4	35.0	32.0	**34**
3	1	4233	CCB 23-1	40.6	33.2	34.0	32.1	**33**
4	3	4234	CCB 22-2	33.4	34.1	36.0	32.5	**34**
5	7	4235	CCB 24-1	32.3	33.1	34.0	35.1	**34**
6	2	4236	**ZC (Rhcb-011-CZ; CCB 37-SZ)**	33.4	31.8	33.0	34.9	**33**
7	4	4237	**QC (Suvin)**	30.9	32.7	33.0	31.9	**33**
8	5	4238	CCB-24-2	30.6	30.1	33.0	33.6	**32**

Br 14a – Coordinated Varietal Trial - *G. barbadense*

Bolls/plant

S. No.	Code-I	Code -II	Entries	Rahuri	Dharwad	Chamrajnagara	Coimbatore	Mean SZ
1	8	4231	CCB 22-1	39.4	5.9	19.2	55.7	**27**
2	6	4232	SIMA B-8	44.1	5.7	26.0	65.7	**32**
3	1	4233	CCB 23-1	39.9	6.1	25.2	68.7	**33**
4	3	4234	CCB 22-2	29.1	5.7	24.3	70.3	**33**
5	7	4235	CCB 24-1	38.8	6.3	17.8	68.0	**31**
6	2	4236	**ZC (Rhcb-011-CZ; CCB 37-SZ)**	46.9	5.7	23.6	66.7	**32**
7	4	4237	**QC (Suvin)**	41.7	6.2	19.9	57.3	**28**
8	5	4238	CCB-24-2	31.7	4.6	20.7	74.3	**33**

Boll weight (g)

S. No.	Code-I	Code -II	Entries	Rahuri	Dharwad	Chamrajnagara	Coimbatore	Mean SZ
1	8	4231	CCB 22-1	2.6	2.9	4.0	2.7	**3**
2	6	4232	SIMA B-8	3.1	3.2	3.5	3.2	**3**
3	1	4233	CCB 23-1	3.5	3.1	3.7	3.5	**3**
4	3	4234	CCB 22-2	3.7	3.5	4.0	3.5	**4**
5	7	4235	CCB 24-1	4.2	3.1	4.0	3.2	**3**
6	2	4236	**ZC (Rhcb-011-CZ; CCB 37-SZ)**	3.5	2.8	3.6	2.8	**3**
7	4	4237	**QC (Suvin)**	3.1	3.2	4.0	2.8	**3**
8	5	4238	CCB-24-2	3.3	2.9	3.9	3.4	**3**

Br 24b – Coordinated Variety Trial - *G. arboreum* - (South Zone)

Seed Cotton Yield (Kg/ha)

S. No.	Code-I	Code -II	Entries	Dharwad	Nandyal	Mean SZ	Rank
1	3	4241	CNA 1084	227	2802	**1515**	1
2	5	4242	DDCC 1 (CC)	370	2219	**1295**	3
3	4	4243	Local Check	229	1868	**1049**	5
4	2	4244	ZC (DLSa 17)	226	2188	**1207**	4
5	1	4245	DWDa 2252	116	1952	**1034**	6
6	6	4246	CNA 1085	187	2646	**1417**	2
			CD @ 5 %	46	442		
			CV %	13	13		
			Local Checks	**AKA 235**	**Yaganti**		

Lint Yield (kg/ha)

S. No.	Code-I	Code -II	Entries	Dharwad	Nandyal	Mean SZ
1	3	4241	CNA 1084	83	1073	**578**
2	5	4242	DDCC 1 (CC)	129	777	**453**
3	4	4243	Local Check	85	617	**351**
4	2	4244	ZC (DLSa 17)	94	744	**419**
5	1	4245	DWDa 2252	43	726	**385**
6	6	4246	CNA 1085	70	942	**506**

Ginning outturn (%)

S. No.	Code-I	Code -II	Entries	Dharwad	Nandyal	Mean SZ
1	3	4241	CNA 1084	36.7	38.3	**37.5**
2	5	4242	DDCC 1 (CC)	34.8	35.0	**34.9**
3	4	4243	Local Check	36.9	33.0	**35.0**
4	2	4244	ZC (DLSa 17)	41.8	34.0	**37.9**
5	1	4245	DWDa 2252	37.5	37.2	**37.4**
6	6	4246	CNA 1085	37.5	35.6	**36.6**

Br 24b – Coordinated Variety Trial - *G. arboreum* - (South Zone)

Bolls/plant

S. No.	Code-I	Code -II	Entries	Dharwad	Nandyal	Mean SZ
1	3	4241	CNA 1084	4.5	40.0	**22.3**
2	5	4242	DDCC 1 (CC)	8.0	38.3	**23.2**
3	4	4243	Local Check	5.2	31.0	**18.1**
4	2	4244	ZC (DLSa 17)	6.3	34.4	**20.4**
5	1	4245	DWDa 2252	4.2	34.0	**19.1**
6	6	4246	CNA 1085	4.3	39.1	**21.7**

Boll weight (g)

S. No.	Code-I	Code -II	Entries	Dharwad	Nandyal	Mean SZ
1	3	4241	CNA 1084	2.4	2.6	**2.5**
2	5	4242	DDCC 1 (CC)	2.1	2.6	**2.4**
3	4	4243	Local Check	2.4	2.6	**2.5**
4	2	4244	ZC (DLSa 17)	2.2	2.6	**2.4**
5	1	4245	DWDa 2252	2.6	2.7	**2.7**
6	6	4246	CNA 1085	2.3	2.4	**2.4**

Report on Pre-Breeding Activities
PAU, Faridkot

1. Transfer of cotton leaf curl disease (CLCuD) resistance from *Gossypium armourianum* to *G. hirsutum*

G. hirsutum (Susceptible) x *Gossypium armourianum* (Resistant)

↓

Resistant F_1 x *G. hirsutum*

↓

Resistant BC_1F_1

↓

↓

↓ 2024-25

↓

Resistant BC_4F_7

BC_4F_7 generation derived from a cross between *G. hirsutum* and *G. armourianum* was planted during Kharif 2024. The population was evaluated for cotton leaf curl disease resistance (CLCuD) and various economic traits. Plants resistant to the disease with superior agronomic performance were selected. However, the population is significantly segregating for various agro-morphological traits. Therefore, this population requires a few more cycles of selection for the identification of stable agronomically superior genotype(s) having resistance to cotton leaf curl disease.

2. Transfer of cotton leaf curl disease (CLCuD) resistance from American cotton genotype, MAC 7

F 2164 (Susceptible) x MAC 7 (Resistant)

↓

Resistant F_1 x F 2164

↓

Resistant BC_1F_1

↓

↓ 2024-25

Resistant BC_2F_5

Mac-7, an introgression line with complex pedigree has been identified as resistant to both CLCuD and whitefly. BC_2F_5 generation of the cross, F 2164/ Mac7/F 2164 was raised during Kharif 2024 and evaluated for seed cotton yield, cotton leaf curl disease and other agronomic traits. Several cotton leaf curl-resistant plants with good seed cotton yield and other agronomic traits were selected.

Technical Programme for 2025-26:

1. **Transfer of cotton leaf curl disease (CLCuD) resistance from *Gossypium armourianum* to *G. hirsutum***

G. hirsutum (Susceptible) x *Gossypium armourianum* (Resistant)

↓

Resistant F_1 x *G. hirsutum*

↓

Resistant BC_1F_1

↓

↓

↓ 2025-26

Resistant BC_4F_8

BC_4F_8 generation derived from a cross between *G. hirsutum* and *G. armourianum* will be planted during Kharif 2025. The population will be evaluated for cotton leaf curl disease resistance (CLCuD) and various economic traits. Plants resistant to the disease with superior agronomic performance will be selected.

2. **Transfer of cotton leaf curl disease (CLCuD) resistance from American cotton genotype, MAC 7**

F 2164 (Susceptible) x MAC 7 (Resistant)

↓

Resistant F_1 x F 2164

↓

Resistant BC_1F_1

↓

↓ 2025-26

Resistant BC_2F_6

BC_2F_6 generation of the cross, F 2164/ Mac7/F 2164 will be raised during Kharif 2025 and evaluated for seed cotton yield, cotton leaf curl disease and other agronomic traits. Cotton

leaf curl-resistant plants with good seed cotton yield and other agronomic traits will be selected.

NAU, Surat

Activity:1

Crosses between available wild species and cultivated diploid and tetraploid cotton species.

1.Wild species to be used for crossing with the character of interest.

a. Wild Species Derivative-1: {(G-6 X *G.anomalum*) X *G.tomentosum*} X G.Cot.10
- Resistance to diseases and jassids, good fiber quality

b. Wild Species Derivative-2: (Karnugani-1 X *G.stocksii*) X G.Cot.10 - Strong fiber and resistant to leaf curl virus

2. Cultivated tetraploid Species-1: G.Cot.10
Cultivated tetraploid Species-2: GN.Cot.22

Progress Report:

Female	Male	Number of Cross attempted	No of bolls set	Number of seeds harvested
{(G-6 X *G.anomalum*) X *G.tomentosum*} X G.Cot.10	G.Cot.10	560	One boll was set and picked successfully	5
(Karnugani-1 X *G.stocksii*) X G.Cot.10 -	G.Cot.10	440	Crosses were not succeed.	-
{(G-6 X *G.anomalum*) X *G.tomentosum*} X G.Cot.10	GN.Cot.22	725	Two bolls were set and picked successfully	7
(Karnugani-1 X *G.stocksii*) X G.Cot.10	GN.Cot.22	660	Crosses were not succeed	2

Above derivatives reciprocally crossed with G.Cot.10 (good general combiner) and GN.Cot.22 (stable inter specific cross derivatives involving four cultivated cotton species and three wild species Viz., *G.stocksii*, *G.armouriamum and G.anomalum*) during 2024-25 season and results mentioned in table.

Activity: 2 Growing of successful crosses and back crossing with cultivated parents

The harvested seeds from ({(G-6 X *G.anomalum*) X *G.tomentosum*} X G.Cot.10) X GN.Cot.22 and seeds from ((Karnugani-1 X *G.stocksii*) X G.Cot.10) X GN.Cot.22 were sown in nursery and grow successfully and backcrosed with cultivated parents .

1. {(G-6 X *G.anomalum*) X *G.tomentosum*} X G.Cot.10 backcrossed with GN.Cot.22
2. {(G-6 X *G.anomalum*) X *G.tomentosum*} X G.Cot.10 backcrossed with GN.Cot.22

Activity: 3

1. Sharing of segregating pre breeding lines:

I. Two segregating introgression lines GISV 331 X CCH 15-1 and GISV 323 X TCH 1716 were shared among participating centers during 2024-25

2. **Evaluation report of segregating introgression lines received from participating centers:**

Datasheet of segregating introgression lines received from participating centers **Year: 2024-25**

Sr. No.	Code	Seed Cotton Yield (Kg/ha)	Plant Height (cm)	Boll Weight (g)	No. of Bolls/Plant	Lint Index (g)	Seed Index (g)	Ginning outturn (%)	No of sympodia	No of monopodia
1	SP 134-1	1312	140	2.0	35.4	3.0	6.0	33.3	12.0	2.0
2	SP 115-1	1389	130	2.2	33.8	3.4	6.4	34.6	10.0	2.3
3	SP 118-1	1235	125	2.2	30.0	3.2	6.2	33.7	09.0	2.8
4	SP 126-1	1188	130	2.0	32.7	3.3	6.0	35.8	14.0	1.9
5	SP 113-5	1003	132	2.0	27.1	3.0	5.8	33.8	09.0	2.1
6	SP 125-2	700	135	2.1	18.3	3.1	5.5	35.8	07.0	1.8
7	SP 119-1	1188	152	1.8	35.3	2.7	5.0	34.9	13.0	2.9
8	SP 122-1	1080	125	2.0	29.2	2.7	5.5	32.9	11.0	1.8
9	SP 82-2	1235	150	1.8	36.2	2.7	5.0	35.1	12.0	2.7
10	SP 99-1	903	158	1.9	25.9	2.7	5.5	32.9	10.0	2.6
11	*G arboretum* X *G.annomalum*	926	145	1.8	27.8	2.5	5.0	33.3	08.0	3.2
12	(GISV 323 X TCH 1716) F4	2546	128	3.4	40.4	3.7	6.2	37.1	15.0	1.4
13	(GISV 331 X CCH -15-1) F3	1775	115	3.3	28.7	5.4	8.5	39.0	9.0	2.5
14	(GISV 342 X GPC 26) F4	2315	125	3.9	32.1	4.9	8.0	38.0	13.0	2.0
15	(GISV 349X G.Cot.34) F4	2392	132	3.3	39.4	6.2	9.0	40.8	17.0	1.9
16	GISV 350 X GISV 285 F4	2199	138	3.2	36.7	4.8	10.0	32.6	13.0	2.1
17	GISV 323 X BS-27 F4	2083	120	4.0	28.1	5.7	10.0	36.4	15.0	2.3

Technical Programme for 2025-26

The new crosses between available wild species and cultivated cotton species will be carried out.

1) Growing of successful crosses and back crossing with cultivated parents
2) Generation of advancement of successful crosses
3) Sharing of segregating generation of successful crosses with other AICRP centres.

	Activity
Crosses between available wild species and cultivated diploid and tetraploid cotton species.	The following crossing programme will be continue during 2025-26. 1) {(G-6 X *G.anomalum*) X *G.tomentosum*} X G.Cot.10 } X G.Cot.10 2) {(Karnugani-1 X *G.stocksii*) X G.Cot.10 } X G.Cot.10 3) {(G-6 X *G.anomalum*) X *G.tomentosum*} X G.Cot.10} X GN.Cot.22 4) {(Karnugani-1 X *G.stocksii*) X G.Cot.10} X GN.Cot.22
Growing of successful crosses.	Growing of Previous year harvested seeds will be grown during *Kharif* – 2025 1) Cross {(G-6 X *G.anomalum*) X *G.tomentosum*} X G.Cot.10 X G.Cot.10 2) Cross {(G-6 X *G.anomalum*) X *G.tomentosum*} X G.Cot.10 X GN.Cot.22 3) (Karnugani-1 X *G.stocksii*) X G.Cot.10 4) Further back cross will be performed for following back cross 3. {(G-6 X *G.anomalum*) X *G.tomentosum*} X G.Cot.10 backcrossed with GN.Cot.22 4. {(G-6 X *G.anomalum*) X *G.tomentosum*} X G.Cot.10 backcrossed with GN.Cot.22
Sharing segregating introgression lines with participating centers	Two segregating lines harvested from segregating generation will be sharing with participating centers.

MPKV, Rahuri

1) Embryo Rescue of tri-specific hybrid in cotton:

Back ground information:

For this study, earlier we made cross between *G. arboreum* and *G. anomalum* to obtain F1. Chromosome-doubled plants were obtained by colchicine treatment of the interspecific hybrid seeds of *G. arboreum* and *G. anomalum*. Chromosome-doubled plants were crossed with *G. hirsutum* to obtain Tri species hybrid *G. hirsutum* × (*G. arboreum* × *G. anomalum*)^2 Chromosomal association and microsatellite analysis confirmed that they share multigenomic background from the three cotton species. These tri-specific hybrids are resistant to insects and pest. These rare desired gene combinations offer a new avenue of gene introgression from wild species to commercial cotton cultivars. However, these plants were highly sterile and produced no seeds by either selfing or backcrossing. It is expected to

stabilize ploidy gradually by backcrossing with cultivated tetraploid cotton in subsequent generations, which is reported by several workers in cotton.

Technical Details:

Flowers of tri species hybrids Tri species hybrid G. hirsutum × (*G. arboreum × G. anomalum*)² were pollinated with pollens of *G. hirsutum* var Phule 688. The early abscission of the young bolls was prevented by repeated application of growth regulators (100 mg/l NAA and 50 mg/l GA). However, most of the bolls do not produce any seeds or produce empty seeds. We were able to obtained 8 seeds from this cross. In addition, Flowers of *G. hirsutum* var Phule688 were pollinated with pollens of 688 tri species hybrids (*G. hirsutum, G. arboreum, G. anomalum*). We obtain 23 seeds from this cross. These seeds will be germinated *in vitro*.

2) Segregating pre-breeding lines shared by participating centres and identification of useful segregants for various traits.

- Pre-breeding material received from ICAR-Central Institute for Cotton Research, Regional Station, Coimbatore
  - Seeds obtained from selfing of eleven lines listed below in table were sown on 15/06/2024 with 8 Rows of 6-meter length, each with 90x60 cm spacing**.**
  - Optimum germination was observed in all the lines.
  - Flowering was observed in all the sixteen lines, and self-pollination was done in all the lines.
  - Optimum seed set was observed in 13 lines, and seeds were collected from selfed flowers.
  - Individual plants showing tolerance to sucking pest were selected for further studies.
  - Details of lines used for is given in the table below

Sr. No.	Pre-breeding Material Selfed F2	Seed Germination	Seed Set after Selfing
1.	*G. a* x *G. r. 99-1*	Optimum	Yes
2.	*G. a* x *G. r. 125-2*	Optimum	Yes
3.	*G. a* x *G. r. 113-5*	Optimum	Yes
4.	*G. a* x *G. r. 126-1*	Optimum	Yes
5.	*G. a* x *G. r. 122-1*	Optimum	Yes
6.	*G. a* x *G. r. 118-1*	Optimum	Yes
7.	*G. a* x *G. r. 115-2*	Optimum	Yes
8.	*G. a* x *G. r. 119-1*	Optimum	Yes
9.	*G. a* x *G. r. 134-2*	Optimum	Yes
10.	*G. a* x *G. r. 82-2*	Optimum	Yes
11.	G.N. cot-22(GISV-218)	Optimum	Yes
12.	GISV 322x CCH-15-1 (Seg. Line)	Optimum	Yes
13.	GISV-316 x BGDS-1033 (Seg. Line)	Optimum	Yes

3) Pre-breeding material received from Main Cotton Research Station, Navsari Agriculture University Surat

- Seeds of (GISV342X GPC 26 and GISV349 X G Cot 34) were sown on 02/07/2024 with 8 Rows of 6-meter length, each with 90x60 cm spacing**.**

- Optimum germination was observed in all the lines.
- Flowering was observed in both lines, and self-pollination was done.
- Optimum seed set was observed, and seeds were collected from selfed flowers.

4) **New crosses attempted:**
   - The cross of *G. arboreum* X *G. raimondi* and *G. raimondi X G. arboreum* was attempted in 2024-25, however no seed set was observed.
5) **Availability of seeds of select superior lines from pre-breeding segregants for sharing among various AICRP centres.**
   - Seeds of multiparent cotton hybrid involving *G. hirsutum* and *G. barbadense* species for Extra-long staple and insect resistance in cotton is available for sharing.

Technical Programme for 2025-26:

Embryo Rescue of tri-specific hybrid in cotton

Tri species hybrid G. hirsutum × (*G. arboreum × G. anomalum*)² will be crossed with *G. hirsutum* and embryo rescue of tri-specific hybrid will be attempted in 2025-26.

New crosses for 2025-26

- The cross of *G. arboreum* X *G. raimondi,* G. *arboreum* X *G. davidsoni* and reciprocal cross of both will be attempted in 2025-26.

CICR, Nagpur

Thirty-two (32) wild species, 15 races of cultivated species and more than 45 synthetic polyploids are conserved *in-situ* at ICAR-CICR, Nagpur

New Crosses attempted during the cropping season 2024-25 between Cultivars/ Races of cultivated species and Wild species are as listed below:

Cultivars & Races:

LRA5166, LRK 516, MCU5, MCU5VT, Arogya, Suvin, KH3, Moco, Suraj, MCU10, Africanum, Jawahar Tapti, AK5, AK7, PA255, PA402, CNA1003, Digvijay, AK8401, G cot23, DLSA17, Latifolium , Palmeri, Richmondii, Sinense, Indicum, Burmanicum,. Bengalense , Cernuum and Soudanense

Wild Species:

G. raimondii (Fibre legth , stregth , elongation & Tolerance to bollworm), *G. australe* (high ginning out turn & delayed moprhpogenesis of gossypol gland) *, G. klotzschianum (Tolerance to sucking pests), G. capitis viridis* (Bacterial Blight tolerance) , *G. trilobum* (Glabrous leaves), G. thurberi(High GOT, Fibre fineness, prolific bearing), *G. triphyllum* (Jassid , bollworm & Bacterial; Blight tolerance),*G.anomolum* (Fibre yield, fineness, strength, *G.barbosanum* (sucking pest tolerance), *G.somalense* (Bollworm & Drought tolerance), *G.stocksii* (Drought tolerance),*G.davidsoni* (Tolerance to aphids, Salinity & BB), *G. longicalyx* (Fibre length , strength & elongation , *Thespesia lampas*(Thick boll rind), *Mexicanum* (colour).

Crosses attempted (3133 nos.)

Sr. No.	Wild species	New crosses		BC_1F_1		BC_2F_1	
		Attempted	Harvested	Attempted	Harvested	Attempted	Harvested
1	*G. raimondii*	-	-	522	85	16	02
2	*G. stocksii*	60	1	49	18	69	09
3	*G.capitis viridis*	-	-	138	27	49	14
4	*G. anomolum*	-	-	69	21	89	15
5	*G. barbosanum*	-	-	186	33	17	06
6	*G. davidsonii*	35	11	219	54	-	-
7	*Thespecies lampas*	-	-	34	11	16	01
8	*G. somalense*	150	07	178	46	101	38
9	*G. australe*	-	-	48	07	-	-
10	*G. klotzschianum*	23	04	14	01	19	01
11	*G.mexicanum*	37	19	54	16	108	19
12	*G. triphyllum*	-	-	203	70	-	-
13	*G. thurberi*	37	3	30	4	18	5
14	*G. trilobum*	09	02	-	-	-	-
15	*G. incanum*	6	-	-	-		
16	*G. mustelinum*	159	33	70	08	-	-
17	*G. areysianum*	217	76	-	-	-	-
18	*G.ekmanianum*	-	-	90	20	-	-

LRA – 5166
(Female Parent)

G. ekmanianum
(Male Parent)

LRA – 5166 x
G. ekmanianum (F_1)

LRA – 5166
(Female Parent)

G. mustelinum
(Male Parent)

LRA – 5166 x
G.. mustelinum (F_1)

- *All the introgressed derivatives were evaluated for Biotic stress tolerance:*

Insects: Jassids, Whitelfy , aphids, Helicoverpa armigera and Natural enemies

Diseases: Grey mildew, Corynespora leaf spot, bacterial blight (Arogya) and root rot using (Susceptible check - Malawi 20 and Susceptible checks for Alternaria, Ramularia & Xanthomonas- AKH4 & Surabhi (*G. hirsutum* check); DCH 32 – Grey mildew

Evaluation of Advance Breeding Lines:

Two advance breeding lines namely GISV 350 x GISV 285 and GISV 232 x BS 27 were obtained from NAU, Surat for evaluation in 2024-25. These were evaluated along with the lines obtained in the previous year's namely GN cot 22 /GISV 218, GISV-316 x BGDS 1063 (Seg Lines), GISV 322 x CCH 15-1, GISV 342 x GPC 26 and GISV349 x G cot 34. The morphological data is depicted in Table 1, 2 & 3.

Table 1. Morphological data of the Pre-Breeding lines of NAU, Surat (2024-25)

No.	Entry	Height (cm)	Monopodia	Sympodia	No. of bolls	Green boll weight gm (1 Boll)	Bursting boll weight gm (5 Bolls)	GOT
24080	G. cot -22 / GISV-218							
	Sp-1	105	1	21	24	11.00	21.00	
	Sp-2	98	2	20	26	13.00	22.93	
	Sp-3	102	2	18	20	14.47	21.78	
	Sp-4	108	2	21	27	18.74	22.82	
	Sp-5	100	2	19	23	13.42	22.43	
	Mean	102.6	1.8	19.8	24	14.12	22.19	32.0
24081	GISV-316 x BGDS -1063 (Seg Line)							
	Sp-1	110	2	19	29	10.35	19.79	
	Sp-2	117	1	22	28	13.00	20.45	
	Sp-3	133	4	18	39	12.82	20.17	
	Sp-4	120	1	17	41	12.92	20.37	
	Sp-5	110	1	21	30	14.15	21.97	
	Mean	118	1.8	19.4	33.4	12.64	20.55	38.66
24082	GISV-322 x CCH-15-1							
	Sp-1	135	2	21	40	9.89	23.46	
	Sp-2	120	2	18	32	14.75	23.40	
	Sp-3	127	2	16	30	14.37	29.34	
	Sp-4	128	1	18	33	12.26	28.02	
	Sp-5	110	1	19	35	12.38	27.87	
	Mean	124	1.6	18.4	34	12.73	26.41	39.66
24083 (New 2023)	GISV-342 x GPC-26							
	Sp-1	118	1	22	23	13.43	25.81	
	Sp-2	131	2	22	18	16.24	30.53	
	Sp-3	125	0	20	22	18.77	29.24	

	Sp-4	131	1	21	33	19.07	29.61	
	Sp-5	105	0	18	17	19.26	22.84	
	Mean	122	0.8	20.6	22.6	17.35	27.60	35.3
24084 (New 2023)	GISV-349 x G. cot-34							
	Sp-1	115	2	21	44	16.40	21.19	
	Sp-2	125	3	20	38	19.50	27.36	
	Sp-3	116	2	21	41	16.16	26.15	
	Sp-4	110	1	22	35	15.04	24.90	
	Sp-5	115	1	22	33	13.59	26.76	
	Mean	116.2	1.8	21.2	38.2	16.13	25.27	41.00
24085 (New 2024)	GISV-350 x GISV-285							
	Sp-1	112	1	16	17	16.94	25.77	
	Sp-2	113	2	18	35	15.27	29.00	
	Sp-3	120	1	24	31	12.08	24.50	
	Sp-4	116	2	21	24	11.25	18.74	
	Sp-5	127	1	19	33	17.76	28.88	
	Mean	117.6	1.4	19.6	28	14.66	25.37	32.00
24086 (New 2024)	GISV-323 x BS-27							
	Sp-1	112	3	17	39	15.37	26.50	
	Sp-2	131	3	16	49	15.45	24.04	
	Sp-3	136	3	18	50	17.96	33.81	
	Sp-4	111	1	19	22	15.05	29.46	
	Sp-5	122	1	19	25	18.64	29.83	
	Mean	122.4	2.2	17.8	37	16.49	28.72	35.33

Table 2. Morphological data of the advance breeding introgressed lines of ICAR-CICR, Nagpur

No.	Entry	Hieght	Monopodia	Sympodia	No. of bolls	Green boll weight gm (1 Boll)	Bursting boll weight gm (5 Bolls)
24122 (R)	*G.arboreum* x *G. longicalyx* (ICAR-CICR, Nagpur shared with other centres in 2021-22)						
	Sp– 82 -2	144	3	20	33	9.54	16.96
	Sp–99 – 1	151	2	18	52	5.21	17.23
	Sp -113 -5	170	2	23	28	7.90	18.34
	Sp – 115 -2	152	3	21	62	9.18	13.72
	Sp – 118 -1	151	1	19	37	6.88	16.14
	Sp – 119 -1	153	1	21	42	8.55	14.31
	Sp – 122 -1	148	2	18	45	12.31	21.15
	Sp – 125 -2	157	2	15	42	7.89	16.06

	Sp – 126 -1	152	2	17	43	6.00	18.43
	Sp – 135 -2	134	2	19	38	8.32	16.25
24123 (R)	*(G.arboreum race indicum x G. davidsonii)*						
	Sp – 17	150	2	22	52		
	Sp –21	145	2	20	24		
	Sp –23	148	1	17	37		
	Sp –25	122	1	18	31		
	Sp –28 -2	147	0	22	30		
	Sp –30	145	1	20	41		
	Sp –38	124	2	18	17		

Table 3. Morphological data of the advance breeding introgressed lines of ICAR-CICR, Nagpur

No.	Entry	Height	Monopodia	Sympodia	No. of bolls	Green boll weight gm (1 Boll)	Bursting boll weight gm (5 Bolls)
24122 (R 1)	*G.arboreum (P1)* x *G. longicalyx* (ICAR-CICR, Nagpur shared with other centres in 2022-23)						
	Sp– 82 -2	146	2.33	17.33	39.66	9.54	16.96
	Sp – 125 -2	138.33	2.33	20.66	40.33	7.89	16.06
24008 (R)	Parent (P1)	134.66	1.66	18.66	25	7.39	15.92
24123	*[G.arboreum race indicum(P1) x G. davidsonii]*						
	Sp –28 -2	131.33	2	17.33	30	6.70	15.90
	Sp –30	137.33	2	18.67	39.66	7.62	15.54
	Sp –39	154	2	20.33	45.33	7.42	16.41
24001 (R)	Parent (P1)	148.33	1.33	20.66	41	5.80	15.67
24124	Malvi-4 (check)	141	2.33	18.66	32.66	6.19	15.84
24125	AKA-4(check)	143.33	1.66	19.33	32	8.31	14.97
24126	PA-255(check)	146.66	1	21.66	35.66	8.71	15.86
24127	Roja-1003(check)	148.66	2.66	19.66	44.33	7.98	14.86

Regional Station, Sirsa

Screening for ClCuV

Advance Backcrosses of CLCuV immune lines *i.e* GVS-8 & GVS-9 were developed mat ICAR-CICR, Nagpur while screening was taken up at ICAr-CICR, Regional Station, Sirsa. The data in Table 4 & 5 show their reaction to CLCuV disease.

Table 4 Screening for CLCuV Resistance in BC_3F_1

BC_3 F_1 Populations (2nd year Evaluation)	Plant stand	SCY (g)/plant	PDI	Plants with "0.0" PDI
(GVS 8 X CSH 3075) X CSH 3075 X CSH 3075 X CSH 3075	15	71.2	23.40	1
(GVS 8 X CSH 3129) X CSH 3129 X CSH 3129 X CSH 3129	12	58.8	21.88	1
(GVS 8 X HS 6) X HS 6 X HS 6 X HS 6	13	63.8	14.81	3
[(GVS 9 X CSH 3075) X CSH 3075 X CSH 3075 X CSH 3075	11	52.6	31.82	0
(CSH 3129 X GVS 8) X GVS 8 X GVS 8 X GVS 8	3	32.5	0.00	3
(CSH 3075 X GVS 8) X GVS 8 X GVS 8 X GVS 8	5	42.3	0.00	5
(HS 6 X GVS 8) X GVS 8 X GVS 8 X GVS 8	3	35.8	0.00	3
(CSH 3075 X GVS 9) X GVS 9 X GVS 9 X GVS 9	8	59.4	0.00	8
(CSH 3129 X GVS 9) X GVS 9 X GVS 9 X GVS 9	7	53.2	0.00	7
(HS6 X GVS 9) X GVS 9 X GVS 9 X GVS 9	5	61.6	0.00	5

Table 5. Screening for CLCuV Resistance in BC_4F_1

BC4 F1 Populations (2024-25)	SPS Nos tested	Plant Stand	SCY (g)/plant	PDI	Plants with "0.0" PDI
(GVS 8 X CSH 3075) X CSH 3075 X CSH 3075 X CSH 3075 X CSH 3075	6	88	31.2	31.59	0
(GVS 8 X CSH 3129)X CSH 3129 X CSH 3129 X CSH 3129 X CSH 3129	4	42	53.9	34.71	0
(GVS 8 X HS 6) X HS 6 X HS 6 X HS 6 X HS 6	4	34	42.5	36.90	0
[(GVS 9 X CSH 3075) X CSH 3075 X CSH 3075 X CSH 3075 X CSH 3075	5	55	48.6	34.61	0
(CSH 3129 X GVS 8) X GVS 8 X GVS 8 X GVS 8 X GVS 8	5	10	14.9	9.58	2
(CSH 3075 X GVS 8) X GVS 8 X GVS 8 X GVS 8 X GVS 8	5	9	11.8	6.90	1
(HS 6 X GVS 8) X GVS 8 X GVS 8 X GVS 8 X GVS 8	5	11	08.9	6.67	3
(CSH 3075 X GVS 9) X GVS 9 X GVS 9 X GVS 9 X GVS 9	3	18	15.3	2.33	5
(CSH 3129 X GVS 9) X GVS 9 X GVS 9 X GVS 9 X GVS 9	5	16	18.2	3.67	6
(HS6 X GVS 9) X GVS 9 X GVS 9 X GVS 9 X GVS 9	4	13	20.3	4.87	4

TNAU, Coimbatore

i. Evaluation of introgressed lines of *G. hirsutum*

Nineteen *G. hirsutum* based introgressed lines were raised in a non-replicated trial for evaluation and seed multiplication. Observations were recorded on morphometric and fibre quality traits and the same are furnished as table 1. Two segregating populations (F_2 generation of GISV 350 x GSV 285 and F_3 generation of GSV 325 x BS 27), received from NAU, Surat were raised during winter, 2024 and selections have been made for jassid tolerance. The selected segregants will be advanced for further generations.

ii. Hybridization with *G. arboreum* x *G. davidsonii* derived lines introgressed lines

Hybridization between *G. arboreum* x *G. davidsonii* derived introgressed lines was attempted with *G. hirsutum* cultivars CO 14 and CO 17, with the later as ovule parent. But no boll set was observed.

iii. Hybridization between triploid interspecific hybrid and *G. hirsutum*

Hybridization was attempted between triploid hybrids namely CO 14 x *G. armourianum* and CO 14 x *G. aridum* and *G. hirsutum* variety CO 14. Though several crossings were attempted, it resulted in setting of one crossed boll with three seeds in CO 14 x *G. armourianum* combination. These were raised during winter,2024 and it was observed that they were morphologically identical to *G. hirsutum*. However, selfing has been done and the selfed seeds will be raised during ensuing season for further studies.

iv. Polyploidization of seedling apical meristem of diploid wild species

Apical meristem of self-sown seedlings of *G. anomalum* were subjected to polyploidization by placing cotton buds dipped in 0.25% and 0.5% colchicine. In both the treatments, the treated seedlings expressed stunted growth initially as compared to untreated control and were also characterized by thick leaves. In 0.5% colchicine, none of the seedlings survived. But in 0.25%, out of 15 seedlings tried, two survived.

v. Mutation breeding

M_2 generation of EMS (0.025%) mutant population (280 plants) of *G. hirsutum* variety CO 17 was raised during summer, 2024 and it was sprayed with glyphosate 15ml/lit on 25 days after sowing. Four surviving plants were identified and selfed seeds have been obtained from them for further study to identify mutants with herbicide tolerance.

vi. Strengthening of wild species collection in Department of Cotton

Seeds of wild species namely *G. tomentosum*, *G. darwini*, *G. stocksii*, *G. raimondii*, *G. captiviridis* and *G. thurberi* were received from Anand Agricultural University, Anand and ICAR-CICR, Nagpur. Since seeds sown in protray failed to germinate even after scarification, efforts were taken to obtain plants by germinating *in vitro*. This resulted in recovery of *G. tomentosum* (1 plant) , *G. darwinii* (2 plants) , *G. stocksii* (1 plant), *G. captiviridis* (I plant) and *G. thurberi* (2 plants) seedlings and these have established.

vii. Seed multiplication of *G. hirsutum* races

- Seeds of *G. hirsutum* races *Latifolium, Richmondii* and *Palmeri* were received from ICAR-CICR, Nagpur and these were raised for seed multiplication. Interracial hybridisation will be attempted with *G.hirsutum* in the ensuing season

Table Performance of introgressed lines of *G. hirsutum*

S.no	Entry	Plant height (cm)	No. monopodia	No. sympodia	No. bolls	Plot yield (g/10.8sqm)	Boll weight (g)	GOT (%)	UHML (mm)	Strength (g/tex)	Mic (microgram/inch)	UI (%)	EL (%)
1	NLSD21022*	93.3	13.0	0.7	18.3	1110	4.1	37.6	25.5	21.6	4.8	78.4	5.7
2	NLSD21024	93.3	15.3	0.0	17.3	750	4.0	35.9	25.6	20.9	4.7	80.9	5.7
3	NLSD 21029	110.0	14.3	0.3	24.0	660	4.0	31.3	26.8	22.6	4.3	79.9	5.9
4	NLSD21050	110.0	14.3	0.3	24.0	1160	3.8	34.0	25.2	20.3	4.6	80.2	5.4
5	NLSD21051	93.3	14.0	0.7	10.7	100	4.6	34.2	25.1	20.0	5.5	79.7	5.6
6	NLSD21052	96.7	12.3	0.0	15.7	1300	4.6	33.3	27.5	24.3	4.7	79.6	5.8
7	NLSD 21053	116.7	17.0	0.7	20.0	1350	4.7	34.7	28.5	26.3	4.7	78.2	6.3
8	NLSD 21054	96.7	11.3	0.0	12.3	1700	4.6	37.1	24.9	19.8	5.0	77.5	5.5
9	NLSD 21055	96.7	12.0	1.7	20.0	2100	4.6	39.7	25.1	20.2	5.0	77.3	5.6
10	NLSD 21056	110.0	13.3	0.0	14.0	1700	4.7	38.0	27.1	24.1	4.6	80.1	5.8
11	NLSD 21058	113.3	13.7	0.7	22.7	2000	4.8	27.7	26.6	22.0	5.3	78.9	5.9
12	NLSD 21059	130.0	15.3	0.7	19.3	1650	5.2	38.7	27.0	21.2	5.3	77.4	5.7
13	NLSD 21060	103.3	12.7	0.3	18.7	1850	4.7	38.5	26.3	21.4	4.6	79.5	5.6
14	NLSD 21061	126.7	14.7	0.3	24.0	1650	4.3	36.9	29.7	23.1	4.6	79.5	5.7
15	NLSD 21062	140.0	18.7	2.3	24.3	2000	4.6	34.7	26.4	22.1	4.7	79.2	5.7
16	NLSD 21063	123.3	15.0	0.3	17.7	1750	4.8	32.9	27.4	22.3	5.1	79.2	5.8
17	NLSD 21064	113.3	12.0	1.3	20.0	2100	4.1	38.3	26.7	22.2	4.3	80.5	5.7
18	NLSD 21065	106.7	12.3	0.7	23.0	1900	4.1	35.1	26.4	20.7	4.9	79.2	5.5
19	NLSD 21066	106.7	12.0	0.3	19.7	817	4.4	35.0	25.5	19.9	4.6	79.6	5.6

CICR, Coimbatore

Thirty two entries were evaluated for various yield and physiological parameter and the results are provided in Table. The lines had huge variability in the number of bolls, varying from 4 to 60, boll weight of 3.5 to 6 gm, and maturity of these lines was found to range between 120 to 160 days. A few lines, like PB 25-20 and PB 25-30, showed higher proline and nitrogen reductase content, and these lines could be explored for abiotic stress tolerance. The *G. hirsutum* crosses attempted with *G. aridium* and *G. armorianum* were sterile and these lines were maintained in the wild garden

Table. Yield and physiological parameters of 32 pre-breeding lines

Lines	Plant height	No. of Mono-podia	No. of sympodia	No. of bolls	Nitrate reductase	Proline %	TSS %	Protein mg/g	Chl a	Chl b	Carotenoids
PB 25-1	61.07*	0*	14.08	4	169.4*	99.45*	14.56	12.9*	11.21	6.93	4.52*
PB 25-2	158.28	5	18.95	16.84	169.4*	106.73	17.3	16.62*	13.33*	7.25	4.66*
PB 25-3	121.89*	4	23.06*	25.38	148.38*	107.84	18.47	14.53*	16.58*	10.96*	6.57*
PB 25-4	189.78	4	27.19*	34.81*	249.91*	106.95	14.64	6.81	16.97*	10.92*	5.72*
PB 25-5	149.78	1*	27.04*	38.05*	255.56*	75.5*	14.25	5.38	19.98*	13.56	6.53*
PB 25-6	144.88	2*	25.16*	53.09*	88.03	117.77	7.09	9.33	11.96	8.56*	3.9*
PB 25-7	87.89*	1*	12.99	35.05*	161.71*	99.12*	19.33	11.86*	7.2	4.25	1.89
PB 25-8	156.31	3	25.12*	40.17*	169.91*	163.02	8.16	9.28	12.84	8.9*	3.38
PB 25-9	176.6	2*	17.98	34.91*	163.93*	103.42*	49.14*	12.67*	16.64*	11.3*	5.68*
PB 25-10	137.63	4	17.02	30.21	83.42	104.53*	14.75	9.65	15.6*	10.38*	4.72*
PB 25-11	178.32	1*	18.1	14.97	190.43*	83.78*	6.72	8.18	11.53	8.32*	3.45
PB 25-12	131.82	1*	15.98	39.25*	89.4	53.31*	18.1	9.64	24.3*	16.31*	7.35*
PB 25-13	125.19*	2*	18.03	20.1	55.38	86.31*	44.66*	10.65	12.21	8.33*	4.1*
PB 25-14	182.96	1*	32.97*	58.78*	172.48*	117.66	14.39	13.96*	9.41	6.54	3.46
PB 25-15	141.81	2*	21.89	31.93	68.04	160.15	19.27	8.31	11.61	7.57	3.13
PB 25-16	151.59	3	20.89	50.13*	101.54	145.03	25.55*	12.71*	14.85*	10.18*	4.34*
PB 25-17	169.56	3	24.99*	19.97	112.99*	151.43	34.77*	10.98	16.82*	11.09*	4.9*
PB 25-18	86.18*	3	17.96	20.11	194.19*	146.36	41.51*	11.78*	10.37	7.43	2.99
PB 25-19	100.07*	4	18.98	17.87	1.2	106.18	32.43*	11.1*	11.56	7.25	2.97
PB 25-20	106.14*	2*	27.05*	40.03*	46.5	209.49	31.63*	9.86	9.42	5.83	2.4
PB 25-21	119.9*	3	22.14	32.49	14.02	99.45*	18.28	7.1	15.78*	5.91	3.84
PB 25-22	78.16*	1*	15.88	10	127.86*	167.11	20.34	11.64*	16.77*	6.38	2.29
PB 25-23	77.87*	2*	14.9	35.17*	21.88	116.78	19.5	11.79*	4.74	2.77	1.44
PB 25-24	118.03*	1*	22.08	30.01	0.68	129.14	19.08	11.6*	10.97	8	3.27
PB 25-25	122.87*	3	20.02	35.06*	60.51	150.55	25.9	12.61*	12.22	8.33*	0.91
PB 25-26	109.65*	2*	17.92	14.77	14.02	105.96*	5.82	9.76	4.03	2.65	1.48
PB 25-27	140.39	4	31.88*	48.98*	183.42*	141.28	86.21*	13.11*	12.03	4.24	1.88
PB 25-28	109.61*	2*	23.79*	35.75*	1.2	127.26	29.2*	7.75	15.86*	5.19	4.46*

PB 25-29	121.84*	1*	29.92*	50.18*	13.16	45.7*	15.29	15.61*	12.36	6.65	3.12
PB 25-30	194.65	5	22.03	24.98	298.97*	51.1*	18.49	11.42*	15.79*	8.67*	4.37*
PB 25-31	120.42	4	25.11*	37.65*	62.73	10.71*	26.04	12.09*	8.57	4.27	2.02
PB 25-32	129.13	2*	22.06	42.11*	55.38	26.27*	17.68	11.32*	12.07	6.7	3.46
Mean	131.259	2.435	21.661	31.961	110.801	109.854	23.392	11	12.987	7.863	3.725
SE	1.43	0.035	0.257	0.326	0.524	0.268	0.15	0.01	0.039	0.06	0.079

Program for 2025-2026

- Maintenance: Maintenance of the wild species and triploid lines
- Attempting further new wide crosses: *G. aridum* (D4), *G. armourianum* (D2) with diploid and tetraploid cultivars
- Evaluation and raising crosses attempted with *G. hirsutum* (Suraksha) x *G. aridium*
- Evaluation and utilization of Ten lines of *G. arboreum* x *G. longicalyx*, F7 segregating lines, 60 stable lines and using them in the breeding program for trait improvement.

Crop Production Results

CROP PRODUCTION

AGRONOMY, PHYSIOLOGY AND BIOCHEMISTRY

The following Experiments were undertaken during *Kharif*-2024-25 at various centers of AICRP on Cotton.

AGRONOMY

Agronomy I	Agronomic requirements of promising non Bt and Bt pre-release/recently released *hirsutum/ arboreum/ barbadense* genotypes including compact / hybrids of both interspecific and desi hybrids of cotton
Agronomy II	Augmenting ELS cotton production
Agronomy III	Developing and testing of Bt cotton based cropping system
Agronomy IV	Yield maximisation trial
Agronomy V	Conservation agriculture
Agronomy VI	Preparing for climate change
Agronomy VII	Input use pattern & cost of cultivation
Agronomy VIII	Canopy management in compact genotypes
Agronomy X	Use of Defoliants to facilitate mechanical picking
Agronomy XI	Testing of modules of organic in cotton based cropping system
Agronomy XII:	Paid trial Bio-efficacy evaluation & effect of “Zeba”

PHYSIOLOGY and BIOCHEMISTRY

PHY I	Management of square shedding in cotton
PHY 2	Growth and development of *arboreum c*otton in response to growth regulator
PHY 3	Drone-based foliar application of nutrients in cotton
BIO CHEM1	Screening of Cotton genotypes for abiotic stress tolerance and estimation of seed oil, gossypol and protein
BIO CHEM2	Analysis of biochemical constituents of preparing for climate change (AGR VI) Canopy management (AGR VIII) , defoliants (AGR X) and square shedding (PHY I)
BIO CHEM. 3	Influence of Biochemical constituents on the incidence of Pink bollworm in cotton

The trials conducted zone-wise were as follows:

North zone	Faridkot, Bathinda, Sirsa, Hisar and Sriganganagar
Central Zone	Surat, Akola, Rahuri, Nanded, Khandwa, Junagadh and Bhawanipatna
South Zone	Lam (Guntur), Nandyal, Dharwad**,** Chamrajanagar, Coimbatore, Srivilliputtur and Raichur

The project-wise findings and salient highlights of the research pertaining to North, Central and South zones are summarized below.

Agronomy IA: Agronomic requirements of promising pre-release/recently released *arboreum* desi hybrid of cotton

NORTH ZONE

BATHINDA

The results of agronomic requirement studies of KR 152 desi hybrid conducted at Bathinda under irrigated conditions revealed that seed cotton yield varied significantly under different planting geometries and fertilizer levels. KR 152 produced a significantly higher seed cotton yield with a planting geometry of 67.5 x 45 cm (2817 kg/ha). The significantly lowest yield was recorded with 67.5 x 30 cm (2457 kg/ha) and 67.5 x 60 cm (2573 kg/ha). Among the Nitrogen levels tested the highest seed cotton yield was recorded under 125% RDN (2738 kg/ha) followed by 100 %RDN (2684 kg/ha). Further decrease in nitrogen to 75% RDN resulted in a significant decline in seed cotton yield (2427 kg/ha) (Table 1). The interaction among different planting geometries and fertilizer levels was found to be non-significant.

Table 1. Seed cotton yield (kg/ha) as influenced by spacing levels and nutrient levels with KR 152-in Bathinda

Treatments	**S_1.67.5 X 30 cm**	**S_2.67.5 X 45 cm**	**S_3. 67.5X 60 cm**	**Mean (Fertilizers)**	**Anova**	**SE d**	**CD (5%)**
F_1- 75% RDN (56.2 kg N per ha)	2257	2692	2331	2427	Spacing	113	242
F_2- 100% RDN (75 kg N per ha)	2544	2842	2664	2684	Fertilizers	113	242
F_3- 125% RDN (93.7 kg N per ha)	2571	2918	2725	2738	S X F	196	NS
Mean (spacing)	2457	2817	2573				
FMDH 9 at 67.5 x 45 cm (RND 100%)				3065			

Soil parameters: Soil pH: 8.75, EC:0.18 m mhos cm-1, OC (%): 0.38, Available P_2O_5: 11.6 kg/ha & Available K_2O: 280 kg/ha, Recommended nutrients: 75 kg N /ha, Environment: irrigated; Total rainfall during cropping period: 269 mm

BATHINDA

The results of agronomic requirement studies conducted at Bathinda under irrigated conditions revealed that the performance of tested desi cotton hybrid CISAA19-4 varied Significantly under different planting geometries and fertilizer levels. CISAA19-4 produced significantly higher seed cotton yield under planting geometry of 67.5 x 30 cm (2288 kg/ha)

followed by 67.5 x 45 cm (2187 kg/ha) (Table 2). Significantly the least yield was recorded with 67.5 x 60 cm (1659 kg/ha). Among the nitrogen levels tested, the highest seed cotton yield was recorded under 125% RDN (2286 kg/ha) followed by 100%RDN (2092 kg/ha). The least SCY was recorded under 75% RDN (1756 kg/ha). The interaction results between different planting geometries and nitrogen levels were found to be non-significant.

Table 2. Seed cotton yield (kg/ha) as influenced by spacing levels and nutrient levels with CISAA19-4 in Bathinda

Treatments	S_1.67.5 X 30 cm	S_2.67.5 X 45 cm	S_3. 67.5 X 60 cm	Mean (Fertilizers)	Anova	SE d	CD (5%)
F_1- 75% RDN (56.2 kg N per ha)	1858	1835	1573	1756	Spacing	123	263
F_2- 100% RDN (75 kg N per ha)	2360	2291	1625	2092	Fertilizers	123	263
F_3- 125% RDN (93.7 kg N per ha)	2645	2434	1778	2286	S X F	213	NS
Mean (spacing)	2288	2187	1659				
FMDH 9 at 67.5 x 45 cm (RND 100%)				3020			

Soil parameters: Soil pH: 8.75, EC: 0.18 m mhos cm-1, OC (%): 0.38, Available P_2O_5: 11.6 kg/ha & Available K_2O: 280 kg/ha, Recommended nutrients: 75 kg N /ha, Environment: irrigated; Total rainfall during cropping period: 269 mm

CENTRAL ZONE

AKOLA

The results of agronomic requirement studies conducted at Akola under rainfed conditions revealed that seed cotton yield of tested *arboreum* variety JLA 1204 varied Significantly under different planting geometries and nitrogen levels. The SCY was significantly highest (2023 kg/ha) with plant density (1.66 lakh ha^{-1}) i.e. with 60 x 10 cm spacing which was found significantly superior over wider spacing of 60X15 cm with plant density of 1.11 lakh /ha with seed cotton yield of 1683 $kgha^{-1}$. The highest SCY (1989 kg/ha) was recorded at 125 % RDN level which was found significantly superior over 100 % RDN (1676 kg/ha) and 75 % RDN (1544 kg/ha) (Table 3.). The interaction effect of spacing x nitrogen levels with regards to all growth parameters were found non-significant except sympodial length and seed cotton yield. The seed cotton yield of genotype JLA-1204 (2475 kg/ha) was significantly the highest with 60 x 10 cm with a plant population of 1.66 lakh ha^{-1} and RDN level of 125 %.

Table 3. Seed cotton yield (kg/ha) as influenced by spacing levels and nutrient levels with JLA 1204 in Akola

Treatments	S1.60X10 cm	S2.60X15 cm	S3.60X 30 cm	Mean (Nitrogen)	Anova	SE d	CD (5%)
F_1. 75% RDN (30:20:20 NPK kg/ha)	1771	1442	1420	**1544**	Spacing	64.92	137.61
F_2. 100% RDN (40: 20:20 NPK kg/ha)	1825	1763	1442	**1676**	Nitrogen	64.92	137.61
F_3. 125% RDN (50: 20:20 NPK kg/ha)	2475	1845	1646	**1989**	S X N	112.44	238.35
Mean (spacing)	**2023**	**1683**	**1503**				

Soil parameters: Soil pH: 7.80, O.C.(%) : 3.90, Available N : 237 kg/ha , P_2O_5 : 17.20 kg/ha , K_2O : 374 kg/ha, Environment: Rainfed, Cotton Species: Arboreum Variety, Total Rainfall during Cropping period: 955.1 mm in 44 rainy days,

NANDED

The results of agronomic requirement studies conducted at Nanded under rainfed conditions revealed that the plant height and number of sympodia of genotype CAN 20402 were not affected due to spacing and nitrogen levels. The number of monopodia per plant was significantly reduced in closer spacing of 45 x 15 cm than wider (45 x 30 cm). The yield attributes *viz.,* number of bolls/ m^2 and boll weight (g) differed significantly by spacing and nitrogen levels. Seed cotton yield of color *arboreum* cot variety CAN 20402 was not varied statistically by nitrogen levels. Spacing 45 x 15 cm (1168 kg/ha) was significantly superior over 45 x 30 cm (894 kg/ha) and was on par with the recommended spacing of 45 x 22.5 cm (1095 kg/ha) for seed cotton yield (Table 4.).

Table 4. Seed cotton yield (kg/ha) as influenced by spacing levels and nutrient levels with CAN 20402 BG II in Nanded

Treatments	S_1.45x15 cm	S_2. 45x22.5 cm	S_3. 45x30 cm	Mean (Nitrogen)	ANOVA	SE d	CD (5%)
N_1. 75% RDN (37.5 kg N/ha)	1111	1036	811	**886**	Spacing	40.73	87.09
N_2. 100% RDN (50 kg N/ha)	1118	1100	894	**1061**	Nitrogen	40.73	N.S.
N_3. 125% N RDN (62.5 kg N/ha)	1203	1150	978	**1110**	S X N	70.55	N.S.
Mean (spacing)	**1168**	**1095**	**894**		**CV**	8.21	

Soil parameters pH: 8.12, EC: 0.19 m mhos cm-1, OC (%): 0.44, Available N : 141.4 kg/ha, P_2O_5: 11.76 kg/ha, K_2O : 434.8 kg/ha, Environment: Rainfed, Recommended spacing: 45 x 22.5 cm, Total Rainfall (mm) received during cropping periods: 1233.8 mm.

SOUTH ZONE

DHARWAD

The results of agronomic requirement studies of DDCC-2151 arboreum variety conducted at Dharwad under rainfed conditions revealed that seed cotton yield varied significantly under different planting geometries and nitrogen levels. DDCC-2151 produced significantly higher seed cotton yield under planting geometry of 60 x 30 cm (1560 kg/ha). The significantly least yield was recorded under 90 x 30 cm (1288 kg/ha). Among the nitrogen levels tested, the highest seed cotton yield was recorded under N3- 125% RDN (50 kg N/ha) (1536 kg/ha) (Table 5). The least seed cotton yield was recorded under 75% RDN (1313 kg/ha). Interaction among the different planting geometries and nitrogen levels was non-significant.

Table 5. Seed cotton yield (kg/ha) as influenced by spacing and nitrogen levels with DDCC-2151 in DHARWAD

Treatments	S_1.60 x 30 cm	S_2.75 x 30 cm	S_3.90x 30 cm	Mean (Nitrogen)	ANOVA	SE d	CD (5%)	CV
N_1- 75% RDN (30 kg N/ha)	1468	1288	1182	1313	Spacing	66.31	184.05	9.99
N_2- 100% RDN (40 kg N/ha)	1513	1314	1289	1372	Nitrogen	62.36	136.04	9.41
N_3- 125% RDN (50 kg N/ha)	1698	1516	1394	1536	S X N	110.34	NS	
Mean (spacing)	1560	1373	1288					

soil parameters: pH: 7.10, OC %: 0.61, Available N: 222.0 kg/ha, Available P_2O_5: 23.0 kg/ha, Available K_2O : 395 kg/ha, Total rainfall: 1003 mm, Rainy days: 71 days Soil type medium deep black cotton

AGR II: Augmenting ELS cotton production
CHAMARAJANAGAR

The study was conducted under rainfed condition to assess the comparative performance of recently released *barbadense* genotypes revealed that the growth parameters such as plant height and number of monopodial branches per plant didn't differ significantly among the tested genotypes. Whereas the number of sympodial branches (24.1), bolls per square meter (69.4/m^2), boll weight (4.6 g) and seed cotton yield (1227 kg/ha) were significantly higher in Bt cotton hybrid (Control-Bahubali), Similarly, maximum gross returns (Rs.122728/ha), net returns (Rs.51602/ha) and B:C ratio (1.72).was recorded in the same genotype. Amongst barbadense genotypes higher seed cotton yield was noticed in CICR B-45 (1032 kg/ha), followed by Suvin (1007 kg/ha) and CICR B-37 (933 kg/ha), However, theses genotypes are found to be on par with each other with respect to seed cotton yield. Similar trends were observed with respect to economics (Table 6).

Table 6. Growth characters, seed cotton yield (kg/ha) and quality parameters of *barbadense* genotypes

Treatments	Plant height (cm) at harvest	No. of monopodia at harvest	No. of sympodia at harvest	No of bolls/ sqm	Boll weight (g)	Seed cotton yield (kg/ha)	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Benefit Cost Ratio
G1.DB1601	131.7	1.3	15.4	43.9	3.5	857	61043	85691	24648	1.40
G2.DB1602	144.5	1.3	17.8	46.9	3.7	860	61043	85985	24942	1.41
G3.ARBB1502	142.4	1.4	18.0	43.2	3.9	883	61459	88336	26877	1.44
G4.CICR B cotton 37	146.0	1.3	19.5	46.6	3.5	933	62084	93333	31249	1.50
G5.CICR B cotton 45	143.7	1.3	18.7	49.3	3.8	1032	63126	103180	40055	1.63
G6. Control (suvin)	146.4	1.4	19.7	47.9	3.8	1007	62918	100682	37764	1.60
G7. Bahubali (HxB) Bt	159.9	1.5	24.1	69.4	4.6	1227	71126	122728	51602	1.72
SEd	11.24	0.12	1.64	3.39	0.25	70.15	810.6	7015	6216	0.08
CD (5%)	NS	NS	3.58	7.40	0.54	152.8	1766	15286	13545	0.18
CV	9.49	11.48	10.59	8.38	7.94	8.84	1.56	8.84	22.47	6.76

Soil parameters : pH: 8.25, EC:0.54 m mhos cm^{-1}, OC (%):0.48, Available N (kg/ha): 258.2, P2O5 (kg/ha): 19.25, K (kg/ha):850.3,Environment: rainfed, Rainfall (mm) received during cropping periods: 584 mm

Agronomy III- Developing and testing of Bt cotton-based cropping system to enhance resource utilization and sustainability

CENTRAL ZONE

AKOLA

The earliness associated with Bt hybrid could be exploited to design more efficient cotton-based cropping systems. Sequence crops like Wheat, Chickpea, Linseed, Onion and Groundnut were raised in the rabi season in Kharif planted early maturing Bt cotton plots to study the influence of different treatments of Bt cotton-based cropping systems for enhancing resource utilization and sustainability. The study at Akola revealed that Significantly maximum seed cotton yield (2526 kg/ha) was registered in T_1 i.e.in Mid-late Bt hybrid ACH-155 Which was found at par with seed cotton yield of 2303 kg/ha in case of ACH-5 as a sole cotton. The maximum yield in these treatments might be due to the extension of cotton crop till mid of January. In other system, the cotton crop was terminated in first week of December for sowing of succeeding rabi crops like wheat, chickpea, linseed, onion and groundnut followed by early bt cotton. Significantly the highest seed cotton equivalent yield of 8340 kg/ha was recorded in Bt Cotton-onion sequence cropping followed by Bt cotton-groundnut sequence cropping system (4604 Kg/ha) (Table 7). The seed cotton equivalent yield in Bt Cotton-onion sequence was significantly superior than all other sequences tried in the experiment. This might be due to the higher production potential of onion crop in rabi season. All the sequence crops showed good seed cotton equivalent yield than early and medium duration Bt cotton taken as a sole crop.

The different economic parameters indicated that, significantly highest Gross return (GR) of Rs.564618/ha., Net return (NR) of Rs.425973/ha and B:C ratio of 4.07 was registered in Bt Cotton-onion sequence followed by in Bt cotton-groundnut sequence crop system with GR of Rs.311691 /ha., NR of Rs.230351/ha and B:C ratio of 3.83. In a limited water availability with only two irrigations Bt cotton-chickpea sequence registered GR of Rs.265858/ha, NR of Rs.194523 and B:C ratio of 3.73.

Maximum relative production efficiency of 230.1 % was recorded in Bt cotton-onion sequence cropping system followed by Bt cotton-groundnut sequence cropping system with relative production efficiency of 82.27% over existing sole mid-late Bt cotton. In kharif season maximum N (144.6 kg/ha), (35.68 kg/ha) and K (63.3 kg/ha) uptake was recorded in sole cotton (midlate) as compared to nutrients uptake in early Bt cotton. Among the sequence crops maximum uptake of N (263.7 kg/ha),P (82.2 kg/ha) and K (342.7 kg/ha) was registered in onion crop followed by wheat crop which recorded 196.6 kg,70.5 kg and 223.0 kg N,P and K respectively. Linseed crop showed less uptake of all the major nutrients. Bt cotton-groundnut sequence crop system showed maximum availability of nutrients at harvest followed by in Bt cotton-chickpea sequence cropping system. This might be due to inclusion of chickpea and groundnut as a sequence crops grown after early bt cotton

Table 7. Seed cotton yield (kg/ha), yield of different sequence rabi crops, cotton equivalent yield and economics in Akola

Treatments	Seed Cotton Yield (Kg/ ha)	Intercrop yield	Cotton Equivalent Yield (kg/ ha)	Cost of cultivation (Rs/ ha)	Gross return (Rs/ha)	Net return (Rs/ ha)	Benefit Cost Ratio	Relative production efficiency (% Over C1)	Relative production efficiency (% Over C2)	System Profitability (Rs. /ha/day)
C1: Sole Bt Cotton (Mid-late durationi.e.160-170 days duration)	2526		2526	53850	170988	117138	3.18	--	--	458
C2: Sole Bt-cotton (Early duration i.e. 140-150 days duration)	2303		2303	50692	155936	105244	3.08	--	--	411
C3: Bt-cotton (Early duration)-Wheat (kg/ha)	2122	4241	3579	71645	242321	170676	3.38	41.7	55.4	662
C4: Bt-cotton (Early duration)-Chickpea (kg/ha)	2148	2165-	3927	71335	265858	194523	3.73	55.4	70.5	729
C5: Bt-cotton (Early duration)-Linseed (kg/ha)	2172	1045	3119	65170	211156	145986	3.24	23.4	35.4	551
C6: Bt-cotton (Early duration)-Onion (t/ha)	2093	27.57	8340	138645	564618	425973	4.07	230.1	262.1	1578
C7: Bt-cotton (Early duration)-Groundnut (kg/ha)	2086	2614	4604	81340	311691	230351	3.83	82.2	99.9	808
SEd	108		194	-	12808	12808	-	-	-	-
CD (5%)	234		410	-	27793	27793	-	-	-	-
CV	7.99		8.56	-	9.26	7.90	-	-	-	-

RAHURI

Sequence crops like Wheat, Chickpea, Linseed, Onion and Groundnut were raised to study the influence of different treatments of Bt cotton-based cropping systems for enhancing resource utilization and sustainability. It was observed that treatmentT_1 (Sole *Bt* Cotton (RCH-659) Mid-late duration variety recorded significantly maximum seed cotton yield (1651 kg/ha) followed by treatment T_5(*Bt* cotton- RCH-779 (Early duration) - Linseed) (1445 kg/ha). The treatment T_6 -*Bt* cotton- RCH-779 (Early duration) – Onion) sequence cropping recorded significantly higher Gross monetary returns (Rs. 340286 ha^{-1}), Net Monitory returns (Rs.196544 ha^{-1}) and B: C ratio (2.6) (Table 8). The higher relative production efficiency (242.5 %) and relative economic efficiency (452.3 %) were recorded in treatment T_6 -*i.e Bt* cotton- RCH-779 (Early duration) – Onion cropping sequence followed by T_7 *i.e Bt* Cotton groundnut cropping sequence (103.8 %) and (163.4 %) respectively.

Table 8. Seed cotton yield (kg/ha), yield of different sequence rabi crops, cotton equivalent yield and economics in Rahuri

Treatments	Seed Cotton Yield (Kg/ha)	Inter-crop yield	Cotton Equivalent Yield (kg/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Benefit Cost Ratio	Relative production efficiency (% Over	Relative production efficiency (% Over
C_1 - Sole *Bt* Cotton – RCH-659 (Mid-late duration)	1651		1650	99347	35574	1.7	0.0	0.0
C_2 -*Bt* cotton- RCH-779 (Early duration)	1416		1416	69704	15932	1.1	-29.8	-55.2
C_3 -*Bt* cotton- RCH-779 (Early duration) - Wheat	1269	4678	2885	173101	66546	1.7	74.2	87.1
C_4 -*Bt* cotton- RCH-779 (Early duration) - Chickpea	1342	1943	2958	177510	87837	2.0	78.7	146.9
C_5 -*Bt* cotton- RCH-779 (Early duration) - Linseed	1445	680	1946	116733	33178	1.2	17.5	-6.7
C_6 -*Bt* cotton- RCH-779 (Early duration) - Onion	1332	10	5671	340286	196544	2.6	242.5	452.5
C_7 -*Bt* cotton- RCH-779 (Early duration) - Groundnut	1289	4678	3374	202434	93696	1.9	103.8	163.4
SEd	176.4			6884.4	6408.4	0.3		
CD (5%)	384.2			14999.9	13962.7	0.6		
CV								

JUNAGADH

The Sequence crops like wheat, chickpea, coriander, fenugreek and cumin were raised to study the influence of different treatments of Bt cotton-based cropping systems for enhancing resource utilization and sustainability. The kharif season cotton crop data is presented here. Different treatment of cotton based cropping system significantly influences on days to 50 % flowering, number of bolls per square meter and seed cotton yield. The plant height, numbers of sympodia and monopodia were not significantly effect by the different treatments. Minimum days to 50 % flowering (51.67-54 days) was recorded with G.Cot.Hy-8 BG-II genotype as compared to G.Cot.Hy. 24 BG-II. Numbers of boll per square meter (67) and seed cotton yield (2693 kg/ha) were found significantly the highest with treatment T_1 i.e Sole *Bt* Cotton (Mid-late duration) G.Cot. Hy. 24 BG –II (Table 9).

Table 9. Growth, yield attributes and seed cotton yield (kg/ha) of cotton as influenced by different treatments of Bt cotton-based cropping system

Treatments	Plant height (cm) at harvest	No. of monopodia at harvest	No. of sympodia at harvest	No of bolls/ sqm	Boll weight (g)	Days of 50% flowering	Seed cotton yield (kg/ha)
C_1. Sole *Bt* Cotton (Mid-late duration) G.Cot. Hy. 24 BG -II	128	2	17	67	4.3	57.3	2693
C_2. *Bt*-cotton (Early duration) G.Cot.Hy.8 BG-II	118	1	17	49	4.1	53.7	2024
C_3. *Bt*-cotton (Early duration) - wheat	125	1	16	49	4.2	53.7	2081
C_4. *Bt*-cotton (Early duration) - chickpea	122	2	16	48	4.0	53.0	1938
C_5. *Bt*-cotton (Early duration) - coriander	125	1	16	51	4.2	54.0	2102
C_6. *Bt*-cotton (Early duration) - fenugreek	118	1	16	51	4.2	54.0	2066
C_7. *Bt*-cotton (Early duration) - cumin	122	1	16	46	4.2	51.7	1970
SEd	6.91	0.20	1.09	2.47	0.12	0.74	99
CD (5%)	NS	NS	NS	7.62	NS	2.28	307
CV %	9.75	24.30	11.49	8.30	4.90	2.38	8.11

Soil parameters of pH:7.70, Soil EC: 0.46 m mhos cm^{-1}, OC: 0.75%, available N 299 kg/ha , P_2O_5 35.49 kg/ha & K_2O 330 kg/ha, recommended spacing 120 x 45 cm, recommended nutrients 240-50-150 NPK kg/ha, environment: irrigated and total rainfall 2296.30 mm during cropping periods

SURAT

The earliness associated with Bt hybrid could be exploited to design more efficient cotton-based cropping systems. Sequence crops like Green gram, Chickpea, Maize, Sorghum and Sunhemp were raised in rabi season in kharif planted early maturing Bt hybrid plots to study the influence of different Bt cotton-based cropping systems for enhancing resource utilization and sustainability. Seed cotton yield showed significant difference amongst different cotton based cropping system tested. Sole Bt Cotton (Mid-late duration) (G. Cot. Hy.-10 BG-II) recorded significantly higher seed cotton yield (3066 kg/ha) than rest of the treatments(Table 10) .

Grain yield of green gram (720 kg/ha), chickpea (590 kg/ha), Maize (2840 kg/ha), Sorghum (2580 kg/ha) and Sunnhemp (1420 kg/ha) were obtained during the Rabi season . Lowest value of Cost of cultivation was recorded in cropping sequence Bt-cotton (Early duration) (GTHH-49 BG-II) (Rs 70856/ha) where as highest cost of cultivation was recorded by treatment T_7 .Bt-cotton (Early duration) –Maize (Rs 114736/ha). The highest values of Gross return (Rs 249240/ha), Net return (Rs 134504 /ha) and Benefit Cost Ratio (2.17) were recorded by Bt-cotton (Early duration) –Maize system. The highest values of relative production efficiency (44.9), Relative Economic efficiency (0.44), water use efficiency (2.89) and labour use

efficiency (989) were recorded with Bt-cotton (Early duration) –Maize (T_7). Where as highest nutrient use efficiency (10.2) was recorded by treatment T_5. Bt-cotton (Early duration) - Sunhemp (Seed production).

Table 10. Seed cotton yield, yield of different sequence rabi crops, cotton equivalent yield and economics in Surat

Treatments	Seed Cotton Yield (Kg/ ha)	Intercrop yield (kg/ha)	Cotton Equivalent Yield (kg/ha)	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ ha)	Benefit Cost Ratio	Relative production efficiency (% Over C1)	Relative production efficiency (% Over C2)
T_1.Sole Bt Cotton (Mid-late duration)(G. Cot. Hy.-10 BG-II)	2866		2866	78593	171980	93387	2.19	0.00	0.00
T_2. Bt-cotton (Early duration) (GTHH-49 BG-II)	2220		2220	70856	133220	62364	1.88	-22.5	-0.33
T_3. Bt-cotton (Early duration)- Green gram	2333	720	3413	106425	204800	98375	1.92	19.0	0.05
T_4. Bt-cotton (Early duration) – Chickpea	2374	590	3043	108264	182580	74317	1.69	6.1	-0.20
T_5. Bt-cotton (Early duration) - Sunhemp (Seed production)	2230	1420	3650	108414	219000	110587	2.02	27.3	0.18
T_6. Bt-cotton (Early duration) –Sorghum	2247	2580	3788	110007	227280	117273	2.07	32.1	0.26
T_7. Bt-cotton (Early duration) –Maize	2388	2840	4154	114736	249240	134504	2.17	44.9	0.44
SEd	**129.91**		**117**						
CD (5%)	**400**		**360**						

Soil parameters : soil pH: 8.35, EC : 0.51 m mhos cm^{-1}, OC (%) : 0.42, Available N: 291 kg/ha , Available P_2O_5: 35.67 kg/ha, Available K_2O : 583 kg/ha, Recommended spacing : 120 x 45 cm, Cotton species/ type: *Gossypium hirsutum*, Recommended nutrients : 240-40-00 NPK kg/ha , Environment: Irrigated, Total rainfall : 955 mm

AGR IV: Yield maximization of Bt cotton by integrated crop management techniques

NORTH ZONE

Irrigated Environment

BATHINDA

The results of yield maximization of Bt cotton by integrated crop management techniques conducted at Bathinda revealed that sympodia per plant were significantly lesser under all high-dense treatments as compared to control. The number of boll/SQM (94) and seed cotton yield (2573 kg/ha) were significantly higher with the treatment of canopy management along with drip fertigation and straw mulching (T_{11}). Seed cotton yield was 35% higher with T_{11} in comparison with T_1 : Conventional practice (Recommended spacing) (Table 11). Plant growth and productivity were affected by plastic mulch due to hot weather conditions during May June and July months.

Table 11. Growth characters, yield attributes and seed cotton yield (kg/ha) as influenced by Yield maximization techniques in Bt cotton at Bathinda

Treatments	Plant height (cm) at harvest	No. of monopodia at harvest	No. of sympodia at harvest	Sympodial length (cm)	No of bolls /sqm	Boll weight (g)	Height to node ratio	Seed cotton yield (kg/ha)
T_1 : Conventional practice (Recommended spacing)	135	1.40	23	28	87	4.4	6.2	1905
T_2 : Cotton in closer 90 x 30 cm (37037 plants ha^{-1})	147	0.93	19	23	80	4.1	6.2	1986
T_3 : T_2+ Detopping at 100cm height	113	0.93	17	27	85	4.3	5.9	2069
T_4 : T_2+ Pruning of monopodia at 45 DAS	128	0.07	16	25	75	4.4	5.0	1973
T_5 : T_2+Two sprays of Mepiquat chloride @ 25 g *a.i.* at 45 and 60 DAS	114	0.93	20	22	88	4.2	4.8	2202
T_6:T_3+T_4	120	0.20	16	27	81	4.4	5.7	2031
T_7:T_3+T_5	111	1.07	15	25	79	4.2	5.3	1987
T_8:T_4+T_5	110	0.13	15	24	80	4.2	4.6	2006
T_9:T_3+T_4+T_5	106	0.20	15	22	75	4.3	5.2	1980
T_{10}: T_9+ Drip fertigation*	102	0.07	14	24	85	4.4	4.5	2339
T_{11}:T_{10}+ straw/crop residue mulch @5 t/ha*	118	0.20	16	26	94	4.5	4.8	2573
T_{12}: T_9+Poly mulch	99	0.13	13	18	65	4.1	4.6	1833
SEd	9.7	0.12	1.6	2.2	6.8	0.1	0.5	184.0
CD (5%)	20.2	0.25	3.4	4.5	14.0	0.2	0.9	381.0
CV	10.2	27.8	12.1	10.9	10.2	3.3	10.6	10.0

Soil parameters: pH: 8.70, EC:0.29 m mhos cm-1, OC (%): 0.22, Available N: 145 kg/ha, P_2O_5: 9.2 kg/ha & Available K_2O: 285 kg/ha, Recommended nutrients: 105 kg N /ha, Environment: irrigated; Total rainfall during cropping period: 269 mm

HISAR

The results of yield maximization of Bt cotton by integrated crop management techniques conducted at Hisar revealed that the maximum seed cotton yield was obtained in treatment T_8 i.e., Cotton in closer 90 x 30 cm + Pruning of monopodia at 45 DAS+ Two sprays of Mepiquat chloride @ 25g a.i. at 45 and 60 DAS (3714 kg/ha) statistically at par with treatments T_7 i.e., Cotton in closer 90 x 30 cm + Detopping at 100 cm height + Two sprays of Mepiquat chloride @ 25g a.i. at 45 and 60 DAS (3586 kg/ha), T_{12} (3517 kg/ha), and T_6 (3488 kg/ha) . The economic analysis indicates that the highest net returns (₹107,011/ha) were achieved under treatment T_8 closely followed by T_7 (₹104,094/ha) and T_6 (₹95,955/ha) . The highest gross returns (₹259,980/ha) were also recorded under T_8. However, the maximum benefit-cost ratio (B:C) was observed in T_7 (1.71) which was statistically at par with T_8 (1.70) and T_6 (1.65) (Table 12). In contrast, the lowest net returns (₹28,744/ha) and B:C ratio (1.19) were recorded under treatment T_{11}.

Table 12. Seed cotton yield (kg/ha) and Economics as influenced by Yield maximization techniques in Bt cotton at Hisar

Treatment	Seed cotton yield (kg/ha)	Height (cm) to node ratio at first picking	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Benefit Cost Ratio
T_1 - Conventional practice (Recommended spacing)	2751	6.43	122713	192570	69857	1.57
T_2 - Cotton in closer 90 x 30 cm (37037 plants / ha)	2370	6.70	116999	165900	48901	1.42
T_3 - T_2 + Detopping at 100 cm height	2371	5.75	123201	165970	42769	1.35
T_4 - T_2 + Pruning of monopodia at 45 DAS	2851	5.08	134526	199570	65044	1.48
T_5 - T_2 + Two sprays of Mepiquat chloride @ 25g a.i. at 45 and 60 DAS	3263	4.47	137955	228410	90455	1.66
T_6 - T_3 + T_4	3488	5.01	148205	244160	95955	1.65
T_7 - T_3 + T_5	3586	4.16	146926	251020	104094	1.71
T_8 - T_4+T_5	3714	4.37	152969	259980	107011	1.70
T_9 - T_3+T_4 + T_5	2773	4.51	142980	194110	51130	1.36
T_{10} - T_9 + Drip fertigation	2645	4.67	141061	185150	44089	1.31
T_{11} - T_{10} + straw / crop residue mulch @ 5t / ha	2616	4.89	154376	183120	28744	1.19
T_{12} - T_9 + Poly mulch	3517	5.20	165965	246190	80225	1.48
SEd	**278**	**0.44**				
CD (5%)	**518**	**0.92**				
CV	**11**	**10.57**				

Soil parameters: soil pH: (7.8), Soil EC: (0.34 m mhos cm-1), OC (%): 0.53, Available N : 317.8 (kg/ha), P_2O_5: 26.8 (kg/ha), K_2O: 326.5 (kg/ha), Recommended Nutrient levels: 175:60:60:25 (N:P:K:$ZnSO_4$ kg/ha), Environment: Irrigated, Recommended spacing: 100X45 cm, Total Rainfall (mm) received during cropping periods: 483.5 mm in 21 rainy days.

SRIGANGANAGAR

The results of the yield maximization trial in Bt cotton by adopting integrated crop management techniques conducted at Sriganganagar under irrigated conditions revealed that higher seed cotton yield was recorded in drip fertigation 3429 kg/ha with water use efficiency WUE 4.44 kg/ha mm followed by drip with poly-mulch 3349 kg/ha with water use efficiency of 4.48 kg /ha mm, drip with straw residue 3326 kg/ha with water use efficiency 4.41 kg /ha mm which were significantly higher over other rest of treatments(Table 13).

Table 13. Growth attributes and Seed cotton yield (kg/ha) as influenced by Yield maximization techniques in Bt cotton

Treatments	Plant height (m) at harvest	No. of sympodia at harvest	No. of Bolls/ sqm	Boll weight (g)	Seed cotton Yield (q/ha)	Water use efficiency (kg/ha-mm)
T_1 : Conventional practice (Recommended spacing)	176	14	274	4.0	2961	3.56
T_2 : Cotton in closer 90 x 30 cm (37037 plants/ha)	179	13	280	3.5	2995	3.60
T_3 : T_2 + Detopping at 100 cm height	178	12	281	3.7	2984	3.59
T_4 : T_2 + Pruning of monopodia at 45 DAS	177	11	275	3.7	2869	3.45
T_5 : T_2+Two sprays of mepiquat chloride @ 25 g *a.i.* at 45 and 60 DAS	152	10	282	3.7	2721	3.27
T_6:T_3+T_4	159	12	282	3.7	2549	3.06
T_7:T_3+T_5	119	9	289	3.7	2606	3.13
T_8:T_4+T_5	100	8	279	3.7	2961	3.56
T_9:T_3+T_4+T_5	98	8	292	3.7	2892	3.47
T_{10}: T_9+ Drip fertigation	158	11	262	4.0	3429	4.44
T_{11}:T_{10}+ straw/crop residue mulch @5 t/ha	156	12	265	4.1	3326	4.41
T_{12}: T_9+Poly mulch	108	13	271	4.1	3349	4.48
S Ed	5.4	1.4	4.8	0.0	165.1	--
CD (5%)	15.7	NS	14.1	0.1	484.1	--

Soil parameters; soil pH: 7.8, EC :0.59, OC (%): 0.24, Available P (kg/ha):21, K (kg/ha):432, available N : 150 kg/ha, Environment: Irrigated, Total Rainfall (mm) received during crop periods: 432.3 mm

CENTRAL ZONE

SURAT

The results of yield maximization of Bt cotton by integrated crop management techniques conducted at Surat revealed that Seed cotton yield showed significant difference due to application of different treatments. Higher seed cotton yield was recorded in treatment T_7 i.e.Cotton in closer 90 x 30 cm+ Detopping at 100 cm height +Two sprays of Mepiquat chloride @ 25g a.i. at 45 and 60 DAS (2819 kg/ha) which was found at par with treatments T_9 (2521 kg/ha) and T_{10} (2789 kg/ha). The lowest treatment cost (Rs. 79012/ha) was recorded in treatment T_1 (Conventional practice) and the highest treatment cost of Rs. 136453/ha was in treatment T_{10}. The highest gross return (195230 Rs /ha) and net return (86801Rs /ha) was found in treatment T_{10} (Cotton in closer 90 x 30 cm (37037 plants / ha) +Pruning of monopodia at 45 DAS+Two sprays of Mepiquat chloride @ 25g a.i. at 45 and 60 DAS +straw / crop residue mulch @ 5t / ha+Poly mulch) and T_7 (Cotton in closer 90 x 30 cm +Detopping at 100 cm height

+ Two sprays of Mepiquat chloride @ 25g a.i. at 45 and 60 DAS) respectively. The highest BCR value (1.79) was found in treatment T_7 (Table 14).

Table 14. Seed cotton yield (kg/ha) and Economics as influenced by Yield maximization techniques in Bt cotton at SURAT

Treatments	Seed cotton yield (kg/ha)	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Benefit Cost Ratio
T_1 - Conventional practice (Recommended spacing)	1718	79012	120260	41249	1.52
T_2 - Cotton in closer 90 x 30 cm (37037 plants / ha)	1661	94659	116270	21611	1.23
T_3 - T_2 + Detopping at 100 cm height	2167	102831	151690	48859	1.48
T_4 - T_2 + Pruning of monopodia at 45 DAS	1905	103323	133350	30027	1.29
T_5 - T_2 + Two sprays of Mepiquat chloride @ 25g a.i. at 45 and 60 DAS	2026	99487	141820	42333	1.43
T_6 - T_3 + T_4	2097	108355	146790	38435	1.35
T_7 - T_3 + T_5	2819	110529	197330	86801	1.79
T_8 - T_4+T_5	1949	104941	136430	31489	1.30
T_9 –T_8 + straw / crop residue mulch @ 5t / ha	2521	113773	176470	62697	1.55
T_{10} -T_9 + Poly mulch	2789	136453	195230	58777	1.43
SEd	185				
CD (5%)	551				
CV	14.8				

Soil parameters: soil pH: 7.78, EC: 0.81m mhos cm^{-1}, OC (%) : 0.59, Available N: 227 kg/ha, Available P_2O_5:30.51kg/ha, Available K_2O: 448 kg/ha, Recommended spacing : 120 x 45 cm, Recommended nutrients: 240-40-00 NPK kg/ha, Cotton species/ type: Intra *Hirsutum* Bt Cotton hybrid, Environment : Irrigated, Total rainfall: 1335 mm

JUNAGADH

The results of yield maximization of Bt cotton by integrated crop management techniques conducted at Junagadh revealed that different treatment of yield maximization techniques significantly influence growth characters and yield attributes of *Bt* cotton. The significantly highest seed cotton yield (3470 kg/ha) was harvested with application of detopping at 100 cm height + pruning of monopodia at 45 DAS + two sprays of mepiquat chloride @ 25 g *a.i.* at 45 and 60 DAS + poly mulch (T_{12}). This treatment statistically at par with treatments No. T_7, T_9, T_{10} and T_{11}. The maximum gross returns (Rs 244412 /ha) was recorded with application of detopping at 100 cm height + pruning of monopodia at 45 DAS + two sprays of mepiquat chloride @ 25 g *a.i.* at 45 and 60 DAS + poly mulch(T_{12}). The yield maximization technique T_{11} (Detopping at 100 cm height + two sprays of mepiquat chloride @ 25 g *a.i.* at 45 and 60 DAS+ straw/crop residue mulch @5 t/ha) registered the highest net returns (Rs 110296 /ha) and B:C ratio (2.03) (Table 15).

Table 15. Seed cotton yield (kg/ha) and Economics as influenced by Yield maximization techniques in Bt cotton at JUNAGADH

Treatments	Seed cotton yield (kg/ha)	Gross return (Rs/ha)	Cost of cultivation (Rs/ha)	Net return (Rs/ha)	Benefit Cost Ratio
T_1 : Conventional practice (Recommended spacing)	1983	139648	88770	50878	1.57
T_2 : Cotton in closer 90 x 30 cm (37037 plants/ha)	2129	150042	92078	57964	1.63
T_3 : T_2 + Detopping at 100 cm height	2410	169831	98760	71071	1.72
T_4 : T_2 + Pruning of monopodia at 45 DAS	2196	154760	94552	60208	1.64
T_5 : T_2+Two sprays of mepiquat chloride @ 25 g *a.i.* at 45 and 60 DAS	2566	180817	103452	77365	1.75
T_6:T_3+T_4	2571	181169	103302	77867	1.75
T_7:T_3+T_5	2947	207597	112334	95263	1.85
T_8:T_4+T_5	2621	184690	105662	79028	1.75
T_9:T_3+T_4+T_5	2955	208161	112510	95651	1.85
T_{10}: T_9+ Drip fertigation	2994	210908	144646	66262	1.46
T_{11}:T_{10}+ straw/crop residue mulch @5 t/ha	3085	217316	107020	110296	2.03
T_{12}: T_9+Poly mulch	3470	244412	163919	80493	1.49
SEd	180				
CD (5%)	528				
CV	11.7				

Soil parameters of pH:7.70, Soil Ec: 0.45 m mhos cm^{-1}, OC(%): 0.83 , Available N: 301 kg/ha , P_2O_5 36.78 kg/ha & K_2O 311 kg/ha, recommended spacing 120 x 45 cm, recommended nutrients 240-50-150 NPK kg/ha, environment: irrigated and total rainfall 2296.30 mm during cropping periods

RAHURI

The results of yield maximization of Bt cotton by integrated crop management techniques conducted at Rahuri revealed that Seed cotton yield of treatment Cotton in closer 90 cm X 30 cm + Detopping at 100cm height + Pruning of monopodia at 45 DAS +Two sprays of Mepiquat chloride@25g a.i.at 45 and 60 DAS +Drip fertigation+ Poly mulch (T_{12}) (5138 kg/ha) was found higher as compared to treatment T_2 to T_9 and treatment T_{10} and T_{11} was at par with treatment T_{12}. Amongst the treatments, Treatment T_1 (Control) recorded lowest seed cotton yield (2258 kg/ha) . The economics calculation revealed that the treatment (T_{12}) registered higher Gross monetary returns (Rs.385322 ha^{-1}), Net monetary returns (Rs.229240 ha^{-1}) and B:C ratio (2.47) respectively(Table 16) . The control recorded the least economic return

Table 16. Seed cotton yield (kg/ha) and Economics as influenced by Yield maximization techniques in Bt cotton

Treatments	Seed cotton yield (kg/ha)	Water used efficiency (Kg/ha.cm)	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Benefit Cost Ratio
T_1- Conventional practice - 90cm x 90cm	2258	1.29	90751	178348	87596	1.97
T_2-Cotton in closer 90 cm X 30 cm (37037 Plants/ha)	3314	1.27	110644	251868	141224	2.28
T_3-T_2+ Detopping at 100cm height	3634	1.28	110644	276183	165539	2.50
T_4 -T_2 + Pruning of monopodia at 45 DAS	3453	1.22	110644	262459	151815	2.37
T_5-T_2+ Two sprays of Mepiquat chloride@25g a.i.at 45 and 60 DAS	3199	1.30	118242	243116	124874	2.06
T_6 -T_3 + T_4	3626	1.30	116444	275558	159114	2.37
T_7-T_3+ T_5	3574	1.33	118242	271594	153352	2.30
T_8- T_4+ T_5	3714	1.30	118242	289710	17146	2.45
T_9- T_3+ T_4+T_5	3727	1.31	118242	279557	161315	2.36
T_{10}- T_9+ Drip fertigation	4312	1.04	147648	323425	175776	2.19
T_{11}-T_{10}+ straw/crop reidue mulch @ 5 t/ha	4593	1.03	153448	344442	190994	2.24
T_{12}- T_{10}+ Poly mulch	5138	1.02	156081	385322	229240	2.47
SEd(±)	**356.8**	**0.02**	-			
CD (5%)	**1046.4**	**0.04**	-			

Soil pH: 8.02, Ec: 0.23 m mhos cm^{-1}, OC(%) : 0.53, available N: 168.75 kg ha^{-1}, P_2O_5 : 22.25kg ha^{-1},K_2O : 658 kg/ha, Environment: Irrigated, Total Rainfall (mm) received during cropping periods: 836.4mm

SOUTH ZONE

RAICHUR

The results of yield maximization of Bt cotton by integrated crop management techniques conducted at Raichur under irrigated condition revealed that Significantly higher seed cotton yield (3229 kg/ha) was recorded with T6 (Closer spacing + Detopping at 100 cm height + Pruning of Monopodia at 45 DAS) which is followed by T5 (Closer spacing of 90 cm X 30 cm + 2 sprays of mepiquat chloride at 45 & DAS) recorded 3191 kg/ha (Table 17). The treatments T3, T4, T7 and T9 were also found on par with T6 & T5.

Table 17. Growth attributes and Seed cotton yield (kg/ha) as influenced by Yield maximization techniques in Bt cotton

Treatments	Plant Height (cm)	No. of Mono-podia/ plant	No. of Sym-podia/ plant	Sym-podial length (cm)	No. of Bolls/ Sq. m	Boll weight (g)	Total SCY (kg/ha)
T_1:Conventional practice (Recommended spacing of 90 cm X 60 cm) @ 18518 plants/ha	152	2	28	49	159	5.7	2411
T_2:Cotton in closer spacing (90 cm X 30 cm) @ 37037 plants /ha	135	2	22	35	149	5.5	2823
T_3:T2 + Detopping at 100 cm height	104	2	18	39	143	5.1	3055
T_4:T2 + Pruning of Monopodia at 45 DAS	106	0	20	38	133	5.1	3094
T_5:T2 + two sprays of Mepiquat chloride @ 25 g a. i. At 45 and 60 DAS	94	1	19	42	126	5.1	3191
T_6:T3 + T4	104	1	19	34	125	5.1	3229
T_7:T3 + T5	94	0	18	34	128	5.1	3008
T_8:T4 + T5	97	0	17	32	122	5.1	2645
T_9:T3 + T4 + T5	94	2	19	30	129	5.0	2803
S. Em±	4	0	2	2	11	0.1	156
C. D. at 5%	13	0	6	6	32	0.4	468

Soil pH value: 8.10, available N : 268kg/ha, P_2O_5 : 34 kg/ha, K_2O : 292 kg/ha, O.C.(%) : 0.48, Recommended spacing : 90 cm X 60 cm, Environment: Irrigated

COIMBATORE

The results of yield maximization of Bt cotton by integrated crop management techniques conducted at Coimbatore under irrigated condition revealed that the highest seed cotton yield of 2426 kg/ha was recorded by the combination of Cotton in closer 90 x 30 cm + Detopping at 100cm height + Pruning of monopodia at 45 DAS + Two sprays of Mepiquat chloride @ 25 g *a.i.* at 45 and 60 DAS with poly mulch (T_{12}) which was comparable with T_{11} and T_{10}. Seed cotton yield was found lesser in T_1- Conventional practice - 90cm x 90cm (1683 kg/ha) (Table 18). Higher net return (Rs.68170/ha) and BCR (1.77) was noticed in T_5 - Cotton in closer 90 cm X 30 cm + Two sprays of Mepiquat chloride @ 25g a.i.at 45 and 60 DAS followed by T_9. (Cotton in closer 90 x 30 cm + Detopping at 100cm height + Pruning of monopodia at 45 DAS + Two sprays of Mepiquat chloride @ 25 g *a.i.* at 45 and 60 DAS)

Table 18. Seed cotton yield (kg/ha) and Economics as influenced by Yield maximization techniques in Bt cotton

Treatments	Seed cotton yield (kg/ha)	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Benefit Cost Ratio
T_1- Conventional practice - 90cm x 90cm	1683	83000	116150	33150	1.40
T_2-Cotton in closer 90 cm X 30 cm (37037 Plants/ha)	1938	85400	133745	48345	1.57
T_3-T_2+ Detopping at 100cm height	1921	86400	132549	46149	1.53
T_4 -T_2 + Pruning of monopodia at 45 DAS	2046	87500	141220	53720	1.61
T_5-T_2+ Two sprays of Mepiquat chloride@25g a.i.at 45 and 60 DAS	2263	88000	156170	68170	1.77
T_6 -T_3 + T_4	2143	87000	147890	60890	1.70
T_7-T_3+ T_5	2069	89000	142807	53807	1.60
T_8- T_4+ T_5	2216	92000	152950	60950	1.66
T_9- T_3+ T_4+T_5	2259	93000	155894	62894	1.68
T_{10}- T_9+ Drip fertigation	2306	100100	159160	59060	1.59
T_{11}-T_{10}+ straw/crop reidue mulch @ 5 t/ha	2418	110000	166865	56865	1.52
T_{12}- T_9+ Poly mulch	2426	148500	167440	18940	1.13
SEd	46.9				
CD (5%)	95.2				
CV	2.6				

Soil pH value: 7.9, available N : 224, P_2O_5 : 28, K_2O : 730, O.C.(%) : 0.52, Nutrients applied: 120 : 80 : 80, Environment: Irrigated, Total Rainfall (mm) received during cropping periods: 547 mm

SRIVILLIPUTHUR

The results of yield maximization of Bt cotton by integrated crop management techniques conducted at Srivilliputhur revealed that the overall seed cotton yield exhibited a positive trajectory, with T_{12} yielding the highest amount at 2585 kg/ha, a significant increase over T_1's yield of 1798 kg/ha. This enhancement in yield is consistent with the observed increment in bolls and sympodia, suggesting a synergistic effect of the treatments on cotton productivity. The data reveals a positive correlation between the cost of cultivation and the gross return, net return, and benefit-cost ratio across the twelve treatments (T_1 to T_{12}). The cost of cultivation ranges from Rs. 79800 in T_1 to Rs. 132000 in T_{12}, while the gross return increases from Rs. 134875 in T_1 to Rs. 193900 in T_{12}, with the highest net return of Rs. 90575 achieved in T_9 (Table 19). The benefit-cost ratio also exhibits a positive trend, ranging from 1.7 in T_1 to 2.0 in T_9, indicating that higher costs are associated with increased returns, making the investment more profitable. However, treatment T_{10} and T_{12} show lower benefit-cost ratios of 1.6 and 1.5, respectively, suggesting that these treatments may not be as cost-effective as others. Overall, these findings suggest that optimizing the cost of cultivation can lead to

increased returns and improved benefit-cost ratios, underscoring the importance of efficient agricultural practices in enhancing profitability.

Table 19. Seed cotton yield (kg/ha) and Economics as influenced by Yield maximization techniques in Bt cotton

Treatments	Seed cotton yield (kg/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Benefit Cost Ratio
T_1- Conventional practice - 90cm x 90cm	1798	134875	55075	1.69
T_2-Cotton in closer 90 cm X 30 cm (37037 Plants/ha)	1895	142125	61675	1.76
T_3-T_2+ Detopping at 100cm height	2113	158500	77000	1.94
T_4 -T_2 + Pruning of monopodia at 45 DAS	2163	162250	78500	1.93
T_5-T_2+ Two sprays of Mepiquat chloride@25g a.i.at 45 and 60 DAS	2210	165750	81150	1.95
T_6 -T_3 + T_4	2232	167375	81675	1.95
T_7-T_3+ T_5	2258	169375	83375	1.96
T_8- T_4+ T_5	2344	175775	87575	1.99
T_9- T_3+ T_4+T_5	2395	179625	90575	2.01
T_{10}- T_9+ Drip fertigation	2441	183050	61450	1.50
T_{11}-T_{10}+ straw/crop reidue mulch @ 5 t/ha	2537	190300	64300	1.51
T_{12}- T_9+ Poly mulch	2585	193900	61900	1.46
SEd	**47.81**			
CD (5%)	**99.15**			

Soil parameters of pH:7.7, Soil EC: 0.6 m mhos cm^{-1}, OC (%): 1.8, available N 190 kg/ha (Low), P_2O_5 45 kg/ha (High)& K_2O 412 kg/ha (High), recommended spacing:90 x 60cm, recommended nutrients: 120:80:80 kg/ha NPK), Cotton species (RCH 929), environment (rainfed) and total rainfall (480 mm) during cropping periods

KHANDWA

The results of yield maximization of Bt cotton by integrated crop management techniques conducted at Khandwa revealed that the plant height, number of bolls per sq.m. and seed cotton yield were affected significantly due to different treatments of integrated crop management. The significantly higher seed cotton yield was found under T_5: T_2+ Two sprays of Mepiquat chloride @ 25 g *a.i.* at 45 and 60 DAS (2064 kg/ha) being statistically at par with the seed cotton yield received under T_8:T_4+T_5 and T_7:T_3+T_5. The technique,T_5 also recorded higher gross return (Rs.128019/ha), Net return (Rs.66835/ha) and B: C ratio (2.092) (Table 20). Whereas T_1 : Conventional practice recorded the lowest seed cotton yield and economics.

Table 20. Seed cotton yield (kg/ha) and Economics as influenced by yield maximization techniques in Bt cotton

Treatments	Seed cotton Yield (kg/ha)	Total Cost of cultivation (₹/ha)	Gross return (₹/ha)	Net Return (₹/ha)	BC Ratio
T_1 : Conventional practice (Recommended spacing)	1302	56784	80753	23970	1.42
T_2 : Cotton in closer 90 x 30 cm	1386	60134	85920	25786	1.43
T_3 : T_2+ Detopping at 100 cm height	1790	60484	110988	50504	1.84
T_4 : T_2+ Pruning of monopodia at 45 DAS	1836	60484	113858	53375	1.88
T_5 : T_2+ Two sprays of Mepiquat chloride @ 25 g *a.i.* at 45 and 60 DAS	2065	61184	128019	66835	2.09
T_6:T_3+T_4	1852	60484	114815	54331	1.90
T_7:T_3+T_5	1886	61534	116920	55386	1.90
T_8:T_4+T_5	1944	61534	120556	59022	1.96
T_9:T_3+T_4+T_5	1559	61484	96636	35152	1.57
SEm	137	-	**8488.7**	**8488.7**	0.14
SEd	194	-	**12004.8**	**12004.8**	0.20
CD (5%)	410	-	**25449.1**	**25449.1**	0.42

Soil parameters: pH : 7.84, EC : 0.59 m mhos cm^{-1}, OC (%):0.52, Available N, P_2O_5 & K_2O (kg/ha): 208.6 (N), 12.8 (P_2O_5) & 312.4 K_2O, Recommended spacing : 90 X 60 cm & 90 X 30 cm, Recommended dose of nutrients : NPK @ 125:60:40 kg/ ha, Cotton species/type :Hirsutum (Hybrid), Environment: irrigated and total rainfall (mm) during cropping periods: 788 mm. Uneven distribution of rainfall was observed. Water logging and drought spells were occurred during early growth and flowering period

Rainfed Environment

CENTRAL ZONE
AKOLA

The results of yield maximization of Bt cotton by integrated crop management techniques conducted at Akola under rainfed condition found significant differences amongst treatments . The significantly highest seed cotton yield (2879 kg/ha) was registered in treatment T_9 i.e. Detopping at 100 cm height + Pruning of monopodia at 45 DAS + Two sprays of Mepiquat chloride @ 25 g a.i. at 45 and 60 DAS in closer spacing of 90 x 30 cm. which was closely followed by treatment T_6 where only Detopping at 100 cm height + Pruning of monopodia at 45 DAS was done without mepiquet chloride spray (2869 Kg/ha). The lowest seed cotton yield was recorded in recommended spacing of 90x60 cm. This might be due to less plant population in these treatments. Other treatments i.e. T_2, T_3, T_4,T_5,T_7 and T_8 were found statistically at par with each other in respect of seed cotton yield. Significant results with regards to final plant population was observed due to different plant geometry of T_1 and T_2-T_9 treatments. The data on various monetary parameters indicated significant effects of different canopy management techniques compared to existing recommended planting of cotton at 90x60 cm (1968 kg/ha). The different canopy management techniques significantly increased gross return, net return, and B:C ratio. The significantly highest gross return of Rs.209356/ha was registered with T_9 i.e. Detopping at 100 cm height + Pruning of monopodia

at 45 DAS + Two sprays of Mepiquat chloride @ 25 g a.i. at 45 and 60 DAS.However, net return of Rs.139403/ha and B:C ratio of 3.02 was registered in treatment T6 i.e. Pruning of monopodia at 45 DAS + Detopping at 100 cm height in closer spacing of 90x30 cm followed by T_9 treatment (Detopping at 100 cm height + Pruning of monopodia at 45 DAS + Two sprays of Mepiquat chloride @ 25 g a.i. at 45 and 60 DAS) with NR of Rs.138874/ha. and B:C ratio 2.97 (Table 21). The lowest GR (Rs.143118 /ha), NR (Rs.89386/ha.) and B:C ratio of 2.66 was registered in recommended plant geometry of 90x60 cm. Good monetary benefits in all the canopy management techniques was observed due to its positive effect of cotton growth and development and good source to sink relationship.

Table 21. Seed cotton yield (kg/ha) and Economics as influenced by Yield maximization techniques in Bt cotton at AKOLA

Treatments	Seed cotton yield (kg/ha)	Cost of Cultivation (Rs/ha)	Gross Returns (Rs/ha.)	Net Returns (Rs/ha.)	B:C ratio
T1: Recommended spacing (90x60 cm)	1968	53732	143118	89386	2.66
T2: HDPS planting (90 x 30 cm)	2316	59004	168396	109392	2.85
T3: T_2 + Detopping at 100 cm height	2442	62243	177534	115291	2.85
T4: T_2 + Pruning of monopodia at 45 DAS	2463	65593	179101	113509	2.73
T5: T_2+ Two sprays of Mepiquat chloride @ 25 g a.i. at 45 and 60 DAS	2432	61361	176806	115445	2.88
T6: T_2 + Pruning of monopodia at 45 DAS+ Detopping at 100 cm height	2869	69177	208581	139403	3.02
T7: T_2+Detopping at 100 cm height+ Two sprays of Mepiquat chloride @ 25 g a.i. at 45 and 60 DAS	2570	63060	186863	123803	2.96
T8: T_2+Pruning of monopodia at 45 DAS +Two sprays of Mepiquat chloride @ 25 g a.i. at 45 and 60 DAS	2488	66968	180927	113958	2.70
T9: T_2+Detopping at 100 cm height + Pruning of monopodia at 45 DAS + Two sprays of Mepiquat chloride @ 25 g a.i. at 45 and 60 DAS	2879	70482	209356	138874	2.97
SEd	138	--	9367	9367	--
CD (5%)	293	--	19857	19857	--
CV	7.36	--	7.38	9.75	--

Soil parameters : pH value: 7.80, EC: 0.13 m mhos cm^{-1}, O.C.(%) : 3.90, Available N : 256 $kgha^{-1}$, P_2O_5 : 16.9 $kgha^{-1}$, K_2O : 378 $kgha^{-1}$**,** Recommended spacing: 90x60 cm, Recommended Fertilizer dose : 90:45:45 Kg NPK/ha ,Environment: Rainfed, Total Rainfall during Cropping period:955.1 mm in 44 rainy days

BHAWANIPATNA

The results of yield maximization of Bt cotton by integrated crop management techniques conducted at Bhawanipatna under rainfed condition revealed that different growth and yield parameters and seed cotton yield were significantly affected by different treatments. Seed cotton yield (3824 kg/ha) was significantly higher in T_9 (Closer spacing of 90 x 30 cm + pruning of monopodia at 45 DAS + detopping at 100 cm + two sprays of Mepiquat chloride at 45 and 60 DAS). The next best seed cotton yield (3506 kg/ha) was recorded in T_8 i,e. pruning of monopodia at 45 DAS + two sprays of Mepiquat chloride at 45 and 60 DAS. The minimum seed cotton yield (2572 kg/ha) was obtained in T_1 (Conventional practice with recommended spacing of 90 x 60 cm). The maximum net return of Rs. 191496/ha was obtained in T_9 (Closer spacing of 90 x 30 cm + pruning of monopodia at 45 DAS + detopping at 100 cm + two sprays of Mepiquat chloride at 45 and 60 DAS) followed by T_6 (pruning of monopodia at 45 DAS + detopping at 100 cm) with Rs. 191237/ha and T_5 (two sprays of Mepiquat chloride at 45 and 60 DAS) with Rs. 186161/ha being at par. The minimum net return of Rs. 109971/ha was recorded in conventional practice. B:C ratio was maximum in T_6(3.90) followed by T_9(3.80), and minimum in conventional practice (2.70) (Table 22).

Table 22. Seed cotton yield (kg/ha) and Economics as influenced by Yield maximization techniques in Bt cotton at Bhawanipatna

Treatments	Seed cotton yield (kg/ha)	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Benefit Cost Ratio
T_1 : Conventional practice (Recommended spacing of 90 x 60 cm))	2572	64917	174887	109971	2.70
T_2 : Cotton in closer 90 x 30 cm (37037 plants/ha)	3109	65068	211414	146346	3.25
T_3 : T2+ Detopping at 100cm height	3321	66417	225837	159420	3.40
T_4 : T2+ Pruning of monopodia at 45 DAS	3250	65683	220974	155291	3.36
T_5 : T2+Two sprays of Mepiquat chloride @ 25 g *a.i.* at 45 and 60 DAS	3728	67340	253501	186161	3.77
T_6:T3+T4	3782	65933	257170	191237	3.90
T_7:T3+T5	3703	68267	251772	183505	3.69
T_8:T4+T5	3601	67967	244882	176915	3.60
T_9:T3+T4+T5	3824	68567	260062	191496	3.80
SEd	220.4	657.61	14988	15045	
CD (5%)	**467.2**	**1394.1**	**31772**	**31893**	

Soil parameters: soil pH: 6.2, Available N: 132 kg/ha , P_2O_5 : 38.6 kg/ha , K_2O: 248 kg/ha, rainfall during cropping period: 992.6 mm, Genotype of cotton: Keshari, Recommended spacing: 90 cm x 60 cm, Environment : Rainfed, Total Rainfall (mm) received during cropping periods: 992.6 mm

NANDED

The results of yield maximization of Bt cotton by integrated crop management techniques conducted at Nanded revealed that significantly increased plant population in closer spacing + Detopping at 100cm height + Pruning of monopodia (T_6) has resulted in significant increase in seed cotton yield (3425 kg/ha) over conventional spacing (2454 kg/ha). Closer spacing + detopping has resulted in 23.72 per cent increase in seed cotton yield / ha whereas Closer spacing + detopping + monopodia pruning has resulted in 39.56 per cent increase in seed cotton yield. Detopping alone has increased 4.58 per cent and monopodia pruning has increased seed cotton yield by 11.89 per cent per ha. Cost of cultivation was significantly increased in closer spacing over conventional spacing, pruning of monopodia over no pruning. Closer spacing was significantly profitable over conventional spacing and all the canopy management treatments were on par with each other excluding T_6. The treatment T_6 *i.e.* closer spacing + detopping + monopodia pruning was the most remunerative with highest Net return Rs. 147357 per ha and BCR of 2.46 (Table 23).

Table 23. Seed cotton yield (kg/ha) and Economics as influenced by Yield maximization techniques in Bt cotton

Treatments	Seed cotton yield (kg/ha)	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Benefit Cost Ratio
T_1- Conventional practice - 90cm x 90cm	2454	86676	177962	91286	2.05
T_2-Cotton in closer 90 cm X 30 cm (37037 Plants/ha)	2903	91585	210498	118913	2.30
T_3-T_2+ Detopping at 100cm height	3036	93915	220144	126228	2.34
T_4 -T_2 + Pruning of monopodia at 45 DAS	3248	98214	235516	137301	2.40
T_5-T_2+ Two sprays of Mepiquat chloride@25g a.i.at 45 and 60 DAS	2732	93152	198073	104921	2.13
T_6 -T_3 + T_4	3425	100983	248340	147357	2.46
T_7-T_3+ T_5	2841	95669	206016	110347	2.15
T_8- T_4+ T_5	2749	96503	199323	102820	2.06
T_9- T_3+ T_4+T_5	3034	100351	219971	119621	2.19
SEd	184.57	1846	13383	11537	0.10
CD (5%)	391.27	3913	28371	24458	0.21

Soil properties : pH: 8.06, EC: 0.24 m mhos cm^{-1}, OC: 0.42%, Available N: 136.8 kg/ha, P_2O_5 : 11.39 kg/ha, K_2O: 465 kg/ha, Recommended spacing: 120 x 45 cm, Closer spacing: 90 x 30 cm; Cotton type: *Bt* hybrid, Environment: Rainfed, Total rainfall during season: 1233.8 mm

Rainfed

SOUTH ZONE

DHARWAD

The results of yield maximization of Bt cotton by integrated crop management techniques conducted at Dharwad under rainfed conditions revealed that significantly higher seed cotton yield of 2082 kg/ha was recorded in T_{10} (Cotton in closer 90 x 30 cm + Detopping at 100cm height + Pruning of monopodia at 45 DAS + Two sprays of Mepiquat chloride @ 25 g *a.i.* at 45 and 60 DAS + straw/crop residue mulch @5 t/ha). Highest gross return (Rs.154052/ha), Net

return (Rs.91074/ ha) and B:C ratio (2.45) were also registered in T_{10}(Table 24). Whereas T_1 : Conventional practice recorded the lowest seed cotton yield and economics.

Table 24. Seed cotton yield (kg/ha) and Economics as influenced by Yield maximization techniques in Bt cotton

Treatments	Seed cotton yield (kg/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Benefit Cost Ratio
T_1 : Conventional practice (Recommended spacing) (90 x 60cm)	1440	106539	44082	1.71
T_2 : Cotton in closer 90 x 30 cm (37037 plants/ha)	1583	117154	52349	1.81
T_3 : T2+ Detopping at 100cm height	1616	119603	54733	1.84
T_4 : T2+ Pruning of monopodia at 45 DAS	1577	116710	51540	1.79
T_5 : T2+Two sprays of Mepiquat chloride @ 25 g *a.i.* at 45 and 60 DAS	1617	119628	52921	1.79
T_6:T3+T4	1523	112713	47415	1.73
T_7:T3+T5	1443	106787	39781	1.59
T_8:T4+T5	1705	126188	59020	1.88
T_9:T3+T4+T5	1653	122331	54863	1.81
T_{10}: T9+ straw/crop residue mulch @5 t/ha*	2082	154052	91074	2.45
SEd	**155.63**	**11511**	**11511**	**0.18**
CD (5%)	**329.50**	**24371**	**24371**	**0.37**
CV	**11.74**	**11.73**	**25.74**	**11.69**

Soil type medium deep black cotton soil, pH: 7.40, OC %: 0.72, Available N: 250.0 kg/ha, Available P_2O_5: 25.0 kg/ha, Available K_2O : 415.0 kg/ha,Total rainfall: 1003 mm, Rainy days: 71 days

CHAMARAJANAGAR

The results of yield maximization of Bt cotton by integrated crop management techniques conducted at Chamarajanagar under rainfed conditions revealed that manual detopping+ Pruning + Two sprays of Mepiquat chloride @ 25 g a.i. at 45 and 60 DAS (T_9) recorded significantly higher seed cotton yield (2019 kg/ha), followed by (T_6) T_2+ Detopping at 100 cm height + Pruning of monopodial at 45 DAS under closer spacing of 90 x 30 cm (1926 kg/ha) and these two treatments were at par with each other. The next best treatment was T5: Closer spacing (90x 30 cm) +two sprays of mepiquat chloride @ 25 g a.i. at 45 and 60 DAS with a seed cotton yield of 1840 kg/ha, followed by T7:Closer spacing and manual de-topping (1821 kg/ha) (Table 25). When compared to conventional practices, closer plant spacing along with manual de-topping or chemical spray of mepiquat chloride is found to be promising in arresting the plant height and increasing the length of sympodial branches resulting in increased seed cotton yield. The economics also followed a similar trend. The highest gross return (Rs.201933/ha) and Net return (Rs.92108/ ha) were also registered in T_9.

Table 25. Seed cotton yield (kg/ha) and Economics as influenced by Yield maximization techniques in Bt cotton

Treatments	Seed cotton yield (kg/ha)	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Benefit Cost Ratio
T_1 : Conventional practice (Recommended spacing)	1450	88567	145000	56433	1.64
T_2 : Cotton in closer 90 x 30 cm (37037 plants/ha)	1614	92625	161367	68742	1.74
T_3 : T2+ Detopping at 100cm height	1801	97417	180100	82683	1.85
T_4 : T2+ Pruning of monopodia at 45 DAS	1775	92042	177500	85458	1.93
T_5 : T2+Two sprays of Mepiquat chloride @ 25 g *a.i.* at 45 and 60 DAS	1840	100783	183967	83183	1.83
T_6:T3+T4	1926	102333	192633	90300	1.88
T_7:T3+T5	1821	102158	182067	79908	1.78
T_8:T4+T5	1686	102325	168633	66308	1.65
T_9:T3+T4+T5	2019	109825	201933	92108	1.84
SEd	74.89	1235	7489	6265	0.05
CD (5%)	158.7	2620	15877	13282	0.11

Soil pH:8.45, EC: 0.53 m mhos cm^{-1}, OC (%):0.52, Available N (kg/ha): 210.2, P (kg/ha): 22.7, K (kg/ha): 347.2, Recommended Nutrients: 150:75:75 kg NPK/ha, Environment: rainfed, Total Rainfall (mm) received during cropping periods: 584 mm

NANDYAL

The results of yield maximization of Bt cotton by integrated crop management techniques conducted at Nandyal under rainfed conditions revealed the highest seed cotton yield (SCY) (2635 kg/ha) was harvested with T_5 (closer spacing along with two sprays of mepiquat chloride @25 g a.i at 45 and 60 DAS). Further, the SCY was significantly higher as compared to conventional spacing (T_1), closer spacing (T_2), closer spacing along with detopping (T_3) and closer spacing along with pruning of monopodia (T_4) treatments, but was statistically on par with all other treatments. Moreover, higher gross return (Rs.171297/ha), Net return (116382), and B:C ratio (3.12) were noted with T_5 compared to all other treatments. T_1: Conventional practice recorded lesser seed cotton yield with the least economic parameters (Table 26).

Table 26. Seed cotton yield (kg/ha) and Economics as influenced by Yield maximization techniques in Bt cotton in Nandyal

Treatments	Seed cotton yield (kg/ha)	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Benefit Cost Ratio
T_1 : Conventional practice (Recommended spacing)	1754	50058	114009	63951	2.28

T_2 : Cotton in closer 90 x 30 cm (37037 plants/ha)	2044	52835	132881	80046	2.52
T_3 : T2+ Detopping at 100cm height	2148	55535	139620	84085	2.51
T_4 : T2+ Pruning of monopodia at 45 DAS	2101	54725	136580	81855	2.50
T_5 : T2+Two sprays of Mepiquat chloride @ 25 g *a.i.* at 45 and 60 DAS	2635	54915	171297	116382	3.12
T_6:T3+T4	2313	57425	150323	92898	2.62
T_7:T3+T5	2478	57615	161092	103477	2.80
T_8:T4+T5	2325	56805	151138	94333	2.66
T_9:T3+T4+T5	2296	59505	149218	89713	2.51
SEd	209		13646	13646	0.24
CD (5%)	432		28050	28050	0.50

Soil pH :8.51, Ec: 0.47 m mhos cm^{-1}, OC(%):0.31, Recommended Nutrient levels: N:P:K @150 :45:60 kg/ha, respectively, Environment: Rainfed, Recommended spacing: 90 x 45 cm, Total Rainfall (mm) received during cropping periods: 415 mm

LAM

The results of yield maximization of Bt cotton by integrated crop management techniques conducted at LAM under rainfed conditions revealed that higher seed cotton yield (2784 kg/ha) was recorded with (T_9) T_2+ Detopping at 100cm height + Pruning of monopodia at 45 DAS + Two sprays of Mepiquat chloride @ 25 g *a.i.* at 45 and 60 DAS, which was comparable with T_7 treatment i.e T_2+ Detopping at 100cm height + Two sprays of Mepiquat chloride @ 25 g *a.i.* at 45 and 60 DAS. Significantly the least seed cotton yield (2001 kg ha^{-1}) was recorded with T_1 (Control). Boll weight and height to node ratio at first picking were not significantly influenced by different treatments. The treatment T_9: T_2+ Detopping at 100cm height + Pruning of monopodia at 45 DAS + Two sprays of Mepiquat chloride @ 25 g *a.i.* at 45 and 60 DAS recorded the highest net return (₹ 118507 ha^{-1}) and benefit cost ratio (2.26) (Table 27).

Table 27. Seed cotton yield (kg/ha) and Economics as influenced by Yield maximization techniques in Bt cotton at LAM

Treatments	Seed cotton yield (kg/ha)	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Benefit Cost Ratio
T_1 : Conventional practice (Recommended spacing)	2001	79943	141402	80764	1.77
T_2 : Cotton in closer 90 x 30 cm (37037 plants/ha)	2095	80283	148047	84158	1.84
T_3 : T_2+ Detopping at 100cm height	2661	86330	189636	106671	2.20
T_4 : T_2+ Pruning of monopodia at 45 DAS	2589	85700	183786	97533	2.14

T_5 : T_2+Two sprays of Mepiquat chloride @ 25 g *a.i.* at 45 and 60 DAS	2671	85497	188958	108191	2.21
T_6:T_3+T_4	2333	84253	165026	85326	1.96
T_7:T_3+T_5	2714	86573	192663	110183	2.23
T_8:T_4+T_5	2661	86491	188059	101384	2.17
T_9:T_3+T_4+T_5	2784	87510	197675	118507	2.26
SEd	174.1				
CD (5%)	369.0				
CV	8.5				

Soil pH: 8.01, EC: 0.48 m mhos cm^{-1}, OC (%): 0.40, available N: 195.8, P_2O_5 :32.5,K_2O : 847.2 kg/ha, environment:rainfed, Recommended spacing: 90 X 30 cm, Total Rainfall (mm) received during cropping periods: 1092.8 mm.

Agronomy V- Conservation agriculture

NORTH ZONE
FARIDKOT

The conservation agriculture experiment in a cotton-based cropping system conducted at Faridkot revealed that there was a significant decline in productivity when reduced tillage was practiced (T3:2598 kg/ha) over the conventional tillage (T1:2878 kg/ha). However, addition of 100 % cotton crop residue or wheat crop residue either 50 % or 100 % has lead to improvement in seed cotton yield as evident from higher seed cotton yield under T2 (3250 kg/ha), T4 (3006 kg/ha), T5 (3276 kg/ha), T6 (3141 kg/ha), and T7 (3346 kg/ha). Highest yield increments of 16.2 % in SCY were observed under T7 over the conventional treatment which indicated that addition of crop residue to be a promising option. Among N treatments, it was observed that SCY increased significantly by addition of any level of nitrogen and its value was 2718, 3165 and 3329 kg/ha under 75 %, 100% and 125% N. Response of highest level of applied N (125%) was at par with 100% N, and it might be due to addition of crop residue which could have mobilized nutrient availability in the soil over the seasons . A similar trend was observed during for wheat crop, where highest grain yield of 6458 kg/ha has been recorded under T7 against control (4922 kg/ha) indicative of a positive effect of residue incorporation on yield (Table 28).

Table 28. Seed cotton yield and wheat grain yield (kg/ha**) as influenced by different combinations (Residue management and tillage) and N levels at Faridkot**

Treatments	Seed cotton yield Bt cotton				wheat
	N1.75 % RDN	N2.100 % RDN	N3.125 % RDN	Mean	Yield (kg/ha)
T1.Complete removal of wheat residue + conventional tillage for sowing of cotton (Control) (kharif) + Complete removal of cotton residue after picking + conventional tillage for sowing of wheat and drill sowing of wheat crop (Control) (rabi)	2465	2906	3263	2878	4922
T2.Complete removal of wheat residue + conventional tillage for sowing of cotton (Control)) (kharif)+ 100% cotton residue incorporation after picking + sowing of wheat crop through Super seeder in one go(rabi)	2899	3394	3458	3250	5388

T3.Complete removal of wheat residue + minimum tillage for sowing of cotton in rows at 67.5 cm only) (kharif) + Complete removal of cotton residue after picking+ sowing of wheat through zero till drill(rabi)	2231	2638	2926	2598	4549
T4.50% wheat residue incorporation by rotavator (after removal of loose straw) followed by sowing of cotton) (kharif)+Complete removal of cotton residue after picking + sowing of wheat crop through Super seeder (rabi)	2556	3169	3294	3006	5478
T5.50% wheat residue incorporation by rotavator (after removal of loose straw) followed by sowing of cotton) (kharif)+100% cotton residue incorporation after picking + sowing of wheat crop through Super seeder in one go(rabi)	2893	3422	3512	3276	6121
T6.100% wheat residue incorporation by rotavator followed by sowing of cotton) (kharif) +Complete removal of cotton residue after picking + sowing of wheat crop through Super seeder(rabi)	2859	3214	3350	3141	5159
T7.100% wheat residue incorporation by rotavator followed by sowing of cotton) (kharif)+100% cotton residue incorporation after picking + sowing of wheat crop through Super seeder in one go(rabi)	3120	3412	3504	3346	6458
Mean	2718	3165	3329		
ANOVA	RT	N	RT X N		293
CD	243	159	NS		5.6
CV	8.3				4922

Soil parameters: Sandy loam, pH:8.3, EC: 0.21 m mhos cm^{-1}, OC (%):0.27, Available P_2O_5: 48.2 kg/ha & Available K_2O: 312.5 kg/ha ,Recommended spacing: 67.5 X 75 cm, Recommended nutrients: 105 kg N and 30 kg P_2O_5 / ha, ,Environment: irrigated; Total rainfall during cropping period: 327mm.

BATHINDA

The results of conservation agriculture experiments conducted in the cotton–wheat cropping system at Bathinda revealed that there was significant variation in crop performance under different conservational treatments. Incorporation of 100 % cotton and wheat crop residue led to 31.3 and 20.4 percent increase of seed cotton and wheat grain yield respectively as compared to conventional practice with no residue incorporation. Significantly the highest SCY was recorded under T7 (100% residue of both the crops) followed by T5 (100% residue of cotton and 50% of wheat) (Table 29). Significantly the least SCY was recorded under conventional tillage with no residue and minimum tillage with no residue. In the case of wheat crop, overall growth and yield attributes were better under T7 and T5 which led to significant improvement in grain yield of wheat crop under T7 and T5 as compared to control T1. The reduced bulk density was reported under T7 (incorporation of 100% residue of both the crops). The gross and net return of cotton -wheat cropping system increased to 27.3 and 38.1 percent by adopting the conservation practice of T7 (incorporation of 100% residue of both the crops) (Table 30).

Table 29. Seed cotton yield, wheat grain yield (kg/ha) and bulk density (g cm^3)as influenced by different combinations (Residue management and tillage) and N levels at Bathinda

Treatments	Seed cotton Yield (kg/ha)	GOT (%)	Grain yield (kg/ha)	Soil bulk density at 0-15 cm (g cm3)	Soil bulk density at 15-30 cm (g cm3)
T1.Complete removal of wheat residue + conventional tillage for sowing of cotton (Control) (kharif) +Complete removal of cotton residue after picking + conventional tillage for sowing of wheat and drill sowing of wheat crop (Control) (rabi)	2077	34.1	4048	1.57	1.59
T2.Complete removal of wheat residue + conventional tillage for sowing of cotton (Control)) (kharif)+ 100% cotton residue incorporation after picking + sowing of wheat crop through Super seeder in one go(rabi)	2401	35.1	4363	1.5	1.53
T3.Complete removal of wheat residue + minimum tillage for sowing of cotton in rows at 67.5 cm only)(kharif) + Complete removal of cotton residue after picking+ sowing of wheat through zero till drill(rabi)	2169	34.1	4000	1.58	1.58
T4.50% wheat residue incorporation by rotavator (after removal of loose straw) followed by sowing of cotton)(kharif)+Complete removal of cotton residue after picking + sowing of wheat crop through Super seeder(rabi)	2262	35.3	4226	1.52	1.55
T5..50% wheat residue incorporation by rotavator (after removal of loose straw) followed by sowing of cotton)(kharif)+100% cotton residue incorporation after picking + sowing of wheat crop through Super seeder in one go(rabi)	2676	35.1	4783	1.48	1.53
T6.100% wheat residue incorporation by rotavator followed by sowing of cotton) (kharif)+Complete removal of cotton residue after picking + sowing of wheat crop through Super seeder(rabi)	2487	35.6	4331	1.51	1.54
T7.100% wheat residue incorporation by rotavator followed by sowing of cotton) (kharif)+100% cotton residue incorporation after picking + sowing of wheat crop through Super seeder in one go(rabi)	2727	35.7	4872	1.47	1.52
SEd	**177**	**0.5**	**260**		
CD (5%)	**386**	**NS**	**565**		

Soil parameters: pH: 8.52, EC: 0.22 m mhos cm-1, OC (%) : 0.41, Available N: 182 kg/ha, P_2O_5: 13.8 kg/ha & Available K_2O: 305 kg/ha, Recommended nutrients: 105 kg N /ha, Environment: irrigated; Total rainfall during cropping period: 269 mm

Table 30. Gross returns and benefit cost ratio of Rabi season wheat in cotton-wheat cropping system

Treatments	Cotton			Wheat			Cotton-wheat system		
	GR (₹ ha^{-1})	NR (₹ ha^{-1})	B:C	GR (₹ ha^{-1})	NR (₹ ha^{-1})	B:C	GR (₹ ha^{-1})	NR (₹ ha^{-1})	B:C
T1.Complete removal of wheat residue + conventional tillage for sowing of cotton (Control) (kharif) +Complete removal of cotton residue after picking + conventional tillage for sowing of wheat and drill sowing of wheat crop (Control) (rabi)	159943	108866	2.13	92094	64065	2.29	252037	172931	2.19
T2.Complete removal of wheat residue + conventional tillage for sowing of cotton (Control)) (kharif)+ 100% cotton residue incorporation after picking + sowing of wheat crop through Super seeder in one go(rabi)	184913	131306	2.45	99263	76226	3.31	284176	207532	2.71
T3.Complete removal of wheat residue + minimum tillage for sowing of cotton in rows at 67.5 cm only)(kharif) + Complete removal of cotton residue after picking+ sowing of wheat through zero till drill(rabi)	167018	124849	2.95	90991	64522	2.44	258009	189371	2.76
T4.50% wheat residue incorporation by rotavator (after removal of loose straw) followed by sowing of cotton)(kharif)+Complete removal of cotton residue after picking + sowing of wheat crop through Super seeder(rabi)	174176	119732	2.19	96138	66861	2.28	270314	186593	2.23
T5..50% wheat residue incorporation by rotavator (after removal of loose straw) followed by sowing of cotton)(kharif)+100% cotton residue incorporation after picking + sowing of wheat crop through Super seeder in one go(rabi)	206054	148381	2.57	108821	85784	3.72	314875	234165	2.9
T6.100% wheat residue incorporation by rotavator followed by sowing of cotton) (kharif)+Complete removal of cotton residue after picking + sowing of wheat crop through Super seeder(rabi)	191474	134453	2.35	98528	69250	2.37	290002	203704	2.36
T7.100% wheat residue incorporation by rotavator followed by sowing of cotton) (kharif)+100% cotton residue incorporation after picking +	209966	151071	2.56	110843	87806	3.81	320809	238878	2.91

sowing of wheat crop through Super seeder in one go(rabi)									
SEd	13651	12268	0.17	6422	6422	0.24	14028	12809	0.13
CD (5%)	29743	26730	0.37	NS	13991	0.53	30565	27908	0.28
CV (%)	9.05	11.45	8.44	7.9	10.7	10.24	6.04	7.66	6.07

Soil parameters: pH: 8.52, EC: 0.22 m mhos cm-1, OC (%): 0.41, Available N: 182 kg/ha, P_2O_5:13.8 kg/ha & Available K_2O: 305 kg/ha, Recommended nutrients: 105 kg N /ha, Environment: irrigated; Total rainfall during cropping period: 269 mm

HISAR

The results of conservation agriculture experiments conducted in the cotton–wheat cropping system at Hisar revealed that maximum number of bolls per square meter was recorded under T_7 (123 bolls/m²), closely followed by T6 (121 bolls/m²). The highest seed cotton yield was achieved under T_7 (1710 kg/ha), significantly higher than all other treatments; However T_6 (1630 kg/ha) and T_5 (1519 kg/ha) also performed well but were statistically inferior to T_7 .The highest wheat grain yield was achieved under T_6 (5346 kg/ha), followed by T_4 (5309 kg/ha) and T_7 (5247 kg/ha) (Table 31). The ginning outturn (GOT) percentage ranged between 33.13% (T_3) and 33.87% (T_4), with no significant differences among treatments

The highest net returns were recorded under treatment T_7 (₹73,573/ha), significantly outperforming other treatments. This was followed by T_6 (₹68,414/ha) and T_5 (₹56,340/ha). In terms of gross returns also, treatment T_7 led with ₹2,62,338/ha, followed by T_6 (₹2,56,021/ha) and T_5 (₹2,43,715/ha). The maximum benefit-cost (B:C) ratio for the cotton crop was observed under treatment T_7 (1.17), which was statistically at par with T_6 (1.13) and T_5 (1.07). Similarly, for the rotation crop, the highest B:C ratio was also observed under treatment T_4 (1.67) closely followed by T_7 (1.65) and T_6 (1.64). The combined B:C ratio (cotton and rotation crop) was highest in treatment T_7 (1.39). The lowest net returns (₹56,233/ha) were observed in treatment T_4 (Table 32).

The conservation treatments influenced bulk density, soil infiltration rate, and the quantity of residue used. Bulk density ranged from 1.31 to 1.42 g/cm³ in the top 0-15 cm of soil. Treatments T_1 and T_3 recorded the highest soil infiltration rate of 14.6 cm/hr. Residue usage varied significantly, with T_7 using the most at 10327 kg/ha, resulting in the highest seed cotton equivalent yield of 610.71 kg/ha. Incorporation of 100 % cotton crop and wheat crop residue (T_7) led to 21.5 , 10.5 and 48.2 percent increase of seed cotton yield, system gross return and net return respectively as compared to conventional practice with no residue incorporation (T_1).

Table 31. Seed cotton yield, wheat grain yield (kg/ha) and seed cotton equivalent yield as influenced by conservation treatments at Hisar

Treatments	Bulk density		Seed cotton yield (kg/ha)	Wheat Yield (kg/ha)	Seed cotton equivalent yield (kg/ha)
	0-15 cm	16-30 cm			
T1.Complete removal of wheat residue + conventional tillage for sowing of cotton (Control) (kharif) +Complete removal of cotton residue after picking + conventional tillage for sowing of wheat and drill sowing of wheat crop (Control) (rabi)	1.42	1.44	1407	5105	3390
T2.Complete removal of wheat residue + conventional tillage for sowing of cotton (Control) (kharif)+ 100% cotton residue	1.31	1.35	1444	4982	3323

incorporation after picking + sowing of wheat crop through Super seeder in one go(rabi)					
T3.Complete removal of wheat residue + minimum tillage for sowing of cotton in rows at 67.5 cm only) (kharif) + Complete removal of cotton residue after picking+ sowing of wheat through zero till drill(rabi)	1.4	1.43	1469	5025	3374
T4.50% wheat residue incorporation by rotavator (after removal of loose straw) followed by sowing of cotton) (kharif) + Complete removal of cotton residue after picking + sowing of wheat crop through Super seeder(rabi)	1.37	1.39	1340	5309	3443
T5.50% wheat residue incorporation by rotavator (after removal of loose straw) followed by sowing of cotton) (kharif) +100% cotton residue incorporation after picking + sowing of wheat crop through Super seeder in one go(rabi)	1.31	1.35	1519	5148	3482
T6.100% wheat residue incorporation by rotavator followed by sowing of cotton) (kharif) + Complete removal of cotton residue after picking + sowing of wheat crop through Super seeder(rabi)	1.34	1.38	1630	5346	3657
T7.100% wheat residue incorporation by rotavator followed by sowing of cotton) (kharif) +100% cotton residue incorporation after picking + sowing of wheat crop through Super seeder in one go(rabi)	1.32	1.36	1710	5247	3748
SEd	0.01	0.01	100.6	0.03	
CD (5%)	0.02	0.03	221.8	NS	

Table 32. Gross returns and benefit cost ratio of Rabi season wheat in cotton- wheat cropping system

Treatments	Gross return (₹/ha)			Net Return (₹/ha)			B:C Ratio		
	Cotton	Rotation crop	Total	Cotton	Rotation crop	Total	Cotton	Rotation crop	Total
T1.Complete removal of wheat residue + conventional tillage for sowing of cotton (Control) (kharif) +Complete removal of cotton residue after picking + conventional tillage for sowing of wheat and drill sowing of wheat crop (Control) (rabi)	98519	138803	237322	739	48888	49627	1.01	1.54	1.26
T2.Complete removal of wheat residue + conventional tillage for sowing of cotton (Control)) (kharif)+ 100% cotton residue incorporation after picking + sowing of wheat crop through Super seeder in one go (rabi)	101111	131486	232597	2799	44869	47667	1.03	1.52	1.26
T3.Complete removal of wheat residue + minimum tillage for sowing of cotton in rows at 67.5 cm only) (kharif) + Complete removal of cotton residue after picking+ sowing of wheat through zero till drill(rabi)	102840	133325	236165	5543	46708	52250	1.06	1.54	1.28
T4.50% wheat residue incorporation by rotavator (after removal of loose straw) followed by sowing of cotton) (kharif)+Complete removal of cotton residue after picking + sowing of wheat crop through Super seeder(rabi)	93765	147260	241025	-3035	59268	56233	0.97	1.67	1.3

T5..50% wheat residue incorporation by rotavator (after removal of loose straw) followed by sowing of cotton) (kharif)+100% cotton residue incorporation after picking + sowing of wheat crop through Super seeder in one go(rabi)	106296	137419	243715	6914	49427	56340	1.07	1.56	1.3
T6.100% wheat residue incorporation by rotavator followed by sowing of cotton) (kharif) +Complete removal of cotton residue after picking + sowing of wheat crop through Super seeder(rabi)	114074	141947	256021	13084	55330	68414	1.13	1.64	1.36
T7.100% wheat residue incorporation by rotavator followed by sowing of cotton) (kharif)+100% cotton residue incorporation after picking + sowing of wheat crop through Super seeder in one go(rabi)	119691	142647	262338	17544	56030	73573	1.17	1.65	1.39

Soil parameters of pH:8.1, Soil EC: 0.14m mhos cm^{-1}, Organic Carbon (%):0.45, available N: 312.2 P2O5: 29, K: 338 (kg/ha) , recommended spacing (100X45 cm), RDF:175:60:60:25 N:P:K:ZnSo4 respectively kg/ha, Environment: Irrigated, Rainfall (mm) received during cropping periods: 483.5 mm & 21 rainy days

Agronomy VI Preparing for Climate Change-Water logging

NORTH ZONE

BATHINDA

The results of water logging experiment conducted at Bathinda revealed that Plant height, No. of bolls/ SQM and single plant yield (g/plant), Seed cotton yield (kg/ha) and final plant population were significantly as influenced by land configuration. Where broad bed & furrows followed by ridge & furrow were significantly better over control (farmers practice) with respect to plant height, number of bolls/SQM and single plant yield (g/plant) and seed cotton yield (kg/ha).Broad bed furrows recorded significantly the highest seed cotton yield of 2018 kg/ha. Application of sub-plot treatments after draining of excess water in water logging plots, both Nitrogen @20kg/ha + Potassium @20kg/ha and Salicylic acid spray @ 0.5mM were performed equally for mitigating water logging affect and resulted in better crop growth and yield attributes, which led to produce significantly better yield over control. Nitrogen @ 20 kg/ha + Potassium @ 20 kg/ha (D_1) registered highest seed cotton yield of 1701 kg/ha (Table 33).

Table 33. Seed cotton yield (kg/ha) as influenced by Land Configuration and Water logging management at Bathinda

Treatments	Seed cotton yield (kg/ha)			
	A_1. Broad Bed furrows	**A_2. Ridge & Furrow**	**A_3. Control-Farmer practice**	**Mean**
D_1. Nitrogen @ 20 kg/ha + Potassium @ 20 kg/ha	2061	1748	1295	**1701**
D_2. Salicylic acid @0.5mM single spray	2044	1571	1200	**1605**
D_3. Control	1950	1346	1170	**1488**
Mean	**2018**	**1555**	**1222**	
ANOVA	A	D	AxD	
SE d	103	56	97	
CD (5%)	285	122	NS	
CV	13.6	7.4	7.4	

Soil parameters: pH: 8.70, EC:0.23 m mhos cm^{-1}, OC (%) : 0.32, Available N : 150 kg/ha, P_2O_5: 12.0 kg/ha & Available K_2O: 290 kg/ha, Recommended nutrients: 105 kg N /ha, Environment: irrigated; Total rainfall during cropping period: 269 mm

HISAR

The results of water logging experiment conducted at Hisar revealed that non-significant effecton number of monopodia were recorded by land configuration and water logging management treatments. No of sympodia were significantly higher in W_3 (22) as compared to two other treatments of waterlogging management. No of bolls per square meter, boll weight and single plant yield were recorded significantly higher values in W_3 (106,3.77 & 160.44 respectively) as compared to two other water logging management treatments. Application of Salicylic acid @ 0.5 mM single spray recorded numerically higher values for boll weight and single plant yield as compared to Nitrogen application @ 20kg/ha + Potassium @ 20 kg/ha and reverse in case of no of bolls per square meter. Seed cotton yield was significantly higher in W_3 (1543 kg/ha) as compared to other two treatments of water logging management treatments (Table 34). Method of sowing did not have significant effect on seed cotton yield. Plant population at harvest was also not affected significantly by any of the treatments. Interaction affects were also non-significant.

Table 34. Seed cotton yield (kg/ha) as influenced by Land Configuration and Water logging management at Hisar

Treatments	Seed cotton yield (kg/ha)			
	W 1. Nitrogen @ 20 kg/ha + Potassium @ 20 kg/ha	**W 2. Salicylic acid @ 0.5mM single spray**	**W 3. Control**	**Mean**
A1. Broad Bed Furrow with chemical based weed control	471	550	1794	**938**
A2. Ridges& Furrow with chemical based weed control	503	682	1476	**887**
A3. Control-Farmers practice	619	338	1360	**772**
Mean	**531**	**524**	**1543**	
ANOVA	**A**	**W**	**WXA**	**AXW**
CD	NS	135.9	274.3	338.4
SE(d)	98.	61.7	106.8	131.8
SE(m)	69.8	43.6	121.0	93.2

Soil parameters: soil pH 8.2, Ec 0.27 m mhos cm^{-1}, 0.39 OC(%), available(kg/ha) N: 296.8, P2O5: 26 & K2O: 301, recommended spacing (67.5 x 60 cm), RDF:175:60:60:25 N:P:K:ZnSo4 respectively kg/ha, Spacing followed : 100X45 cm, Environment: Irrigated, Rainfall (mm) received during cropping periods : 483.5 mm & 21 rainy day.

CENTRAL ZONE

SURAT

The results of the water logging experiment conducted at Surat revealed that Seed cotton yield (kg/ha) was significantly influenced due to land configuration and sub plot management techniques. The land configuration treatment A1. Broad Bed Furrow recorded significantly higher seed cotton yield (1904 kg/ha) as compared to treatment A3. Control-Farmers practice (1203 kg/ha) but it was statistically at par with treatment A2. Ridges& Furrow (1800 kg/ha). In the case of the plot management technique, treatment W1.Nitrogen @ 20 kg/ha + Potassium @ 20 kg/ha recorded significantly higher seed cotton yield (1735 kg/ha) as compared to treatment W3. control (1491 kg/ha) but it was statistically at par with treatment W2 . Salicylic acid @0.5mM single spray (1681 kg/ha). No significant differences were observed in plant height, No. of monopodia/plant, No. of sympodia/plant, Boll weight (g) due to land configuration and sub plot management technique. However, number of bolls per sqm area was significantly influenced by land configuration treatments only. Significantly higher no. of bolls per sqm (55.49) was recorded in land configuration treatment A_1 . Broad Bed Furrow as compared to treatment A3. Control-Farmers practice (47.66) but it was statistically at par with treatment A_2 Ṅ.Ridges & Furrow (54.50). Single plant yield was significantly

influenced by land configuration treatments only. Significantly higher single plant yield (107.89 g) was recorded in land configuration treatment A1 as compared to treatment A_3 (90.44 g) but it was statistically at par with treatment A_2 (104.33 g) (Table 35).

Table 35. Seed cotton yield (kg/ha) as influenced by Land Configuration and Water logging management at Surat

Treatments	Seed cotton yield (kg/ha)			
	W_1. Nitrogen @ 20 kg/ha + Potassium @ 20 kg/ha	**W_2. Salicylic acid @0.5mM single spray**	**W_3. Control**	**Mean**
A_1. Broad Bed Furrow	1951	1958	1802	1904
A_2. Ridges& Furrow	1974	1871	1556	1800
A_3. Control-Farmers practice	1281	1213	1115	1203
Mean	1735	1681	1491	
ANOVA	**A**	**W**	**A X W**	
SE d	77	62	107	
CD (5%)	301	190	NS	
CV % (Main)	14.0	**CV % (Sub)**	11.3	

Soil Ph: 7.63, EC : 0.83 m mhos cm^{-1}, OC (%) : 0.59, Available N : 218 kg/ha, Av. P_2O_5 : 21.31 kg/ha, Av.K_2O : 470 kg/ha, Recommended spacing : 120 x 45 cm, Recommended nutrients: 240-40-00 NPK kg/ha, Environment: Irrigated, Total rainfall : 1335 mm.

JUNAGADH

The results of the water logging experiment conducted at Junagadh revealed that the effect of different land configuration treatments had a significant influence on seed cotton yield. Significantly higher seed cotton yield 3290 kg/ha was found with treatment broadbed & furrow with chemical based weed control. Which was statistically at par with seed cotton yield (2859 kg/ha) of ridge & furrow treatment. Plant height (143 cm), No. of sympodiya per plant (19.56) and No. of bolls per square meter (86.65) were also observed significantly higher in broadbed & furrow treatment. Different water logging management treatments also had significant influence on seed cotton yield. Significantly higher seed cotton yield 3101 kg/ha was recorded with application of nitrogen @ 20kg/ha + potassium @20kg/ha after draining excess moisture . Which was statistically at par seed cotton yield (2930 kg/ha) with salicylic acid @0.5mM single spray application. No. of bolls per square meter (80.04) was also recorded significantly higher with application of nitrogen @ 20kg/ha + potassium @20kg/ha. Nitrogen and potassium uptake was increases with application of nitrogen @ 20kg/ha + potassium @20kg/ha treatment (Table 36).

Table 36. Seed cotton yield (kg/ha) as influenced by Land Configuration and Water logging management at Junagadh

Treatments	Seed cotton yield (kg/ha)			
	W 1. Nitrogen @ 20 kg/ha + Potassium @ 20 kg/ha	**W 2. Salicylic acid @0.5mM single spray**	**W 3. Control**	**Mean**
A1. Broad Bed Furrow with chemical based weed control	3545	3286	3039	3290
A2. Ridges& Furrow with chemical based weed control	3010	2863	2704	2859
A3. Control-Farmers practice	2746	2641	2438	2608
Mean (W)	3101	2930	2727	
ANOVA	**L**	**W**	**L x W**	
SE d	131	92	160	
CD (5%)	513	284	NS	
CV	13.4	9.4		

Soil parameters of pH-7.71, Soil Ec: 0.60 m mhos cm^{-1}, OC (%): 0.87 , Available 328 kg/ha N, P_2O_5 37.44 kg/ha & K_2O 359 kg/ha, recommended spacing 120 x 45 cm, recommended nutrients 240-50-150 NPK kg/ha, Cotton species/type G.Cot.Hy-24 BG-II, environment: irrigated and total rainfall 2296.30 mm during cropping periods

RAHURI

The results of the water logging experiment conducted at Rahuri revealed that cultivation of cotton on Broad bed furrow with chemical-based weed control (A_1) recorded significantly higher seed cotton yield (2146.8 kg/ha). The same trend was observed number of Sympodia per plant (17.5) and the number of bolls/m^2 (29.9) with A_1*i.e* cultivation of cotton on Broad bed furrow with chemical-based weed control. Water logging management by application of Nitrogen @20kg/ha + Potassium @20kg/ha (W_1) recorded significantly higher seed cotton yield (2459 kg/ha), number of bolls per m^2 (33.3/m^2) and number of sympodia (19.07) (Table 37). The interaction effect was found non-significant for yield and growth contributing characters, except No. of boll per m^2

Table 37. Seed cotton yield (kg/ha) as influenced by Land Configuration and Water logging management at Rahuri

Treatments	Seed cotton yield (kg/ha)			
	A_1. Broad Bed Furrow with chemical based weed control	**A_2. Ridges& Furrow with chemical based weed control**	**A_3. Control- Farmers practice**	**Mean**
W_1. Nitrogen @ 20 kg/ha + Potassium @ 20 kg/ha	2778	2408	2192	2459
W_2. Salicylic acid @0.5mM single spray	2102	1880	1773	1918
W_3. Control	1561	1395	1369	1442
Mean	2147	1894	1778	1940
ANOVA	**A**	**W**	**A X W**	
SEd(±)	46.6	57.0	98.7	
CD (5%)	183.0	175.7	NS	
CV	7.2	8.8		

Soil pH: 7.89,Ec: 0.22 m mhos cm^{-1}, OC (%) : 0.71 , Available N : 187 kg/ha,P_2O_5 : 19 kg ha^{-1}, K_2O : 644 kg, ha^{-1}, Environment: Irrigated, Recommended spacing: 90 x 90 cm, Total Rainfall (mm) received during cropping periods: 836.4mm

SOUTH ZONE

COIMBATORE

The results of the water logging experiment conducted at Coimbatore revealed that the land configuration techniques produced higher seed cotton yield and economic benefits than control. Among them, A_2. Ridges and furrows with chemical-based weed control produced significantly higher yield of 2241 kg/ha and recorded better BCR (1.92) than Broad bed and furrows and farmers practice. With respect to Water logging management, the application of nitrogen at the rate of 20 kg/ha combined with potassium at 20 kg/ha (W_1) recorded a notably higher seed cotton yield of 2094 kg/ha. The same treatment recorded higher numbers of sympodia per plant (16), boll weight (4.2 g) and bolls per square meter (72). The land configuration of ridges and furrows treatment with chemical-based weed control (A_2) exhibited significantly higher numbers of sympodia per plant (15), more boll weight (3.97 g), and bolls per square meter (68) (Table 38).

Table 38. Growth and yield attributes, Seed cotton yield (kg/ha), and Economics as influenced by Land Configuration and Water logging management at Coimbatore

Treatments	Plant height (cm)	Monopodia (No/plant)	Sympodia (No/plant)	Bolls (No. /m²)	Boll weight (g)	Seed cotton yield (Kg/ha)	Gross return (Rs/ha)	Net Return (Rs/ha)	BCR
Land Configuration									
A_1 : Broad Bed Furrow with chemical based weed control	92	1	15	68	3.95	2108	168653	74133	1.78
A_2 : Ridges and Furrow with chemical based weed control	95	2	16	72	4.25	2241	179280	85706	1.92
A_3: Control - Farmers Practice - Beds and Channel	84	1	12	56	3.80	1624	129920	20105	1.18
SEd	4	0	2	2	NS	78.8			
CD (P=0.05)	8	1	4	4	-	160.2			
Water logging management									
W_1 : Nitrogen @ 20 kg / ha + Potassium @ 20 kg / ha	91	1	15	68	3.97	2094	165888	67038	1.68
W_2 : Salicylic acid @ 0.5 m M single spray	90	1	14	63	3.81	1926	154051	54741	1.55
W_3 : Control	85	1	12	55	3.63	1763	141004	42865	1.44
SEd	3	0	1	2	NS	88.5			
CD (P=0.05)	NS	NS	NS	3.8	NS	180.5			

Soil pH value: 7.9, Available N : 224, P_2O_5 : 28, K_2O : 730 kg/ha, OC (%) : 0.52, Environment:irrigated

SRIVILLIPUTHUR

The results of the water logging experiment conducted at Srivilliputhur revealed significant insights into the effectiveness of the different treatments (W1, W2, W3) regarding plant growth metrics, including plant height, number of monopodia, and number of sympodia. The treatment W2 consistently outperforms the others, achieving the highest mean height of 93.92 cm and the most monopodia (1.82) and sympodia (23.89), indicating its superior capability to promote growth and branching. In contrast, W3 demonstrates the least effectiveness, with the lowest mean height (90.05 cm), monopodia (1.18), and sympodia (15.08). The highest seed cotton yield of 1939 kg/ha was recorded in W_2 : Salicylic acid @ 0.5mM single spray. Among land configuration, A_2. Ridges& Furrow with chemical-based weed

control recorded higher yield of 1793 kg/ha (Table 39). The ridges and furrow system along with Salicylic acid application revealed better results on comparision with other treatments.

Table 39. Seed cotton yield (kg/ha) as influenced by Land Configuration and Water logging management at Srivilliputhur

Treatments	Seed cotton yield (kg/ha)			
	A_1. Broad Bed Furrow with chemical based weed control	**A_2. Ridges& Furrow with chemical based weed control**	**A_3. Control-Farmers practice**	**Mean**
W_1 : Nitrogen @ 20 kg / ha + Potassium @ 20 kg / ha	1674	1655	1612	**1647**
W_2 : Salicylic acid @ 0.5 m M single spray	1950	2125	1743	**1939**
W_3 : Control	1650	1600	1570	**1607**
Mean	**1758**	**1793**	**1642**	
ANOVA	**A**	**W**	**AXW**	
SE d	35.8	45.4	78.7	
CD (5%)	99.5	99.0	171.5	
CV	4.3	5.5	5.5	

Soil parameters of pH: 7.7., Soil EC: 0.6 m mhos cm^{-1}, Organic Carbon (%): 1.8, available N 190 kg/ha (Low), P_2O_5 45 kg/ha (High) & K_2O 412 kg/ha (High), recommended spacing (90cmx 20cm), recommended nutrients (120:80:80 kg/ha NPK), Cotton species (RCH 929), environment (rainfed) and total rainfall (480 mm) during cropping periods

Agronomy VI Preparing for climate change: Drought and water logging studies in cotton
Effect of land configuration and plant growth regulator on drought management in cotton

Central zone -Rainfed
Akola

The drought management experiment conducted at Akola revealed that the Seed cotton yield was significantly highest (2542 kg/ha) with land configuration treatment of broad bed furrow which was significantly superior over ridges and furrow treatment (2207 kg/ha) and control (1917 kg/ha). The maximum yield in broad bed furrow might be due to moisture conservation which helped in the later stages of cotton growth and development and also it drains out the excess moisture from the furrow in the situation of excess and continuous rainfall this year. There was a significant response to the spraying of chemicals during drought situations. The spraying of glycine betanine@100 ppm as a single spray (D_1) and salicylic acid@100 ppm as a single spray at 70% water depletion stage in cotton. The drought management practice i.e. spraying of chemicals recorded significant differences in plant height, number of symopodia, number of bolls per square meter, length of sympodial branches, single plant yield and seed cotton yield. Monopodial branches and boll weight were not affected significantly due to the spraying of chemicals. The Seed cotton yield was significantly highest (2379 kg/ha) with the drought management practice of Salicylic acid spraying @ 100 ppm as a single spray on cotton. However, there were non-significant differences in D_1 (Glycine Betanine @100 ppm spraying)

and D_2 (Salicylic acid@100 ppm as a single spray) which were found at par with each other. The lowest yield of 2022 kg ha^{-1} was recorded in farmers practice (D_3) (Table 40).

Interaction effects of Land configuration x Drought management practices with regards to all growth parameters were found non-significant except the number of bolls per square meter was found significantly superior over other treatments. Significantly the highest number of bolls (157.24) were recorded in combination with A_1D_2 (Broad Bed Furrow and Salicylic acid spraying @ 100 ppm as a single spray). The combination of broad bed furrow and salicylic acid spraying was found superior over other combinations of ridges and furrow and other chemicals in respect to seed cotton yield. This combination recorded a seed cotton yield of 2810 Kg/ha significantly superior to other treatment combinations.

Table 40. Seed cotton yield (kg/ha) as influenced by land Configuration and drought management practices at AKOLA

Treatments	A1: Broad Bed Furrow	A2: Ridges & Furrow	A3: Control-Farmers Practice	Mean (Drought)	Anova	SE m	CD (5%)
D_1: Glycine Betaine@100 ppm single Spray	2498	2245	2047	**2263**	Land Configuration (A)	41	161
D_2: Salicylic acid @ 100 ppm single Spray	2810	2262	2066	**2379**	Drought management (D)	49	150
D_3: Control	2317	2114	1637	**2022**	A x D	84.3	259
Mean (Land Configuration)	**2542**	**2207**	**1917**				

Soil parameters: pH : 7.90, EC : 0.13 m mhos cm^{-1}, O.C.(%) : 3.90, Available N : 248 kg/ha, P_2O_5 : 16.6 $kgha^{-1}$, K_2O : 388 $kgha^{-1}$,Recommended spacing: 90X30 cm, Recommended Fertilizer dose : 60:30:30 Kg NPK/ha , Environment : Rainfed, Total Rainfall during Cropping period :955.1 mm in 44 rainy days

BHAWANIPATNA

The drought management experiment conducted at Bhawanipatna revealed that the growth characteristics and yield of cotton were significantly affected by land configuration methods and drought management chemicals. Among the land configuration methods, Ridge and Furrow method (A_2) recorded significantly higher plant height (93.57cm), no of sympodial branches/plant (12.51), No of bolls/m^2 (37.41), final plant population (13,200/ha), single plant yield(155.0 g) and seed cotton yield(2255 kg/ha) but minimum no of monopodia (1.68) and, average boll weight(4.14 g). Flatbed planting (Farmer's practice) recorded minimum growth and yield parameters. Among the drought management techniques, the application of Glycine Betaine @ 100 ppm as a single spray after depletion of 75 percent soil moisture gave the best results with respect to the growth and yield parameters of cotton. Which recorded significantly higher plant height (98.1 cm), No. of sympodial branches/plant (12.59), No of bolls/m^2 (37.72), single plant yield (157.0 g) and seed cotton yield (2316 kg/ha) with minimum numbers of monopodial branches/plant (1.64). Spraying of water (D_3.Control) in place of drought management chemicals recorded the lowest growth and yield parameters of cotton (Table 41).

Table 41. Seed cotton yield (kg/ha) as influenced by land Configuration and drought management practices at Bhawanipatna

Treatments	Seed cotton yield (kg/ha)			
	A1: Broad Bed Furrow	A2: Ridges & Furrow	A3: Control-Farmers Practice	Mean
D_1: Glycine Betaine@100 ppm single Spray	2248	2661	2039	2316
D_2: Salicylic acid @ 100 ppm single Spray	2181	2454	1826	2154
D_3: Control	1707	1650	1460	1606
Mean	2045	2255	1775	2025
ANOVA	A	D	A x D	
SE d	120.3	110.3	191.0	
CD (5%)	333.9	240.3	416.2	

Soil parameters: soil pH - 6.3, Available N: 128 kg/ha , P_2O_5 : 38.5 kg/ha , K_2O: 252 kg/ha, rainfall during cropping period: 992.6 mm, Genotype of cotton: Keshari, Nutrients applied: 120:60:60 kg/ha, Spacing followed: 90 cm x 60 cm, Environment: Rainfed

KHANDWA

The drought management experiment conducted at Khandwa revealed that planting of cotton in land configuration ridge and furrow gave the higher yield which was followed under land configuration broad bed and furrow. Both proved better in comparison the flat bed sowing in terms of growth and productivity of the cotton. Under drought management treatments, after depletion of 75 per cent soil moisture single spray of salicylic acid @ 100 ppm was found better in terms of the growth and productivity with highest seed cotton yield of 1658 kg/ha followed by the application of Glycine Betaine @ 100 ppm as compared to the control (Table 42). As the treatment combination is concern, ridge furrow planting with application of salicylic acid @ 100 ppm single spray after depletion of 75 per cent soil moisture was found better with highest seed cotton yield of 1740 kg/ha followed by the yield under the same land configuration with Glycine Betaine @ 100 ppm single spray after depletion of 75 per cent soil moisture, The nutrient uptake was also recorded higher under ridge furrow sowing of cotton with application of Salicylic acid @ 100 ppm after depletion of 75 per cent soil moisture.

Table 42. Seed cotton yield (kg/ha) as influenced by land Configuration and drought management practices at KHANDWA

Treatments	Seed cotton yield (kg/ha)			
	A1: Broad Bed Furrow	**A2: Ridges & Furrow**	**A3: Control-Farmers Practice**	**Mean**
D_1: Glycine Betaine@100 ppm single Spray	1457	1560	1337	1451
D_2: Salicylic acid @ 100 ppm single Spray	1720	1870	1385	1658
D_3: Control	1440	1792	899	1377
Mean	1539	1741	1207	
ANOVA	**A**	**D**	**AXD**	
SE d	78.0	51.7	100.7	
CD (5%)	216.5	143.5	232.1	
CV	11.1	7.3	8.2	

Soil parameters: pH: 7.764, OC (%): 0.6, Available N, P_2O_5 & K_2O (kg/ha):243.4 (N), 16.3 (P_2O_5) & 372.8 K_2O, Recommended spacing: 75 X 60 cm, Recommended dose of nutrients: NPK @ 125:60:40 kg/ ha, Environment –rainfed and total rainfall (mm) during cropping periods: 788 mm. Uneven distribution of rainfall was observed. Water logging and drought spells were occurred during early growth and flowering period.

SOUTH ZONE

DHARWAD

The drought management experiment conducted at Dharwad revealed different yield parameters were unaffected significantly by levels of land configurations and drought management practices. Different land configuration practices did not affect the seed cotton yield per hectare. Whereas among the drought management practices spraying of Glycine betaine (D_1) produced significantly higher seed cotton yield (1651 kg/ha) and single plant yield (84.98 g) as compared to other treatments(Table 43). The enhanced seed cotton yield could be attributed to the production of higher seed cotton yield per plant. Similar trends were also observed in the numerical increase of the bolls per plant and single boll weight. Land configuration levels were unaffected during this season owing to above-normal rainfall observed from July to the end of October. Whereas from November onwards there was less rainfall observed during the boll development stage. Hence spraying of Glycine Betaine might have helped to upgrade the yield levels. Interactions were not significant. From the studies of this year, it can be inferred that above-normal rainfall years do not require any land modification to conserve moisture (From June to October). It was also true that glycine betaine can help to improve the yield of cotton under stress period

Table 43. Seed cotton yield (kg/ha) and single plant yield (g)as influenced by land Configuration and drought management practices at Dharwad

Treatments	Seed cotton yield (kg/ha)				Single plant yield (g)			
	A1: Broad Bed Furrow	**A2: Ridges & Furrow**	**A3: Control-Farmers Practice**	**Mean**	**A1: Broad Bed Furrow**	**A2: Ridges & Furrow**	**A3: Control-Farmers Practice**	**Mean**
D_1: Glycine Betaine @100 ppm single Spray	1784	1655	1516	**1651**	89.87	84.07	81.00	**84.98**
D_2: Salicylic acid @ 100 ppm single Spray	1715	1489	1533	**1579**	79.07	76.20	73.53	**76.27**
D_3: Control	1377	1346	1238	**1321**	72.13	70.40	68.13	**70.22**
Mean	**1625**	**1497**	**1429**		**80.36**	**76.89**	**74.22**	
ANOVA	**GR**	**D**	**GR x D**		**GR**	**D**	**GRXD**	
SE d	103.42	81.08	140.43		2.85	7.75	13.42	
CD (5%)	NS	176.61	NS		NS	NS	NS	

Soil type medium deep black cotton soil, pH: 7.00, OC (%): 0.51, Available N: 235.0 kg/ha, Available P_2O_5: 24.0 kg/ha, Available K_2O : 485.0 kg/ha, Total rainfall: 1003 mm, Rainy days: 71 days

CHAMARAJANAGAR

The experimental findings of drought management trial conducted at Chamarajanagar revealed that cotton growth and yield characteristics were significantly impacted by land configurations. The least seed cotton yield was recorded with flatbed sowing (1216 kg/ha). Ridges and furrow sowing was the most efficient method for conserving soil moisture and yielding the maximum seed cotton yield (1691 kg/ha). Better moisture availability and higher yield characteristics, such as higher number of bolls (75.8/m^2), boll weight (4.31g), and single plant yield (154.2 g/plant), contributed for higher yield in ridges and furrow planting. In subplot treatments, foliar application of glycine betaine and salicylic acid under moisture stress improved its yield characteristics. The highest seed cotton yield among the plant growth regulators was observed with glycine betaine (100 ppm) (1637 kg/ha). The next best was Salicylic acid@ 100 ppm with seed cotton yield of 1442 kg/ha. The control plot had the lowest seed cotton yield (1342 kg/ha) (Table 44).

Table 44. Seed cotton yield (kg/ha) and single plant yield (g)as influenced by land configuration and drought management practices at Chamarajanagar

Treatments	Seed cotton yield (kg/ha)				Single plant yield (g)			
	A1: Broad Bed Furrow	A2: Ridges & Furrow	A3: Control-Farmers Practice	Mean	A1: Broad Bed Furrow	A2: Ridges & Furrow	A3: Control-Farmers Practice	Mean
D_1: Glycine Betaine@100 ppm single Spray	1721	1868	1323	**1637**	157.9	174.1	119.1	**150.4**
D_2: Salicylic acid @ 100 ppm single Spray	1461	1670	1196	**1442**	131.5	150.3	107.6	**129.8**
D_3: Control	1362	1536	1129	**1342**	122.6	138.2	101.6	**120.8**
Mean	**1515**	**1691**	**1216**	**1474**	**137.3**	**154.2**	**109.4**	**133.7**
ANOVA	**GR**	**D**	**GR x D**		**GR**	**D**	**GR x D**	
SE d	47.77	65.80	113.97		4.38	6.76	11.72	
CD (5%)	136.18	144.96	NS		12.51	14.90	NS	
CV	6.86				6.95			

Soil pH value: 8.24, EC: 0.54 m mhos cm^{-1}, OC (%):0.50, N (kg/ha):304, P_2O_5(kg/ha):23.6, K_2O (kg/ha): 853.5, Spacing followed: 90 x 60 cm, Environment: Rainfed, Rainfall (mm) received during cropping periods: 584 mm

Agronomy VII- Input use pattern & cost of cultivation

North zone

The details of input use and cost of cultivation for north zone of irrigated Bt hybrid and arboreum were surveyed and variable cost (₹ ha^{-1}), fixed cost (₹ q^{-1}) and gross returns (₹ ha^{-1}) were calculated. The variable cost was calculated as ₹ 64227 and ₹ 66316. The fixed cost was calculated as ₹ 29709 and ₹ 27094. The gross return was calculated as ₹ 105000 and ₹ 98550 for irrigated Bt hybrid and arboreum. The mean seed cotton yield of 15.0, 13.5 and 17.5 q ha^{-1} was obtained by survey at North Zone for irrigated Bt hybrid and arboreum.

Central Zone

The details of input use and cost of cultivation for north zone of irrigated Bt hybrid and arboreum were surveyed and variable cost (₹ ha^{-1}), fixed cost (₹ q^{-1}) and gross returns (₹ ha^{-1}) were calculated. The variable cost was calculated as ₹ 82529 and ₹ 91276. The fixed cost was calculated as ₹ 23358 and ₹ 23071. The gross return was calculated as ₹122500 and ₹ 142100 for irrigated Bt hybrid and arboreum. The mean seed cotton yield of 15.0, 13.5 and 17.5 q ha^{-1} was obtained by survey at North Zone for irrigated Bt hybrid and arboreum.

South Zone

The details of input use and cost of cultivation for north zone of irrigated Bt hybrid, arboreum and ELS Bt hybrid were surveyed and variable cost (₹ ha^{-1}), fixed cost (₹ q^{-1}) and gross returns (₹ ha^{-1}) were calculated. The variable cost was calculated as ₹ 81347, ₹ 86435 and ₹ 86132. The fixed cost was calculated as ₹ 27670, ₹ 23981 and ₹ 23518. The gross return was calculated as ₹ 128100, ₹ 149100 and ₹ 142000 for irrigated Bt hybrid, arboreum and ELS Bt hybrid. The mean seed cotton yield of 15.0, 13.5 and 17.5 q ha^{-1} was

obtained by survey at North Zone for irrigated Bt hybrid, arboreum and ELS Bt hybrid (Table 45).

Table 45. Cost of cultivation of North, Central, and South zones under rainfed and irrigated conditions in 2024-25

Details	North Zone	North Zone	Central zone	Central zone	South zone	South zone	South zone
Bt hybrids / arboretum / HxB ELS	Bt hybrid	arboreum	Bt hybrid	Bt hybrid	Bt hybrid	Bt hybrid	ELS (HxB) Bt hybrid
Environment: Irrigated/rainfed	Irrigated	Irrigated	rainfed	Irrigated	Rainfed	Irrigated	Rainfed
Variable costs							
a) Material cost							
1.Seed	7000	2450	3365	3862	4038	4075	3460
2. Fertilisers & Manures	7853	7288	11128	13399	9221	15193	17202
3. Weedicides	3005	1599	1577	2480	908	1813	0
4.Growth regulators	758	39	1469	0	1000	750	0
5. Plant protection chemicals	2355	4600	7050	5396	13787	5905	4970
6. Irrigation charges	2487	2487	0	3763	0	2050	0
B) Labour cost							
1.Field preparation	4263	4848	8286	7321	8460	8400	10000
2. Sowing	3038	4863	3678	2808	2821	4000	6000
3. Gap filling & thinning	0	950	1453	1828	500	500	1250
4. Weeding	11263	9258	6478	7987	6301	6750	4000
5. Intercultural operations	0	4933	5320	3029	7746	3175	5000
6. Fertilizer application	676	1839	3905	2818	2000	1500	8250
7. Weedicide application	985	955	2116	1389	917	750	0
8. Pesticide application	1836	1028	3271	4348	3088	2300	2250
9. Miscellaneous cost	0	943	1333	500	0	500	0
10. Harvesting	18708	17400	20232	28215	17226	26650	23750
11. Others, if any	0	836	1868	2133	3333	2125	0
Total variable cost (I)	64227	66316	82529	91276	81347	86435	86132
Fixed cost							
1. Rent value of own land	20989	21124	12798	15464	22323	19474	20000
2. Rent paid for leased in land	3105	2580	0	915	157	67	0
3. Land revenue	268	268	279	279	299	299	500
4. Depreciation on implements and	392	392	1199	777	573	451	268

5. Interest on fixed capital@ 10%	4955	2730	9081	5635	4318	3689	2750
Total fixed cost (II)	29709	27094	23358	23071	27670	23981	23518
Total Cost (I + II)	93936	93410	105887	114347	109017	110416	109650
Yield (qtl./ha)	15.0	13.5	17.5	20.3	18.3	21.3	14
Gross returns (Rs./ha)	105000	98550	122500	142100	128100	149100	142000

AGR VIII. Canopy management in compact genotypes

NORTH ZONE

SRIGANGANAGAR

The canopy management trial conducted at Sriganganagar under irrigated conditions revealed that significantly lesser plant height (128 cm), higher number of bolls(194) boll weight (4.3 g) and seed cotton yield(2750 kg/ha) was recorded in treatment T_8 (Mepiquat chloride @45ppm at square initiation and 15 days after first spray and 15 days after second spray +Detopping). In seed cotton yield result in T_8 was followed by 2609 and 2629 kg/ha in treatments T_6 (Mepiquat chloride @45ppm at square initiation and 15 days after first spray + Detopping) and T_7 (Mepiquat chloride @45ppm at square initiation and 15 days after first spray and 15 days after second spray respectively. The minimum yield was recorded in control and followed by T_2. Detopping (Table 46).

Table 46. Growth characters, yield attributes and seed cotton yield (kg/ha) as influenced by canopy management techniques at Sriganganagar

Treatments	Plant height (cm) at harvest	No. of monopodia at harvest	No. of sympodia at harvest	No. of Bolls/ sqm	Boll weight (g)	Seed cotton Yield (q/ha)
T_1 : Control	183	1	16	193	3.9	2046
T_2 : Detopping	166	2	7	115	4.0	2275
T_3 : Mepiquat chloride@45ppm at square initiation	150	2	11	137	4.0	2446
T_4 : Mepiquat chloride@45ppm at square initiation +Detopping	141	2	9	167	4.1	2481
T_5 : Mepiquat chloride@45ppm at square initiation and 15 days after first spray	164	3	10	140	4.1	2583
T_6 : Mepiquat chloride@45ppm at square initiation and 15 days after first spray + Detopping	128	2	8	185	4.2	2609
T_7 : Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)	162	3	12	157	4.2	2629
T_8 : Mepiquat chloride @45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)+Detopping	128	3	19	194	4.3	2750
S Ed	7.6	0.4	0.6	6.7	0.1	119.1
CD (5%)	23.0	NS	1.7	20.4	0.2	361.3

Soil pH :7.8, EC:0.59 m mhos cm^{-1}, OC (%):0.24, Available P (kg/ha):21, K (kg/ha): 432, Environment: Irrigated, Total Rainfall (mm) received during crop periods: 432.3 mm

CENTRAL ZONE

RAHURI

The canopy management trial conducted at Rahuri under irrigated conditions revealed that plant height, number of sympodia (18.27) and number of nodes per plant (16.77) were observed higher in T_1 (Control). Among the canopy management treatments, number of sympodia was found higher in T_7. Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (15.27). The significantly highest Seed cotton yield (2419 kg/ha) and number of bolls per square meter (35.83) were recorded in treatment T_6. Mepiquat chloride@45ppm at square initiation and 15 days after first spray + Detopping, followed by T_8. Mepiquat chloride @ 45 ppm at square initiation + 15 days after first spray + 15 days after the second spray (need-based)+Detopping (2217 kg/ha) and T_5.Mepiquat chloride @ 45 ppm at square initiation and 15 days after the first spray (2192 kg/ha) (Table 47).

Table 47. Growth characters, yield attributes and seed cotton yield (kg/ha) as influenced by canopy management techniques at Rahuri

Treatments	Plant height (cm) at harvest	Height to node ratio	No. of sympodia at harvest	No. of Monopodia at harvest	No of nodes	Numberofbolls/sq. m	Seed Cotton Yield (Kg/ha)
T_1.Control	94	5	18	1	17	31	1658
T_2.Detopping	85	6	15	1	13	27	1640
T_3.Mepiquat chloride@45ppm at square initiation	85	5	16	0	12	34	2029
T_4.Mepiquat chloride@45ppm at square initiation +Detopping	84	5	15	0	13	31	1802
T_5.Mepiquat chloride@45ppm at square initiation and 15 days after first spray	84	6	15	0	14	35	2192
T_6.Mepiquat chloride@45ppm at square initiation and 15 days after first spray + Detopping	83	5	13	0	13	36	2419
T_7.Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)	83	5	16	0	13	33	1924
T_8.Mepiquat chloride@45ppm at	80	5	15	0	14	35	2217

square initiation and 15 days after first spray and 15 days after second spray (need based)+Detopping							
SEd(±)	**2.32**	**5.41**	**0.78**	**0.04**	**0.68**	**1.56**	**120**
CD (5%)	**7.04**	**0.65**	**2.35**	**0.13**	**2.07**	**4.73**	**365**

Soil pH: 7.97, Ec: 0.18m mhos cm^{-1}, OC (%): 0.69, available N : 168kg ha^{-1}, P_2O_5 : 19 kg ha^{-1}, K_2O: 573 kg ha^{-1},Environment: Irrigated, Recommended spacing: 90 x 90 cm^2, Total Rainfall (mm) received during cropping periods: 836.4mm

NANDED

The canopy management trial conducted at Nanded under rainfed conditions revealed that mepiquat chloride spray and detopping have significantly reduced plant height. Lesser plant height of 87.27 cm was observed in T_8. Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray +Detopping. Numbers of nodes per plant were reduced in detopping as well as Mepiquat sprays over control. Number of fruiting branches were reduced in detopping and Mepiquat chloride spray and vegetative branches were increased in Mepiquat chloride spray. Number of bolls per sq. m were reduced in Mepiquat chloride spray treatments however, boll size was significantly improved in two and three sprays of Mepiquat chloride over control. Two and three sprays of mepiquat chloride along with detopping (2650 kg/ha and 2636 kg/ha, respectively) has significantly increased seed cotton yield over control (2330 kg/ha) (Table 48).

Table 48. Growth characters, yield attributes and seed cotton yield (kg/ha) as influenced by canopy management techniques at Nanded

Treatments	Plant height (cm) at harvest	Height to node ratio	No. of monopodia at harvest	No. of sympodia at harvest	No of nodes	Number of bolls/ sq.m	Seed Cotton Yield (q/ha)
T_1.Control	187	5	0	32	36	64	2330
T_2.Detopping	115	5	0	21	25	65	2409
T_3.Mepiquat chloride@45ppm at square initiation	163	5	0	28	32	49	2257
T_4.Mepiquat chloride@45ppm at square initiation +Detopping	98	4	1	21	25	49	2382
T_5.Mepiquat chloride@45ppm at square initiation and 15 days after first spray	146	5	1	27	30	46	2576
T_6.Mepiquat chloride@45ppm at square initiation and 15 days after first spray + Detopping	88	4	1	21	25	50	2650
T_7.Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)	141	5	1	26	30	50	2579
T_8.Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)+Detopping	87	4	1	19	23	50	2636
SEd	7.34	0.31	0.08	1.27	1.37	2.38	126
CD (5%)	15.73	0.67	0.16	2.72	2.93	5.10	271

Soil properties : pH: 8.06, EC : 0.24 m mhos cm^{-1}, OC (%): 0.42, Av. N : 136.8 kg/ha, Av. P_2O_5 : 11.4 kg/ha, Av. K_2O :4652.4 kg/ha, Recommended spacing: 120 x 45 cm, Closer spacing: 90 x 30 cm; Environment - Rainfed, Total rainfall during season - 1233.8 mm

JUNAGADH

Different treatment of canopy management with compact genotype trial conducted at Junagadh under irrigated conditions had significant influences on plant height and height to node ratio. Plant height (97 cm) and height to node ratio (5.91) at harvest were recorded significantly lowest with application mepiquat chloride@ 45ppm at square initiation and 15 days after first spray and 15 days after second spray + detopping. While different cotton quality parameters were not affected by canopy management treatments. Numbers of boll per square meter (82) and seed cotton yield (2482 kg/ha) were found significantly the highest with application of application mepiquat chloride@ 45ppm at square initiation and 15 days after first spray and 15 days after second spray + detopping. Which was statistically at par with the treatment no. T_7 (mepiquat chloride@ 45ppm at square initiation and 15 days after first spray), treatment no. T_6 (mepiquat chloride@ 45ppm at square initiation and 15 days after first spray + detopping) treatment no. T_5 (Mepiquat chloride@ 45ppm at square initiation and 15 days after first spray) T_4 (Mepiquat chloride@45ppm at square initiation + Detopping) and T_2 (detopping) (Table 49).

Table 49. Growth characters, yield attributes and seed cotton yield (kg/ha) as influenced by canopy management techniques at Junagadh

Treatments	Plant height (cm) at harvest	Height to node ratio	No. of monopodia at harvest	No. of sympodia at harvest	Sympodial length (mm)	No of nodes	Number of bolls/ sq.m	Seed cotton yield (kg/ha)
T_1 : Control	138	8.2	1	18	41	17	63	1919
T_2 : Detopping	115	6.7	1	19	44	17	72	2131
T_3 : Mepiquat chloride@45ppm at square initiation	123	7.2	1	18	48	17	64	1934
T_4 : Mepiquat chloride@45ppm at square initiation +Detopping	108	6.3	1	19	47	17	73	2129
T_5 : Mepiquat chloride@45ppm at square initiation and 15 days after first spray	115	6.9	1	18	48	17	73	2134
T_6 : Mepiquat chloride@45ppm at square initiation and 15 days after first spray + Detopping	103	6.4	1	18	47	16	78	2327
T_7 : Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)	110	6.6	1	18	47	17	75	2289
T_8 : Mepiquat chloride @45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based) +Detopping	97	5.9	1	18	49	16	83	2482
SEd	5.30	0.39	0.07	0.65	2.64	0.65	3.69	109
CD (5%)	17.70	1.31	NS	NS	NS	NS	12.34	365

Soil parameters of pH-7.70, Soil Ec: 0.45 m mhos cm^{-1}, OC (%): 0.83 , available 301 kg/ha N, P_2O_5 36.78 kg/ha & K_2O 311 kg/ha, recommended spacing 120 x 45 cm, recommended nutrients 240-50-150 NPK kg/ha, Cotton species/type G.Cot.Hy-24 BG-II, environment: irrigated and total rainfall 2296.30 mm during cropping periods

AKOLA

The canopy management trial conducted at Akola under rainfed conditions found that the significantly higher plant height (97 cm) was recorded in T_1 i.e. control had no canopy management practices. Comparatively the lowest plant height was observed in T_5 treatment (75cm) where spraying of mepiquat chloride twice i.e.at square initiation and 15 days after first spraying. Significantly the highest number of sympodial branches (17) were noticed in T5 where two spray of mepiquat chloride was done. The lowest sympodial branches were recorded in T7 and T8 treatments where spraying of mepiquat chloride was done three times. The lowest monopodial branches were recorded in T_4 where monopodia pruning was done at

45 DAS. The height-to-node ratio was calculated before the PGR spray and it was noticed that non-significant results were observed with respect to the H: N ratio. The significantly highest H: N ratio (5.13) at harvest was noticed in the control plot. The significantly highest number of bolls (190) was observed in the T_5 treatment where mepiquat chloride was sprayed twice which was followed by T_2 i.e. detopping at 20th node which recorded 185 bolls per sq.mt. The significantly highest seed cotton yield (2781 kg/ha) was registered in treatment T_5 where mepiquat chloride was sprayed twice @ 45 ppm at square initiation and 15 days after first spray which was followed by T_4 i.e. mepiquat chloride @ 45 ppm at square initiation + detopping on 20th node with seed cotton yield of 2726 kgha^{-1}. These two treatments were found at par with treatments T_2,T_6 and T_7(Table 50).

Table 50. Growth characters, yield attributes and seed cotton yield (kg/ha) as influenced by canopy management techniques at Akola

Treatments	Plant height (cm) at harvest	Monopodial branches	Height to node ratio (45-50 DAS)	No. of sympodia at harvest	No of nodes at harvest	Height to node ratio at harvest	Number of bolls/ sq.m	Seed Cotton Yield (q/ha)
T_1: Control	97	2	4.1	17	19	5	156	2328
T_2: Detopping (20th Node)	88	1	4.3	15	20	4	185	2687
T_3: Mepiquat chloride@45ppm at square initiation	81	1	4.1	14	24	3	169	2473
T_4:Mepiquat chloride@45ppm at square initiation +Detopping (20th Node)	82	1	4.4	14	22	4	164	2726
T_5: Mepiquat chloride@45ppm at square initiation and 15 days after first spray	75	1	4.1	18	24	3	190	2781
T_6 :Mepiquat chloride@45ppm at square initiation and 15 days after first spray + Detopping (20th Node)	77	1	4.5	15	20	4	167	2711
T_7: Mepiquat chloride@45ppm at square initiation and 15 days after first spray and15 days after second spray (need based)	84	1	4.3	14	24	3	158	2677
T_8: Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 5 days after second spray (need based)+Detopping (20th Node)	79	1	4.3	14	20	4	165	2523
SEd	5.73	0.12	0.25	0.80	1.32	0.35	10.36	118
CD (5%)	12.44	NS	NS	1.74	2.85	0.76	22.46	257

Soil parameters : pH value: 7.80, EC: 0.13 m mhos cm^{-1}, O.C.(%) : 3.95, Available N : 258 $kgha^{-1}$, P_2O_5 : 16.8 $kgha^{-1}$, K_2O : 395kg/ha,Recommended spacing: 90x15 cm, Recommended Fertilizer dose: 90:45:45 Kg NPK/ha , Environment: Rainfed, Cotton Species: RASI-971-Swift Bt hybrid (BG-II), Total Rainfall during Cropping period: 955.1 mm in 44 rainy days

BHAWANIPATNA

The canopy management trial conducted at Bhawanipatna under rainfed conditions revealed that different growth and yield parameters and seed cotton yield were significantly affected by different treatments. Plant height recorded at harvest was the highest in control (106 cm) and the least in T_8 (Mepiquat chloride@45ppm at square initiation and 15 days after the first spray and 15 days after the second spray + Detopping) (78 cm). Height to node ratio was the highest with T_2 . Detopping (2.96) and the least recorded with T_8 (Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray +Detopping) (2.34). Yield attributing characters like no. of bolls/m^2 (140), boll weight (3.9 g), and GOT (35.57 %) and seed cotton yield (3917 kg/ha) were significantly higher in T_8.(Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray +Detopping) (Table 51).

Table 51. Growth characters, yield attributes and seed cotton yield (kg/ha) as influenced by canopy management techniques at Bhawanipatna

Treatments	Plant height (cm) at harvest	Height to node ratio	No of momopodia at harvest	No of sympodia at harvest	Numberof bolls/ sq.m	Boll weight (g)	Seed Cotton Yield (kg/ ha)
T1.Control	107	3.0	2	9	119	3.4	2870
T2.Detopping	103	2.6	2	8	128	3.5	3243
T3.Mepiquat chloride@45ppm at square initiation	94	2.6	2	11	122	3.4	2922
T4.Mepiquat chloride@45ppm at square initiation +Detopping	88	2.5	2	9	125	3.6	3274
T5.Mepiquat chloride@45ppm at square initiation and 15 days after first spray	83	2.6	2	10	130	3.5	3355
T6.Mepiquat chloride@45ppm at square initiation and 15 days after first spray + Detopping	84	2.6	2	10	133	3.7	3681
T7.Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)	84	2.5	2	11	133	3.4	3323
T8.Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)+Detopping	78	2.3	2	10	140	3.9	3917
SEd	1.69	0.12	0.1	0.4	4.6	0.1	244.5
CD (5%)	3.63	0.25	0.2	0.8	9.8	0.3	524.3

Soil pH : 6.3, Available N: 132 kg/ha , P_2O_5 : 38.5 kg/ha , K_2O: 250 kg/ha, rainfall during cropping period: 992.6 mm, Genotype of cotton: BS 30, Environment : Rainfed ,Spacing followed: 60 X 10 cm, Rainfall (mm) received during cropping periods: 992.6 mm

KHANDWA

The results of an experiment on canopy management in compact genotype conducted at Khandwa revealed that the highest plant height at harvest (136cm) was recorded in T_3: Mepiquat chloride @ 45 ppm at square initiation, which was on par with T_1. control (129 cm). Height to node ratio at harvest was the significantly least in T_8: Mepiquat chloride @ 45 ppm at square initiation and 15 days after first spray and 15 days after second spray (need-based) with Detopping. (4.02) which was on par with T_4. The maximum number of sympodia at harvest was registered in T_7: Mepiquat chloride @ 45 ppm at square initiation and 15 days after first spray and 15 days after second spray (need-based) (36.07). The least sympodial branches were recorded in T_2: Detopping (20.07). Significantly the highest number of bolls (187) and highest seed cotton yield (2072 kg/ha) were recorded in T_8: Mepiquat chloride @ 45 ppm at square initiation and 15 days after first spray and 15 days after the second spray (need-based) with Detopping (Table 52).

Table 52. Growth characters, yield attributes and seed cotton yield (kg/ha) as influenced by canopy management techniques at Khandwa

Treatments	Plant height (cm) at harvest	Height to node ratio at harvest	No. of monopodia at harvest	No. of sympodia at harvest	No. of Bolls/ SQM	Seed cotton Yield (kg/ha)
T_1: Control	130	4.91	0.13	34.6	125.9	1675
T_2: Detopping	104	4.24	0.20	20.1	124.9	1499
T_3: Mepiquat chloride @ 45 ppm at square initiation	136	5.27	0.07	21.4	160.5	1523
T_4: Mepiquat chloride @ 45 ppm at square initiation + Detopping	104	4.03	0.33	19.9	134.8	1573
T_5: Mepiquat chloride @ 5ppm at square initiation and 15 days after first spray	135	5.10	0.13	21.8	130.9	1602
T_6: Mepiquat chloride @ 45 ppm at square initiation and 15 days after first spray + Detopping	104	4.06	0.33	21.4	147.2	1529
T_7: Mepiquat chloride @ 45 ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)	135	4.78	0.33	36.1	117.5	1529
T_8: Mepiquat chloride @ 45 ppm at square initiation and 15 days after first spray and 15 days after second spray (need based) Detopping	104	4.02	0.27	21.0	187.2	2072
SEd	**8.03**	**0.24**	**0.267**	**7.88**	**7.01**	**153.5**
CD (5%)	**17.23**	**0.52**	**NS**	**NS**	**15.04**	**329.2**

Soil parameters: pH: 7.725, EC: 0.658 m mhos cm^{-1}, Organic Carbon (%) :0.67, Available N, P_2O_5 & K_2O (kg/ha) – 234.4 (N), 15.6 (P_2O_5) & 368.2 K_2O, Recommended spacing – 90 cm X 60 cm, Recommended dose of nutrients – NPK @ 125:60:40 kg/ ha, Cotton species/type – Hirsutum (Hybrid), Environment – irrigated (1 irrigation) and total rainfall (mm) during cropping periods – 788 mm. Uneven distribution of rainfall was observed. Water logging and drought spells were occurred during early growth and flowering period

SOUTH ZONE

RAICHUR

The canopy management trial conducted at Raichur under irrigated conditions revealed that lesser plant height of 91 cm and less height-to-node ratio (3.8) were noticed in T_4. Mepiquat chloride @ 45 ppm at square initiation + Detopping. The significantly highest number of bolls (157) was recorded in T_8. The Significantly highest seed cotton yield (3656 kg/ha) was recorded with T_6 (Mepiquat chloride @ 45ppm at square initiation and 15 days after first spray + Detopping) followed by T_5 (Mepiquat chloride @ 45ppm at square initiation and 15 days after first spray) (3574 kg/ha), T_8 (Mepiquat chloride @ 45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based) +Detopping) (3571 kg/ha), T_7 (Mepiquat chloride @ 45ppm at square initiation and 15 days after first spray and 15 days after second spray (3543 kg/ha) and T_4 (Mepiquat chloride @45ppm at square initiation + Detopping) (3534 kg/ha) which were found on par with each other (Table 53).

Table 53. Growth characters, yield attributes and seed cotton yield (kg/ha) as influenced by canopy management techniques at Raichur

Treatments	Plant height (cm) at harvest	Height to node ratio	No. of Mono-podia at harvest	No. of sym-podia at harvest	No of nodes	Number of bolls/ sq.m	Seed Cotton Yield (kg/ha)
T_1.Control	152	4.7	1.3	27	32	116	2814
T_2.Detopping	103	4.1	1.1	22	25	125	3062
T_3.Mepiquat chloride@45ppm at square initiation	114	4.6	0.9	24	25	133	3142
T_4.Mepiquat chloride@45ppm at square initiation +Detopping	91	3.8	0.7	21	24	142	3534
T_5.Mepiquat chloride@45ppm at square initiation and 15 days after first spray	107	4.6	0.7	22	23	137	3574
T_6.Mepiquat chloride@45ppm at square initiation and 15 days after first spray + Detopping	97	4.3	0.5	21	23	149	3656
T_7.Mepiquat chloride@45ppm at square initiation and 15 days after first spray	98	4.5	0.5	19	22	142	3543

and 15 days after second spray (need based)							
T_8.Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)+Detopping	96	4.4	0.5	17	22	157	3571
S. Em+	**6.1**	**0.4**	**0.07**	**1.8**	**1.6**	**7.1**	**131**
C. D. at 5%	**18.5**	**1.3**	**0.21**	**5.4**	**5.0**	**21.5**	**396**

Soil pH: 8.03, N : 268kg/ha, P_2O_5 : 34kg/ha, K_2O : 298 kg/ha, OC.(%) : 0.48%, Recommended spacing : 90 cm X 60 cm for Bt cotton hybrids, Environment: Irrigated

DHARWAD

The data from the experiment of canopy management trial conducted at Dharwad showed that the combination of Mepiquat chloride and detopping (T4, T6, T8) leads to a noticeable decrease in plant height, with T6 (Mepiquat chloride at square initiation + 15 days after first spray + Detopping) showing the shortest plant height at 109 cm. The height to node ratio is consistent across treatments, though slightly lower in treatments involving Mepiquat chloride (T3, T5, T7) when compared to the control, indicating a slightly more compact growth habit.For monopodia (main stem branches), the control (T1) has the fewest, while detopping treatments and Mepiquat chloride combinations generally result in more monopodia. This suggests that these treatments may promote monopodia branching, likely contributing to higher fruiting potential. Sympodial branches, which are also indicative of fruiting potential, show higher numbers in treatments involving both Mepiquat chloride and detopping (T2, T4, T6, T8), with T6 showing the highest at 36.7 branches. This suggests that a combination of Mepiquat chloride and detopping could be a favorable treatment for increasing sympodial branching, potentially enhancing yield. These findings suggest that specific treatments like T6 may be beneficial for optimizing both plant architecture and yield potential. In terms of boll production, T6 also shows the highest number of bolls per square meter (161), followed closely by T2 (158) and T4 (154). These treatments appear to encourage greater boll formation, which could be linked to the increased branching observed in earlier plant growth parameters. While the control treatment (T1) yields a lower seed cotton yield of 1850 q/ha, treatments involving Mepiquat chloride, especially those combined with detopping (T6), result in higher yields, with T6 achieving the highest at 2245 kg/ha (Table 54). This indicates that the combination of Mepiquat chloride and detopping has a positive effect on seed cotton yield. Overall, the combination of Mepiquat chloride and detopping (particularly in T6) not only leads to the highest yield but also supports improved boll production and fiber elongation. However, it may come at a slight trade-off in terms of fiber strength, with T3 showing the best Lint Index. These findings suggest that while Mepiquat chloride and detopping treatments are beneficial for yield improvement, the quality of the fiber did not vary significantly by canopy management treatments attempted.

Table 54. Growth characters, yield attributes and seed cotton yield (kg/ha) as influenced by canopy management techniques at Dharwad

Treatments	Plant height (cm) at harvest	Height -to-node ratio	No. of monopodia at harvest	No. of sympodia at harvest	Number of bolls/ sq.m	Seed Cotton Yield (kg/ha)
T_1.Control	150	4.31	2	27	140	1850
T_2.Detopping	107	3.41	3	33	158	2160
T_3.Mepiquat chloride@45ppm at square initiation	152	3.19	2	29	144	1945
T_4.Mepiquat chloride@45ppm at square initiation +Detopping	125	3.43	3	34	154	2120
T_5.Mepiquat chloride@45ppm at square initiation and 15 days after first spray	144	3.36	3	31	150	2090
T_6.Mepiquat chloride@45ppm at square initiation and 15 days after first spray + Detopping	109	3.44	3	37	161	2245
T_7.Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)	139	3.33	3	31	149	2050
T_8.Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)+Detopping	120	3.28	3	30	145	1987
SEd	9.11	0.27	0.16	2.41	10.16	104.27
CD (5%)	19.53	0.58	0.35	5.16	21.80	223.63

Soil pH value: 7.5, OC (%):0.54, available N:256 kg/ha, P_2O_5 : 34 kg/ha, K_2O: 515 kg/ha, Spacing followed: 90 x 30 cm

CHAMARAJANAGAR

The canopy management trial conducted at Chamarajanagar under rainfed conditions revealed that significantly lower plant height (98 cm), node count (20.7/plant), and height-to-node ratio (4.4) was noticed in the application of Mepiquat chloride (T_8) at 45 ppm at square initiation + 15 days after the first spray + 15 days after the second spray + de-topping. While significantly higher seed cotton yield (2027 kg/ha) and number of bolls (67) were recorded in T_6 (Mepiquat chloride@45ppm at square initiation and 15 days after first spray + De-topping) followed by T_4. (Mepiquat chloride @ 45 ppm at square initiation and 15 days after first spray and 15 days after second spray) (1933 kg/ha) and these two treatments were found to have comparable results (Table 55). De-topping manually and a single spray of Mepiquat chloride at 45 ppm during square initiation have increased the seed cotton yield by 10.06 and 10.93 percent over control, respectively. Further, de-topping and Mepiquat chloride spray had no significant effects on quality parameters such as lint index, ginning %, and seed index.

Table 55. Growth characters, yield attributes, seed cotton yield (kg/ha) and quality attributes as influenced by canopy management techniques at Chamarajanagar

Treatments	Plant height (cm) at harvest	Height to node ratio	No. of monopodia at harvest	No. of sympodia at harvest	No of nodes	Number of bolls/ sq. m	Seed Cotton Yield (q/ha)	Lint Index (g)	SeedIndex (g)	Ginning outturn (%)
T_1.Control	131	5.0	0.8	18	25	45	1481	6.7	10.4	39
T_2.Detopping	110	4.6	0.5	14	24	52	1630	6.5	10.5	38
T_3.Mepiquat chloride@45ppm at square initiation	118	4.8	0.6	16	24	54	1643	6.6	10.2	39
T_4.Mepiquat chloride@45ppm at square initiation +Detopping	106	4.6	0.6	15	23	64	1933	6.3	10.2	38
T_5.Mepiquat chloride@45ppm at square initiation and 15 days after first spray	108	4.8	0.5	14	22	61	1759	6.7	10.4	39
T_6.Mepiquat chloride@45ppm at square initiation and 15 days after first spray + Detopping	99	4.5	0.4	14	21	67	2027	6.4	10.2	39
T_7.Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)	100	4.6	0.5	14	21	61	1725	6.8	11.0	38
T_8.Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)+Detopping	98	4.4	0.4	13	21	65	1874	6.3	10.2	38
SEd	5.23	0.35	0.06	1.17	1.17	4.82	109.74	0.27	0.40	0.43
CD (5%)	11.22	0.76	0.14	2.52	2.52	10.33	235.37	NS	NS	NS

Soil pH:8.25, EC:0.36 m mhos cm^{-1}, OC (%): 0.50, N: 232.5 kg/ha, P2O5 : 21.62 kg/ha, K : 756.8 kg/ha, Environment : rainfed, Spacing followed : 90 x 30 cm, Rainfall (mm): 584 mm

NANDYAL

The canopy management trial conducted at Nandyal under rainfed conditions revealed that Significantly higher seed cotton yield (SCY) (2460 kg/ha) was achieved with T_8 (Mepiquat chloride @45ppm at square initiation and 15 days after the first spray and 15 days after the second spray + Detopping) compared to control and detopping treatments, but was statistically on par with other treatments (Table 56). The same treatment T_8 registered lesser plant height of 87 cm and reduced height-to-node ratio (3.0). Whereas T_1. Control recorded significantly higher plant height (122 cm), less number of sympodia at harvest (12) and an increased height-to-node ratio (6.9). The sympodial length (21 mm), number of nodes (24) and number of bolls (49) were observed high in T_4. Mepiquat chloride @45ppm at square initiation +Detopping which was on par with T_6 and T_8.

Table 56.Growth characters, yield attributes and seed cotton yield (kg/ha) as influenced by canopy management techniques at Nandyal

Treatments	Plant height (cm) at harvest	Height-to-node ratio	No. of monopodia at harvest	No. of sympodia at harvest	Sympodial length (mm)	No of nodes	Number of bolls /sq. m	Seed cotton yield (kg/ ha)
T_1.Control	122	6.9	0.5	12	15	18	40	1770
T_2.Detopping	100	4.8	0.3	16	19	21	46	2034
T_3.Mepiquat chloride@45ppm at square initiation	91	4.1	0.2	19	20	22	47	2259
T_4.Mepiquat chloride@45ppm at square initiation +Detopping	94	4.0	0.3	21	21	24	49	2324
T_5.Mepiquat chloride@45ppm at square initiation and 15 days after first spray	91	3.9	0.2	21	20	23	49	2428
T_6.Mepiquat chloride@45ppm at square initiation and 15 days after first spray + Detopping	90	3.8	0.3	20	21	24	47	2364
T_7.Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)	91	3.9	0.3	19	20	23	46	2257
T_8.Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)+Detopping	87	3.0	0.3	18	20	24	46	2460
SEd	6.5	0.2	0.1	1.2	1.0	0.8	2.1	192
CD (5%)	13.4	0.5	0.2	2.6	2.1	1.7	4.3	398

Soil pH: 8.51, Soil Ec:0.47 m mhos cm^{-1}, OC (%): 0.31, Soil bulk density (1.13 g/cm^3), Soil type: Black cotton soils (Vertisols), depth >200 cm & texture-clayey, Available N: 178, P_2O_5 :53.4, K_2O: 365.0 kg/ha, Environment: Rainfed, Spacing followed: 90 x 45 cm, Rainfall (mm) received during cropping periods: 415 mm

COIMBATORE

The canopy management trial conducted at Coimbatore under irrigated conditions revealed that the application of Mepiquat chloride at 45 ppm at square initiation and 15 days after the first spray combined with detopping as well as the application of Mepiquat chloride at 45 ppm at square initiation 15 days after the first spray and 15 days after the second spray (based on need) along with detopping, resulted in significantly higher seed cotton yields (T_8, 2153 kg/ha) compared to other treatments. These treatments were statistically on par with T_6.Mepiquat chloride@45ppm at square initiation and 15 days after first spray + Detopping (2153 kg/ha) . The highest plant height (113.68 cm), increased height to node ratio (7.90) and lesser seed cotton yield (1823 kg/ha) were noticed in T_1. Control. Quality parameters were not significantly influenced by mepiquat chloride application and detopping (Table 57).

Table 57. Growth characters, yield attributes, seed cotton yield (kg/ha) and quality attributes as influenced by canopy management techniques at Coimbatore

Treatments	Plant height (cm) at harvest	Height to node ratio	No. of sympodia at harvest	No. of Bolls/sq. mtr	No of nodes	Seed Cotton Yield (kg/ha)
T_1.Control	113.68	7.90	14.40	70.00	61.40	1823
T_2.Detopping	93.90	6.60	17.10	61.80	53.90	1957
T_3.Mepiquat chloride@45ppm at square initiation	96.40	4.40	14.42	65.00	54.70	1953
T_4.Mepiquat chloride@45ppm at square initiation +Detopping	79.60	4.00	16.34	67.70	59.00	1992
T_5.Mepiquat chloride@45ppm at square initiation and 15 days after first spray	83.90	4.10	12.50	67.30	66.70	1924
T_6.Mepiquat chloride@45ppm at square initiation and 15 days after first spray + Detopping	87.70	4.40	15.70	77.70	66.20	2153
T_7.Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)	88.60	4.10	15.60	76.00	49.90	2000
T_8.Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)+Detopping	84.70	4.60	14.90	80.60	55.00	2153
CD (5%)	2.10	0.68	1.46	1.68	3.55	72

Soil pH value:7.8, Available.N : 224, P_2O_5 : 28, K_2O : 730 kg/ha, O.C.(%) : 0.52, Environment: Irrigated.

SRIVILLIPUTHUR

The canopy management trial conducted at Srivilliputhur under irrigated conditions revealed that detopping treatment (T_2) significantly highest number of monopodia (1.39), sympodia per plant (22) and sympodial length (46 cm). This reduction in height is indicative of effective growth regulation leading to increased branching, a crucial characteristic for enhancing yield potential in crops. The study further revealed that treatments T_6 and T_8 also contributed positively to branching parameters, with T_6 yielding 1.31 monopodia and 21 sympodia per plant while achieving an average height of 103 cm. Importantly, the data suggested a strong correlation between the number of sympodia and subsequent yield potential, indicating that branching characteristics play a pivotal role in overall crop productivity. In addition to the aforementioned parameters, several other critical findings emerged from the study, emphasizing the effectiveness of integrating Mepiquat chloride and detopping in crop management practices. The treatment, T_8.(Mepiquat chloride @45ppm at square initiation and 15 days after first spray and 15 days after second spray +Detopping) yielded the highest crop yield at 2290 kg per hectare, reduced height to node ratio (4.30), less monopodia at harvest (1.07), lesser sympodial length (30 cm), more number of bolls (80.57) and higher ginning out turn (38.67%) , and tenacity (41.33) (Table 58).

Table 58. Growth, yield attributes, seed cotton yield (kg/ha) and quality parameters as influenced by canopy management techniques at srivilliputhur

Treatments	Plant height (cm) at harvest	Height to node ratio	No. of monopodia at harvest	No. of sympodia at harvest	Sympodial length (mm)	No of nodes	Number of bolls/sq.m	Seed Cotton Yield(q/ha)	Ginning outturn (%)	UpperHalf Mean Length (mm)	Uniformity index	Micronaire	Tenacity
T_1.Control	125	5.93	1.24	18	366	17	61	1887	33.93	26.80	79.83	3.10	33.33
T_2.Detopping	109	4.54	1.39	22	457	18	64	1965	35.17	27.20	80.73	3.43	37.00
T_3.Mepiquat chloride@45ppm at square initiation	116	5.38	1.20	20	430	19	65	1932	36.27	27.03	82.27	4.13	39.00
T_4.Mepiquat chloride@45ppm at square initiation +Detopping	108	4.68	1.20	21	417	20	69	2008	34.00	27.27	80.97	3.93	37.33
T_5.Mepiquat chloride@45ppm at square initiation and 15 days after first spray	107	5.22	1.21	20	366	19	71	2083	37.33	27.30	82.00	3.97	38.67
T_6.Mepiquat chloride@45ppm at square initiation and 15 days after first spray + Detopping	103	4.76	1.31	21	336	22	76	2168	35.87	26.87	80.40	3.93	40.33
T_7.Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)	103	4.82	1.14	21	340	22	73	2157	37.47	27.17	80.33	4.00	40.67
T_8.Mepiquat chloride @45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)+Detopping	95	4.30	1.07	22	303	22	81	2290	38.67	27.27	81.23	4.37	41.33
SEd	**2.72**	**0.13**	**0.03**	**0.82**	**19.37**	**1.19**	**1.85**	**28.99**	**0.85**	**0.45**	**1.22**	**0.18**	**0.99**
CD (5%)	**5.82**	**0.28**	**0.06**	**1.75**	**41.05**	**2.55**	**3.96**	**62.04**	**1.82**	**NS**	**NS**	**0.39**	**2.12**

Soil parameters of pH (7.7.), Soil EC 0.6 m mhos cm^{-1}, OC (%): 1.8, available N 190 kg/ha (Low), P_2O_5 45 kg/ha (High) & K_2O 412 kg/ha (High), recommended spacing (90 x 20cm), recommended nutrients (120:80:80 kg/ha NPK), Environment: irrigated and total rainfall (480 mm) during cropping periods.

LAM

The results of canopy management experiments conducted in LAM under rainfed conditions revealed that Plant height, the number of nodes per plant, and plant height to node ratio were significantly affected by the imposed treatments. The data show that there was a reduction of plant height with MC @ 45 ppm application, which further accentuated by the detopping and with twice application of MC combined with detopping resulted in plant height decrement by about 25 cm (T6 78.56 cm) to about 30 cm (T8 73.78 cm) from untreated/unmanipulated control (T1 104.33 cm). Similar effects are seen on nodes per plant and, thereby in the height to node ratio of the plant. These interactions resulted in a significant gain of about 300 kg of seed cotton with double application of MC combined with detopping (T6-1664 kg ha^{-1}, T8 – 1609 kg ha^{-1}) with reference to untreated/unmanipulated control (T1-1299 kg ha^{-1}) (Table 59). However, the applied treatment regime didn't show any significant effect on the Seed Index, Lint Index, Ginning Out Turn and other quality parameters

Table 59 . Growth characters , yield attributes and seed cotton yield (kg/ha) as influenced by canopy management techniques

Treatments	Plant height (cm) at harvest	Height to node ratio	No. of monopodia at harvest	No. of sympodia at harvest	Number of bolls/sq. m	Seed Cotton Yield (kg/ha)
T_1. Control	104.33	6.66	0.44	12.22	43.69	1299
T_2.Detopping	89.11	5.94	0.11	11.89	52.94	1393
T_3. Mepiquat chloride@45ppm at square initiation	90.99	5.95	1.00	11.33	56.71	1454
T_4. Mepiquat chloride@45ppm at square initiation +Detopping	71.78	5.22	0.67	10.11	64.15	1493
T_5. Mepiquat chloride@45ppm at square initiation and 15 days after first spray	88.43	5.69	0.89	11.67	57.12	1599
T_6. Mepiquat chloride@45ppm at square initiation and 15 days after first spray + Detopping	78.56	5.48	0.55	10.78	64.49	1664
T_7.Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based) **Not Imposed**	82.00	5.47	0.44	11.56	55.52	1545
T_8. Mepiquat chloride @45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)+Detopping **Not Imposed**	73.78	5.36	0.22	10.55	62.96	1609
SEd	**3.39**	**5.25**	**0.43**	**0.33**	**5.60**	**83.69**
CD (5%	**7.01**	**0.51**	**NS**	**0.69**	**11.58**	**173.13**

Agronomy X-Use of Defoliants to facilitate mechanical picking

NORTH ZONE

FARIDKOT

The defoliant experiment conducted at Faridkot revealed that either of growth, yield contributing characters and seed cotton yield could not vary significantly among the tested defoliants. However, boll opening under different treatments varied significantly. The data clearly indicated that both defoliation as well as boll opening was differentially affected by applied treatments. Highest boll opening (81.1%) at 10 days after spraying was recorded with CICR defoliant, while defoliation was highest (82.8%) under application of Thidiazuron @ 500ppm. Trash content per kg of SCY (g) was higher (>10%) in treatments having Sodium chlorate (T_4, T_9) and T_{10} indicative of its limited utility for machine picking. Quality parameters as GOT (%), seed index, lint index and halo length varied trivially (Table 60).

Table 60. Growth characters, Boll opening, % defoliation seed cotton yield (kg/ha) and quality parameters under different defoliant treatments

Treatments	Plant height (cm) at harvest	Boll weight (g)	Seed cotton yield (kg/ha)	Boll opening (%) 10 days after spraying	% defoliation		Earliness index (% of first picking from total picking)	Trash content per kg of SCY (g)
					5 days after spraying	10 days after spraying		
T_1.Control	152	4.07	3127	38.6	10.2	16.0	63.0	6.55
T_2.Ethrel @3000 ppm	154	3.93	3270	60.5	40.3	44.7	66.3	7.20
T_3.Thidiazuron @500 ppm	153	3.83	3037	52.0	76.9	82.8	71.6	9.80
T_4.Sodium chlorate @0.9 %	159	3.88	3300	48.6	31.1	37.8	70.0	11.89
T_5.CICR Defoliant	156	3.90	3164	81.1	60.3	66.5	82.6	7.86
T_6.Hydrogen cyanamide @5000 ppm	161	4.05	3164	55.9	50.4	59.0	62.3	8.10
T_7.T2+5% of urea	159	3.71	3436	58.2	39.9	46.8	68.0	7.80
T_8. T_2+Diuron@400 ppm	159	4.03	3139	54.5	51.3	54.8	64.0	9.10
T_9.T_2+Sodium chlorate @0.9 %	158	3.85	3344	63.4	45.4	50.3	72.3	10.75
T_{10}.T_3+Diuron @400ppm	151	4.03	3334	55.0	71.9	78.8	71.8	11.20
SEd	9.4	0.20	339	4.5	3.36	3.4	2.3	-
CD (5%)	NS	NS	NS	9.5	7.0	7.1	4.8	-
CV(%)	7.4	6.40	12	9.7	8.6	7.7	4.1	-

Soil parameters:pH:8.3, EC:0.23 mmhos cm^{-1}, OC (%):0.3, Available P_2O_5:40 kg/ha & Available K_2O: 462 kg/ha, Recommended spacing: 67.5 X 75 cm, Recommended nutrients: 105 kg N and 30 kg P_2O_5/ha, Environment: irrigated; Total rainfall cropping period: 327 mm

BATHINDA

The defoliant experiment conducted at Bathinda revealed that either growth, yield contributing characters and seed cotton yield could not vary significantly among the tested defoliant treatments. However, boll opening under different treatments varied significantly. The data indicated that both defoliation, as well as boll opening, were differentially affected by applied treatments. Quality parameters such as GOT (%), seed index and lint index varied trivially. The highest boll opening was recorded under CICR defoliant (68.4%) followed by Thidiazuron @ 500ppm, while defoliation was highest under Thidiazuron @ 500ppm (85% at 10 days after spraying). Crop earliness was recorded under CICR defoliant (0.77) followed by Thidiazuron @ 500ppm (0.71) (Table 61).

Table 61. Growth characters, Boll opening, % defoliation seed cotton yield (kg/ha) and earliness index under different defoliant treatments

Treatments	Plant height (cm) at harvest	No of bolls/ sqm	Boll weight (g)	Seed cotton yield (kg/ha)	Trash content per kg of SCY (g)	Boll Opening percentage	Per cent defoliation at 5 days after spraying	Per cent defoliation at 10 days after spraying	Earliness index
T_1.Control	176	105	4.2	2272	6.2	28.8	7.7	18.3	0.43
T_2.Ethrel @3000 ppm	177	96	4.3	2319	7.4	59.6	47.0	70.0	0.63
T_3.Thidiazuron @500 ppm	173	101	4.1	2334	7.8	64.5	74.7	85.0	0.71
T_4.Sodium chlorate @0.9 %	-	-	-	-	-	-	-	-	-
T_5.CICR Defoliant	177	108	4.3	2625	7.5	68.4	60.7	73.3	0.77
T_6.Hydrogen cyanamide @5000 ppm	174	94	4.4	2293	7.4	50.5	48.0	65.3	0.52
T_7.T2+5% of urea	169	111	4.4	2616	7.6	61.9	49.0	73.3	0.67
T_8. T_2+Diuron@400 ppm	168	100	4.2	2366	7.8	53.2	43.7	77.0	0.58
T_9.T_2+Sodium chlorate @0.9 %	-	-	-	-	-	-	-	-	-
T_{10}.T_3+Diuron @400ppm	172	108	4.3	2643	7.2	58.8	62.0	80.0	0.64
SEd	9.4	7.2	0.19	166.6	-	2.03	3.59	2.83	0.04
CD (5%)	NS	NS	NS	NS	-	4.3	7.7	6.1	0.08
CV	6.6	8.6	5.5	8.3	-	4.4	8.9	5.1	6.9

Soil parameters: pH:8.76, EC:0.27 m mhos cm^{-1}, OC (%): 0.36, Available N: 146 kg/ha, P_2O_5: 12.2 kg/ha & Available K_2O: 305 kg/ha, Recommended nutrients: 105 kg N /ha, Environment: irrigated; Total rainfall during cropping period: 269 mm

HISAR

The defoliant experiment conducted at Hisar revealed that the tallest plants were observed under treatment T_5 (156 cm), followed by T_{10} and T_3 (150 cm each), though plant height differences were statistically at par. The maximum number of bolls per square meter was recorded under treatment T_9 (95 bolls/m²), statistically at par with T_7 (88 bolls/m²). The highest boll weight was observed under T_9 (3.97 g), statistically comparable to T_7 (3.90 g) and T_6 (3.77 g). The highest seed cotton yield was achieved under treatment T_9 (1641 kg/ha), which was statistically at par with T_7 (1608 kg/ha), T_{10} (1515 kg/ha) T_8 (1507 kg/ha) and T_6 (1481 kg/ha) and these were significantly superior to control (Table 62). Boll opening percentage of 66.67 was recorded higher in T_9. Ethrel @3000 ppm +Sodium chlorate @0.9 %. Per cent defoliation was noticed high in T_{10}. Thidiazuron @500 ppm +Diuron @400ppm. Earliness index of 0.82 was recorded in T_2.Ethrel @3000 ppm.

Table 62. Growth characters, Boll opening, % defoliation seed cotton yield (kg/ha) and earliness index under different defoliant treatments

Treatments	Plant height (cm) at harvest	No of bolls/ sqm	Boll weight (g)	Seed Cotton yield (kg/ha)	Boll Opening percentage	Per cent defoliation		Earliness index
						5 days after spraying	10 days after spraying	
T_1.Control	125	61	3.40	1103	38.15	10.10	12.37	0.49
T_2.Ethrel @3000 ppm	140	60	3.47	1296	53.36	13.02	24.99	0.82
T_3.Thidiazuron @500 ppm	150	62	3.57	1322	46.69	14.97	44.59	0.51
T_4.Sodium chlorate @0.9 %	142	68	3.67	1296	47.80	31.13	47.60	0.65
T_5.CICR Defoliant	156	70	3.67	1313	49.29	26.47	38.55	0.72
T_6.Hydrogen cyanamide @5000 ppm	147	83	3.77	1481	59.50	35.93	41.45	0.58
T_7.T2+5% of urea	148	88	3.90	1608	56.78	15.25	25.10	0.75
T_8. T_2+Diuron@400 ppm	144	79	3.73	1507	54.94	21.72	37.58	0.77
T_9.T_2+Sodium chlorate @0.9 %	137	95	3.97	1641	66.67	26.15	42.68	0.81
T_{10}.T_3+Diuron @400ppm	150	81	3.70	1515	59.29	57.81	62.36	0.55
SEd	**12.63**	**4.87**	**0.27**	**117.22**	**1.90**	**2.40**	**2.30**	**0.08**
CD (5%)	**NS**	**10.32**	**NS**	**248.18**	**4.01**	**4.99**	**4.69**	**0.18**

Soil parameters of pH: 7.8, Soil Ec: 0.16 m mhos cm^{-1}, OC (%): 0.45 , available N 299.6 kg/ha, P_2O_5: 27 kg/ha & K_2O: 332.5 kg/ha, recommended spacing (67.5 x 60 cm), RDF:175:60:60:25 N:P:K:$ZnSo_4$ respectively kg/ha

SRIGANGANAGAR

The defoliant experiment conducted at Sriganganagar revealed that the highest plant height of 225 cm was observed in T_8. Ethrel @3000 ppm +Diuron@400 ppm. The highest seed cotton yield was recorded at 3044 kg/ha with T_5.CICR Defoliant followed by 2949 Kg/ha and 2892 Kg/ha in treatments T_2.Ethrel @3000 ppm and T_3. Thidiazuron @500 ppm. The highest number of bolls (228) were recorded in T_5. CICR Defoliant. The highest boll opening percentage and defoliation at 5 & 10 days after spray were also found in those treatments. A boll weight of 4.2 g was noticed high in T_5.CICR Defoliant. The minimum opening boll percentage and defoliants at 5 & 10 days after spray were found to control than rest of the treatments (Table 63).

Table 63. Growth characters, Boll opening, % defoliation and seed cotton yield (kg/ha)

Treatments	Plant height (cm) at harvest	No. of monopodia at harvest	No. of sympodia at harvest	No. of Bolls/ sqm	Boll weight (g)	Seed cotton Yield (q/ha)	Opening Boll %	% defoliation @ 5 days after spray	% defoliation @ 10 days after spray
T_1.Control	181	1	13	186	4.0	2756	84.3	8.8	9.1
T_2.Ethrel @3000 ppm	174	3	11	185	4.1	2949	87.3	11.0	11.3
T_3.Thidiazuron @500 ppm	196	3	14	188	4.1	2892	86.7	10.4	10.7
T_4.Sodium chlorate @0.9 %	211	2	17	191	3.9	2527	84.4	9.6	9.8
T_5.CICR Defoliant	175	3	10	229	4.2	3044	87.9	12.0	12.4
T_6.Hydrogen cyanamide @5000 ppm	204	1	13	193	4.0	2583	86.2	9.0	9.3
T_7.T2+5% of urea	216	2	13	198	4.0	2790	84.6	9.7	10.0
T_8. T_2+Diuron@400 ppm	226	1	10	200	4.0	2789	86.6	11.0	11.3
T_9.T_2+Sodium chlorate @0.9 %	200	2	13	193	4.0	2378	85.8	10.2	10.6
T_{10}.T_3+Diuron @400ppm	211	2	14	203	4.0	2846	85.6	10.0	10.3
S Ed	7.7	0.4	0.6	6.3	0.1	118.3	1.1	0.5	0.5
CD (5%)	22.8	NS	1.8	18.6	0.2	351.4	NS	1.4	1.4

Soil parameters: Soil pH :7.8, EC:0.59 m mhos cm^{-1}, OC (%): 0.24, Available N : 150 kg/ha, P_2O_5 : 38 kg/ha, K_2O: 354 kg/ha, Environment :irrigated, Rainfall received: 432.3 mm

CENTRAL ZONE -SURAT

The defoliant experiment conducted at Surat revealed that all the growth parameters were non significantly affected with different treatments. The yield attributing characters *viz.*, no. of bolls per sqm and boll weight were also found non significantly affected with different treatments. Seed cotton yield (kg/ha) was non-significantly affected with application of different treatments. Numerically higher seed cotton yield (2202 kg/ha) was recorded in treatment $T_{7.}$ (Ethrel @3000 ppm+5% of urea) followed by T_8 (2138 kg/ha) and T_6(2128 kg/ha). Non-significant effect was found on values of boll opening (%). Defoliation percentage recorded at 5 and 10 days after spray were significantly higher in all defoliant treatment as compare to control (water spray). Treatment T_3 (Thidiazuron @500 ppm) showed significant higher per cent defoliation at 5 days after spray followed by treatments T5 (CICR Defoliant) and T_{10} (Thidiazuron @500 ppm followed by Diuron @400ppm). The treatment T_8 showed significant higher per cent defoliation (89.78%) at 10 days after spray. Highest earliness index (0.90) was recorded in treatment T_3 (Thidiazuron @500 ppm) (Table 64).

Table 64. Growth characters, Boll opening, % defoliation, seed cotton yield (kg/ha) and earliness index under different defoliant treatments

Treatments	Plant height (cm) at harvest	No of bolls/sqm	Boll weigh t (g)	Seed cotton yield (kg/ha)	Boll Opening percentage (%)	Per cent defoliation at 5 days after spraying	Per cent defoliation at 10 days after spraying	Earliness index
T_1.Control	114	55	3.58	1879	90.64	18.77	12.76	0.86
T_2.Ethrel @3000 ppm	115	51	3.63	1836	94.92	92.30	76.59	0.87
T_3.Thidiazuron @ 500 ppm	112	52	3.41	2085	84.84	94.58	74.56	0.90
T_4.Sodium chlorate @0.9 %	116	51	3.62	2080	94.67	64.52	66.48	0.85
T_5.CICR Defoliant	117	55	3.97	1959	84.27	94.22	76.23	0.83
T_6.Hydrogen cyanamide @5000 ppm	117	53	3.54	2128	81.32	89.95	86.40	0.81
T_7.T2+5% of urea	121	54	3.80	2202	93.39	82.49	66.87	0.81
T_8. T_2+Diuron@400 ppm	115	56	3.63	2136	95.74	88.36	89.78	0.81
T_9.T_2+Sodium chlorate @0.9 %	115	46	3.64	2118	84.63	88.78	78.26	0.84
T_{10}.T_3+Diuron @400ppm	115	52	3.82	1828	91.08	92.64	88.79	0.88
SEd	4.84	2.01	0.12	132	4.10	2.99	2.16	0.01
CD (5%)	NS	NS	NS	NS	NS	8.87	6.41	0.03
CV	7.24	6.65	5.84	11.28	7.93	6.41	5.22	1.87

Soil parameters: soil pH:7.96, EC: 0.85m mhos cm^{-1}, OC (%): 0.53, Available N :223 kgN/ha, P_2O_5 : 30.21 kg P_2O_5 /ha, K_2O : 498 K_2O kg/ha, Recommended spacing : 120 x 45 cm , Recommended nutrients: 240-40-00 NPK kg/ha , Cotton species/ type: Intra Hirsutum Bt Cotton hybrid, Environment: Irrigated, Total rainfall: 1335 mm

JUNAGADH

The defoliant experiment conducted at Junagadh revealed that application of different defoliants was not significantly influence plant growth characters, yield attributes and seed cotton yield of *Bt* cotton. The highest seed cotton yield of 3002 kg/ha was observed in T_7. Ethrel @3000 ppm +5% of urea. Significantly the highest defoliation per cent at 5 DAS (33.50) and at 10 DAS (63.50) were recorded with application of Sodium chlorate @ 0.9 % which was statistically at par with treatment T_3, T_9 and T_{10}. The *Bt* cotton earliness index recorded significantly the highest with treatment T_9 *i.e*. ethrel @3000 ppm + sodium chlorate @0.9 %.While different cotton quality parameters were not affected by defoliation treatments (Table 65).

Table 65. Growth characters, Boll opening, % defoliation, seed cotton yield (kg/ha) and earliness index under different defoliant treatments

Treatments	Plant height (cm) at harvest	No of bolls/sq m	Boll weight (g)	Seed cotton yield (kg/ha)	Boll Opening percentage	Per cent defoliation at 5 days after spraying	Per cent defoliation 10 days after spraying	Earliness index	Trash (%)
T_1.Control	144	76	3.97	2884	64.00	5.33	7.83	0.47	2.16
T_2.Ethrel @3000 ppm	127	73	4.24	2995	66.00	16.82	23.57	0.50	2.17
T_3.Thidiazuron @500 ppm	124	65	4.24	2586	67.67	28.02	57.52	0.65	1.83
T_4.Sodium chlorate @ 0.9 %	128	72	4.20	2929	67.41	33.50	63.50	0.69	1.77
T_5.CICR Defoliant	123	68	4.27	2790	66.33	19.47	31.47	0.59	1.98
T_6.Hydrogen cyanamide @5000 ppm	125	63	4.24	2561	66.33	15.80	22.80	0.56	2.57
T_7.T2+5% of urea	125	74	4.08	3002	63.33	18.00	24.80	0.54	2.49
T_8.T_2+Diuron@400 ppm	127	73	4.24	2976	63.00	16.07	23.07	0.57	2.29
T_9.T_2+Sodium chlorate @0.9 %	124	73	4.09	2889	66.67	32.57	62.63	0.70	1.61
T_{10}.T_3+Diuron @400ppm	125	67	4.16	2654	65.67	28.67	55.13	0.67	2.17
SEd	5.85	5.16	0.14	256	3.54	1.85	2.96	0.02	0.29
CD (5%)	NS	NS	NS	NS	NS	5.49	8.81	0.05	NS
CV	7.97	12.66	5.63	15.71	9.35	14.94	13.79	6.22	23.48

Soil parameters of pH:7.70, Soil Ec: 0.45 m mhos cm^{-1}, OC 0.83 %, available 301 kg/ha N, P_2O_5 36.78 kg/ha & K_2O 311 kg/ha, recommended spacing 120 x 45 cm, recommended nutrients 240-50-150 NPK kg/ha, Cotton species/type G.Cot.Hy-24 BG-II, environment: irrigated and total rainfall 2296.30 mm during cropping periods

AKOLA

The defoliant experiment conducted at Akola revealed that significantly maximum plant height was recorded in the control plot (125.0 cm) where none of the defoliant was sprayed. The lowest plant height of 106.7 cm was recorded in the T_{10} treatment (Thidiazuron @ 500 ppm + Diuron @400 ppm). However, it was found significantly at par with T_2 to T_9 at different spraying of defoliants. Application of defoliant mixture of Thidiazuron @ 500 ppm + Diuron @ 400 ppm (T_{10}) recorded significantly higher number of bolls (174.7) per sq. meter as compared to other defoliant treatments and control. Boll weight was found non-significant. The significantly highest seed cotton yield of 2663 Kgha^{-1} was registered with Thidiazuron @ 500 ppm + Diuron @ 400 ppm which was followed by seed cotton yield of 2594 Kgha^{-1}, 2587 Kgha^{-1} and 2548 Kgha^{-1} in treatment of T_3 (Thidiazuron@500 ppm), T_9 (Ethrel @ 3000 ppm+ Sodiam chlorate @0.9% and T_8 (Ethrel @ 3000 ppm + Diuron 400 ppm) respectively which might be due to improved boll retention and numerically maximum boll weight in these treatments. The lowest seed cotton yield (2212 Kgha^{-1}) was recorded in the control. The percent increase in yield of T_{10}, T_3, and T_9 over control was 16.9 %, 14.7 and 14.5 % respectively. Application of Thidiazuron @ 500 ppm + Diuron @400 ppm registered the highest percentage of defoliation at 5 days after application of defoliant (67.7%) and 10 days after application of defoliant (94.8 %) followed by 64.7 % and 63.2 % defoliation in T_3 (Thidiazuron @ 500 ppm) and T_5 (CICR defoliant) at 5 days after spraying. Similar trend of defoliation was observed at 10 days after defoliant spray. The highest boll opening percentage was recorded in defoliant spray of Thidiazuron @ 500 ppm + Diuron @400 ppm (T_{10}) where 96.8 % bolls opening was observed followed by 95.1 % and 94.5 % boll opening in T3 i.e. Thidiazuron @ 500 ppm and CICR defoliant. (T_5) respectively which were found at par with each other. Significantly, higher earliness index of 0.73 was registered in T10 i.e. defoliant spray of Thidiazuron @ 500 ppm + Diuron @400 ppm followed by 0.71 in T_3 (Thidiazuron @ 500 ppm) which was found significantly superior to control treatment (Table 66).

Table 66. Growth characters, Boll opening, % defoliation, seed cotton yield (kg/ha) and earliness index under different defoliant treatments

Treatments	Plant height (cm) at harvest	No of bolls/ sqm	Boll weight (g)	Seed cotton yield (kg/ha)	Boll Opening per-centage	Per cent defoliation at		Earliness index
						5 days after spraying	10 days after spraying	
T_1 : Control	125	148	5.1	2212	80.5	6.1	13.0	0.50
T_2 : Ethrel @3000 ppm	112	157	5.3	2435	94.8	62.6	87.8	0.66
T_3 : Thidiazuron @500 ppm	108	164	5.3	2594	95.1	64.7	90.3	0.71
T_4 : Sodium chlorate @0.9 %	110	158	5.3	2409	91.4	58.8	86.8	0.60
T_5. : CICR Defoliant	109	154	5.3	2367	94.5	63.2	89.3	0.70
T_6 : Hydrogen cyanamide @5000 ppm	112	155	5.3	2394	90.0	59.8	85.8	0.57
T_7 :T_2+5% of urea	111	158	5.3	2448	89.9	61.9	87.8	0.69
T_8 : T_2+Diuron@400 ppm	110	159	5.3	2548	90.2	58.5	86.9	0.70
T_9 : T_2+Sodium chlorate @0.9 %	111	161	5.3	2587	90.4	57.1	84.0	0.67
T_{10} :T_3+Diuron @400ppm	107	175	5.3	2663	96.8	67.7	94.8	0.73
SEd	3.9	5.1	0.1	99.2	2.0	3.3	3.5	0.02
CD (5%)	8.2	10.8	NS	208.4	4.1	7.0	7.3	0.03

Soil parameters : pH value: 7.80, EC: 0.13 m mhos cm^{-1}, O.C.(%) : 3.90, Available N : 264 kg/ha, P_2O_5 : 16.8 kg/ha, K_2O : 405 kg/ha,Recommended spacing: 90x15 cm, Recommended Fertilizer dose: 90:45:45 Kg NPK/ha, Environment: Rainfed, Cotton Species: RASI-971 Swift Bt hybrid (BG-II), Total Rainfall during Cropping period: 955.1 mm in 44 rainy days

KHANDWA

The defoliant experiment conducted at Khandwa revealed that plant height, Boll weight, Boll opening percentage (%) and Earliness index shows non-significant results. The highest plant height of 150 cm was observed in T_9: Ethrel @ 3000 ppm + Sodium chlorate @ 0.9 %. The higher number of boll per metre square was noticed in T_8: Ethrel @ 3000 ppm + Diuron@ 400 ppm (71.85). Significantly the highest seed cotton yield of 1840 kg/ha was registered in T_3: Thidiazuron @ 500 ppm. Higher Percent defoliation of 52.93 at 5 days after spraying and 54.49 at 10 days after spraying were found in T_9: Ethrel @ 3000 ppm + Sodium chlorate @ 0.9 %. The least defoliation percent was noticed in T_1: Control (Table 67).

Table 67. Growth characters, Boll opening, % defoliation, seed cotton yield (kg/ha) and earliness index under different defoliant treatments

Treatments	Plant height (cm) at harvest	No. of Bolls/ SQM	Boll weight (g)	Seed cotton Yield (kg/ ha)	Boll opening percentage (%)	Percent defoliation at 5 days after spraying	Percent defoliation at 10 days after spraying	Earliness index
T_1: Control	135	69	4.3	1553	79.7	2.6	3.9	0.35
T_2: Ethrel @ 3000 ppm	140	58	4.5	1225	75.1	45.8	50.0	0.59
T_3: Thidiazuron @ 500 ppm	139	48	4.2	1840	78.7	40.1	43.2	0.43
T_4: Sodium chlorate @ 0.9 %	137	55	4.3	1316	81.2	36.1	40.6	0.41
T_5: CICR Defoliant	121	58	4.0	1476	84.2	50.0	52.8	0.45
T_6: Hydrogen cyanamide @ 5000 ppm	132	62	4.0	1572	76.8	41.7	44.6	0.58
T_7: T_2 + 5% of urea	146	53	4.4	1399	78.2	38.8	42.4	0.47
T_8: T_2 + Diuron@ 400 ppm	143	72	4.3	1163	84.0	46.0	50.1	0.44
T_9: T_2 + Sodium chlorate @0.9 %	150	58	4.3	1505	80.2	52.9	54.5	0.51
T_{10}: T_3 + Diuron @ 400 ppm	128	70	4.2	1665	82.9	34.8	37.5	0.46
SEd	14.2	3.4	0.15	132.5	4.4	6.1	6.3	0.09
CD (5%)	NS	7.2	NS	278.3	NS	12.8	13.2	NS

Soil parameters: pH: 7.5, EC : 0.55 m mhos cm^{-1}, OC (%): 0.58, Available N: 240.7 kg/ha, P_2O_5: 15.8 kg/ha & K_2O: 375.56 kg/ha, Recommended spacing: 90 X 60 cm, Recommended dose of nutrients: NPK @ 125:60:40 kg/ ha, Environment – Irrigated and total rainfall (mm) during cropping periods – 788 mm. Uneven distribution of rainfall was observed. Water logging and drought spells were occurred during early growth and flowering period.

BHAWANIPATNA

The defoliant experiment conducted at Bhawanipatna revealed that different growth and yield parameters and seed cotton yield were significantly affected by different treatments. Growth characters

like plant height of cotton (105cm), No. of bolls/m^2 (36), boll weight (4.01) seed cotton yield (2855 kg/ha), Per cent defoliation at 5 days after spraying (67.80) and Per cent defoliation at 10 days after spraying (92.73) were significantly higher in T_{10} (Thidiazuron @500 ppm + Diuron @400ppm). The next best seed cotton yield (2648 kg/ha) was recorded in T_8 i,e. Ethrel 3000ppm + diuron 400 ppm. The minimum seed cotton yield (1817 kg/ha) was obtained in T_1 (Control). Boll Opening percentage was recorded high in T_4. Sodium chlorate @0.9 % (67.53) (Table 68).

Table 68. Growth characters, Boll opening, % defoliation and seed cotton yield (kg/ha) under different defoliant treatments

Treatments	Plant height (cm) at harvest	No of bolls/ sqm	Boll weight (g)	Seed cotton yield (kg/ha)	Boll Opening percentage	Per cent defoliation at 5 days after spraying	Per cent defoliation at 10 days after spraying
T_1.Control	104	37	3.81	1817	63.81	4.77	6.00
T_2.Ethrel @3000 ppm	105	37	4.00	2375	61.95	45.47	73.07
T_3.Thidiazuron @500 ppm	102	31	3.85	2442	54.48	61.13	88.73
T_4.Sodium chlorate @ 0.9 %	104	44	4.13	2020	67.53	46.02	73.62
T_5.CICR Defoliant	103	37	4.11	1917	61.80	45.83	75.97
T_6.Hydrogen cyanamide @5000 ppm	100	34	3.85	1909	58.16	47.43	75.03
T_7.T2+5% of urea	101	36	4.01	2020	60.52	47.07	74.67
T_8. T_2+Diuron@400 ppm	102	32	3.95	2648	56.35	65.13	92.73
T_9.T_2+Sodium chlorate @0.9 %	102	30	3.74	2233	53.14	54.20	81.80
T_{10}.T_3+Diuron @400ppm	105	36	4.01	2855	60.73	67.80	95.40
SEd	2.81	2.47	0.11	181.14	2.80	1.90	1.83
CD (5%)	**5.91**	**5.19**	**0.22**	**380.56**	**5.89**	**3.99**	**3.84**

Soil parameters: soil pH: 6.3, Available N: 130 kg/ha, P_2O_5 : 36.5 kg/ha , K_2O: 254 kg/ha, Genotype of cotton: Keshari (Kalash seeds), Spacing followed: 90 x 60 cm rainfall during cropping period: 992.6 mm

RAHURI

The defoliant experiment conducted at Rahuri revealed that higher plant height (135),no of boll per sqm. (35) and No of sympodia/ plant (18) was recorded in T_1 (Control). Among the defoliation treatments higher plant height (136 cm) was recorded in treatment T_2 (Ethrel @3000 ppm) and higher number of sympodia/plant (16.00) was recorded in treatment T_9 (T_2+Sodiumchlorate @0.9%) followed by treatment T_7 *i.e* (T_2+5% of urea) (15.53).Higher boll weight of 5.43 g was recorded in T_4.Sodium chlorate @0.9 %. Significantly higher Seed cotton yield (1868 kg/ha) was recorded in T_4.Sodium chlorate @0.9 % followed by T_{10}.T_3+Diuron @400ppm (1734 kg/ha). Boll opening percentage (92.17%) was recorded highest in T_{10} (T_3+Diuron @400ppm). Percent defoliation was also recorded maximum in T_{10} (T_3+Diuron @400ppm) (97.5%), it was followed by T_5.CICR Defoliant (95.9). Higher seed index (12.00g) was recorded in the treatment T_1,T_5,T_7.T_8, T_9 and T_{10}, . Lint index (4.67) was found higher in T_5*i.e* CICR Defoliant followed by T_{10} (T_3+Diuron @400ppm) (4.63) (Table 69).

Table 69. Growth characters, Boll opening, % defoliation, seed cotton yield (kg/ha), earliness index and quality attributes under different defoliant treatments

Treatments	Plant height (cm) at harvest	No. of sympodia at harvest	Boll weight (g)	Seed cotton yield (kg/ha)	No of bolls/ sqm	Boll Opening percentage	Per cent defoliation at 5 and 10 days after spraying	Earliness Index	Trash analysis	Lint Index(g)	Seed Index (g)
T_1.Control	135	18	4.6	1618	35	71.4	16.4	0.46	5.18	4.51	12
T_2.Ethrel @3000 ppm	136	15	5.3	1651	33	83.3	86.8	0.55	6.35	4.04	10
T_3.Thidiazuron @500 ppm	120	16	4.9	1489	31	90.6	94.9	0.60	7.82	4.20	11
T_4.Sodium chlorate @0.9 %	136	15	5.4	1868	35	86.5	88.2	0.58	6.37	4.30	11
T_5.CICR Defoliant	118	15	4.9	1671	34	89.6	95.9	0.57	7.64	4.67	12
T_6.Hydrogen cyanamide @5000 ppm	117	13	4.8	1399	31	81.8	81.7	0.58	7.05	3.86	10
T_7.T2+5% of urea	120	16	4.5	1416	33	88.8	85.1	0.63	5.28	4.81	12
T_8. T_2+Diuron@400 ppm	126	15	5.0	1303	27	85.5	86.9	0.61	6.75	4.52	12
T_9.T_2+Sodium chlorate @0.9 %	121	16	4.6	1488	32	87.0	88.2	0.62	10.12	4.59	12
T_{10}.T_3+Diuron @400ppm	112	16	4.9	1735	36	92.2	97.5	0.65	8.75	4.63	12
SEd(±)	2.5	0.7	0.1	80	0.8	2.9	**1.08**	**0.02**	**0.32**		
CD (5%)	7.5	2.2	0.3	237	2.4	8.5	**3.20**	**0.05**	**0.94**		

Soil pH: 7.7, Ec: 0.33 mmhos cm^{-1}, OC (%) : 0.49, available N : 163 kg/ ha, P_2O_5 : 19 kg/ ha, K_2O : 538 kg/ ha, Environment: Irrigated, Recommended spacing: 90 x 90 cm, Total Rainfall (mm) received during cropping periods: 836.4mm

NANDED

The defoliant experiment conducted at Nanded revealed that all the plant growth and yield contributing characters as well as seed cotton yield were not influenced statistically due to spraying of defoliants. Seed cotton yield of 2952 kg/ ha was observed high in T_7. Ethrel @3000 ppm +5% of urea. Boll opening percentage was significantly increased in CICR Defoliant (95.03%) treatment over control. All the defoliant spray treatments have increased defoliation over control and highest defoliation percentage at 10 days after spray was observed in Thidiazurion @ 500 ppm + diuron @ 400 ppm (81.06%) followed by Thidiazuron @ 500 ppm alone (67.22%). Lower defoliation was observed in Ethrel spray (T2, T7 and T8) (Table 70).

Table 70. Growth characters, Boll opening, % defoliation, seed cotton yield (kg/ha) and earliness index under different defoliant treatments

Treatments	Plant height (cm) at harvest	No. of sympodia at harvest	No of bolls/ sqm	Boll weight (g)	Seed cotton yield (kg/ha)	Boll Opening percentage	Per cent defoliation at 5 and 10 days after spraying	Earliness index
T_1.Control	166	35	62	4.46	2788	78.50	19.51	0.91
T_2.Ethrel @3000 ppm	173	33	58	4.84	2910	79.16	38.15	0.89
T_3.Thidiazuron @500 ppm	166	33	64	4.83	2936	79.45	67.22	0.90
T_4.Sodium chlorate @0.9 %	-	-	-	-	-	-	-	-
T_5.CICR Defoliant	162	32	60	4.33	2648	95.03	66.06	0.97
T_6.Hydrogen cyanamide @5000 ppm	172	33	60	4.84	2872	77.69	55.57	0.86
T_7.T2+5% of urea	164	34	65	4.58	2952	84.44	45.83	0.86
T_8. T_2+Diuron@400 ppm	170	33	63	4.68	2906	82.82	37.27	0.92
T_9.T_2+Sodium chlorate @0.9 %	-	-	-	-	-	-	-	-
T_{10}.T_3+Diuron @400ppm	164	31	64	4.48	2891	84.35	81.06	0.91
SEd	8.53	2.81	4.65	0.34	230.9	4.65	5.36	0.03
CD (5%)	N.S.	N.S.	N.S.	N.S.	N.S.	9.98	11.50	0.06

Soil properties : pH: 8.06, EC: 0.24 m mhos cm^{-1}, OC (%): 0.42, Available N: 136.8 kg/ ha, Av. P_2O_5: 11.386 kg/ ha, Av. K_2O:465.4 kg/ ha, Recommended spacing: 120 x 45 cm, Cotton type:*Bt* hybrid, Environment: Rainfed, Total rainfall during season: 1233.8 mm

SOUTH ZONE

RAICHUR

The defoliant experiment conducted at Raichur revealed that Significantly higher seed cotton yield (2972 kg/ha) was recorded in T_{10} (Thidiazuron @500 ppm + Diuron @ 400ppm) compared to all other treatments which were mainly attributed to the higher number of bolls per sq.m. (160), more boll weight (5.11 g), higher boll opening % (94.2%) and higher percent defoliation (94.0%). The control plot recorded higher plant height of 138 cm and sympodia of 24. The lowest seed cotton yield of 1895 kg/ha was recorded in control (T_1). T_1 also registered lesser boll opening percentage (70.5 %) and less percent defoliation (Table 71).

Table 71. Growth characters, Boll opening percentage, percentage defoliation and seed cotton yield (kg/ha) under different defoliant treatments

Sl. No.	Treatments	Plant height (cm) at harvest	No. of sympodia at harvest	No of bolls/sqm	Boll weight (g)	Seed cotton yield (kg/ha)	Boll Opening percentage	Per cent defoliation (Days after spraying) 5 Days	Per cent defoliation (Days after spraying) 10 Days
1.	T_1.Control	138	24	105	4.73	1895	70.5	4.3	5.2
2.	T_2.Ethrel @3000 ppm	116	18	118	4.86	2200	89.2	16.0	19.1
3.	T_3.Thidiazuron @500 ppm	118	18	131	4.84	2446	89.5	73.6	88.4
4.	T_4.Sodium chlorate @0.9 %	120	18	102	4.82	2336	87.2	34.2	41.1
5.	T_5.CICR Defoliant	123	18	112	4.87	2433	91.4	76.0	91.2
6.	T_6.Hydrogen cyanamide @5000 ppm	126	18	124	4.94	2420	88.6	28.3	32.6
7.	T_7.T2+5% of urea	122	18	85	5.01	2296	81.6	31.7	36.5
8.	T_8.T_2+Diuron@400 ppm	127	19	93	5.04	2421	87.5	26.4	30.4
9.	T_9.T_2+Sodium chlorate @0.9 %	127	16	101	5.13	2368	88.8	30.5	35.0
10.	T_{10}.T_3+Diuron @400ppm	120	16	160	5.11	2972	94.2	81.8	94.0
	S. Em±	**7.6**	**1.4**	**6.7**	**0.17**	**150**	**1.8**	**2.1**	**2.5**
	C. D. at 5%	**22.5**	**4.0**	**19.8**	**NS**	**446**	**5.2**	**6.3**	**7.4**

Soil pH value:8.03, available N : 285kg/ha, P_2O_5 : 35kg/ha, K_2O : 308kg/ha, O.C.(%) : 0.47, Environment:irrigated

DHARWAD

The defoliant experiment conducted at Dharwad revealed that T_9 (Ethrel @3000 ppm + Sodium chlorate @0.9%) produced the highest yield (2475 kg/ha) while also maintaining a balanced number of monopodia (2.9) and boll weight (5.8 g) and was onpar with T_3 (Thidiazuron @500 ppm), which resulted in a yield of 2367 kg/ha, showed a relatively higher monopodia count (3.2) and good boll weight (5.4 g), suggesting that Thidiazuron promotes better boll formation but may also lead to more unproductive monopodia.T_2 (Ethrel @3000 ppm) and T_6 (Hydrogen cyanamide @5000 ppm), with yields of 2301 kg/ha and 2347 kg/ha, respectively, demonstrated improved boll number (123.9 and 123.7 bolls/sqm) and boll weight (5.6 g),

indicating that both treatments are effective in improving cotton yield by enhancing boll size and production. T_4 (Sodium chlorate @0.9%) and T_5 (CICR Defoliant) showed a moderate yield (2312 kg/ha and 2334 kg/ha), with boll numbers around 120 bolls/sqm and boll weights averaging around 5.0-5.2 g, suggesting that while they improve yield, their impact on boll size and overall yield is slightly less pronounced than the top-performing treatments.The combination of Ethrel and Sodium chlorate not only enhanced boll opening (95.2%) and defoliation (68% at 5 days) but also resulted in the most profitable outcome. This treatment maintained a good earliness index (53.2), which suggests timely harvesting. T4 (Sodium chlorate @0.9%) also performed well, showing a higher net return (Rs 147,177.4) and benefit-cost ratio (2.19), though it had a slightly lower boll opening (93.6%) compared to T9. On the other hand, T3 (Thidiazuron @500 ppm), while excelling in boll opening (98.1%) and defoliation (75.4% at 5 days), had a lower net return (Rs 136,837) and a benefit-cost ratio (1.80), suggesting that its higher defoliation did not translate into as profitable an outcome due to its higher cultivation costs. T2 (Ethrel @3000 ppm) also showed good results with a net return of Rs 140,927 and benefit-cost ratio of 2.13, making it a profitable treatment, though its boll opening (95.3%) and defoliation (67.8% at 5 days) were not as high as some other treatments.

Overall, treatments that combined Ethrel with other chemicals, especially Sodium chlorate, offered the best balance of high yield, early harvesting, and economic profitability. T6 (Hydrogen cyanamide @5000 ppm) emerged as the top performer in terms of Lint Index (5.50 g), but it showed a trade-off with smaller seed size and similar fiber length to other treatments. T9 (Ethrel @3000 ppm + Sodium chlorate @0.9%) offered the best combination of high seed index (13.0 g) and solid fiber quality, making it a strong choice for both yield and seed quality. T3 (Thidiazuron @500 ppm) and T10 (T3+Diuron @400ppm) performed well in terms of tenacity and elongation, suggesting they might be suitable for producing stronger fibers with good stretchability, though they had slightly lower lint indices. Overall, T9 seems to strike the best balance between fiber quality, seed quality, and yield parameters. The combination of ethrel and sodium chlorate likely enhanced boll number and size, leading to a substantial increase in yield. T3 (Thidiazuron @500 ppm) also showed strong performance with a yield of 2367 kg/ha, driven by its ability to promote taller plants and a higher number of sympodia, contributing to a greater boll count (Table 72).

Table 72. Growth characters, Boll opening %, % defoliation, seed cotton yield (kg/ha) and quality attributes under different defoliant treatments

Treatments	Plant height (cm) at harvest	No of bolls/sqm	Boll weight (g)	Seed cotton yield (kg/ha)	Boll Opening percentage	Per cent defoliation at 5 days after spraying	Per cent defoliation at 10 days after spraying	Earliness index	Trash analysis (%)	Lint Index (g)	Seed Index (g)	Upper Half Mean Length (mm) undue HVIMode	Micronaire (10^{-6} g/in)	Tenacity 3.2 mm (g/tex)	Elongation (%)
T_1.Control	148	118	4.9	2169	87.8	5.00	7.04	56.40	1.5	3.91	12.0	30.1	3.9	30.0	5.8
T_2.Ethrel @3000 ppm	158	124	5.6	2301	95.3	67.8	79.3	53.10	1.7	4.00	12.5	30.8	4.0	30.8	5.8
T_3.Thidiazuron @500 ppm	168	135	5.4	2367	98.1	75.4	98.0	49.50	1.8	3.87	12.3	30.6	3.9	30.2	6.0
T_4.Sodium chlorate @0.9 %	156	121	5.0	2312	93.6	65.8	85.9	54.60	1.4	3.83	12.0	30.6	3.6	30.6	5.9
T_5.CICR Defoliant	158	122	5.2	2334	97.5	72.7	96.0	52.30	1.9	3.93	12.5	30.3	3.8	30.2	5.8
T_6.Hydrogen cyanamide @5000 ppm	164	124	5.2	2347	97.7	70.0	89.0	51.20	1.6	5.50	11.5	30.6	3.7	30.6	5.9
T_7.T2+5% of urea	162	129	4.9	2238	91.4	66.8	87.9	54.90	1.8	3.78	12.0	29.8	3.9	30.0	5.9
T_8. T_2+Diuron@400 ppm	163	136	5.6	2356	97.9	69.5	94.0	50.30	1.9	3.74	12.0	30.3	4.0	30.5	5.8
T_9.T_2+Sodium chlorate @0.9 %	154	158	5.8	2475	95.2	68.0	93.0	53.20	1.7	4.22	13.0	30.6	4.2	30.6	5.9
T_{10}.T_3+Diuron @400ppm	160	151	5.7	2393	97.7	70.3	95.0	51.80	1.8	3.90	12.4	30.5	3.9	30.4	6.0
SEd	13.6	6.8	0.27	120	7.33	5.24	5.51	3.32	0.09	0.14	0.67	1.56	0.20	1.56	0.30
CD (5%)	28.5	14.3	0.58	252	15.41	11.01	11.57	6.97	0.18	0.29	NS	NS	NS	NS	NS

Soil pH value:7.5, available N :256 kg/ha, P_2O_5 : 34 kg/ha, K_2O : 515 kg/ha, O.C.(%):0.54, Spacing followed: 90X30cm

NANDYAL

The defoliant experiment conducted at Nandyal revealed that higher plant height was observed in T_2.Ethrel @3000 ppm (140 cm). Significantly higher seed cotton yield (SCY) (2602 kg/ha) was achieved with T_3 (Thidiazuron @500 ppm) compared to control and ethrel treatments. T_1.Control registered lesser yield of 1952 kg/ha. The highest number of bolls (63) and high boll weight (5.57) were observed in T_3.Thidiazuron @500 ppm. Boll Opening percentage of 73.2 % was recorded in T_2.Ethrel @3000 ppm. The percent defoliation at 5 days after spraying (73.2%) and 10 days after spraying (95.5%) were registered high in T_3.Thidiazuron @500 ppm. The high earliness index of 75 was noticed in T_{10}.T_3+Diuron @400ppm (Table 73).

Table 73.Growth characters, Boll opening percentage, percentage defoliation, seed cotton yield (kg/ha) and earliness index under different defoliant treatments

Treatments	Plant height (cm) at harvest	Seed cotton yield (kg/ha)	No of bolls/sqm	Boll weight (g)	Boll Opening percentage	Per cent defoliation at 5 days after spraying	Per cent defoliation at 10 days after spraying	Earliness index	Soil moisture content (%) on defoliant applied week
T_1.Control	126	1952	50	4.91	66.8	3.7	5.3	38	31.1
T_2.Ethrel @3000 ppm	140	2386	61	5.17	73.2	13.8	59.1	51	32.2
T_3.Thidiazuron @500 ppm	129	2602	63	5.57	67.0	73.2	95.5	72	29.0
T_4.Sodium chlorate @0.9 %	117	2167	56	5.03	66.2	53.3	80.9	65	31.0
T_5.CICR Defoliant	117	2280	54	5.23	6.0	65.8	86.2	60	30.0
T_6.Hydrogen cyanamide @5000 ppm	132	2229	58	5.20	65.8	22.7	55.6	55	31.0
T_7.T2+5% of urea	116	2447	58	5.27	71.2	28.2	65.6	54	32.0
T_8. T_2+Diuron@400 ppm	138	2339	56	5.03	66.8	52.3	77.5	59	30.0
T_9.T_2+Sodium chlorate @0.9 %	118	2257	58	5.27	4.4	53.4	89.5	60	32.0
T_{10}.T_3+Diuron @400ppm	116	2555	60	5.10	3.5	72.5	93.1	75	31.0
SEd	7.4	162	1.6	0.16	2.8	4.4	2.8	1.5	0.6
CD (5%)	NS	331	3.3	0.33	5.7	9.0	5.8	3.0	1.3

Soil pH:8.51, OC (%): 0.31, Soil bulk density: 1.13g/cm^3, Available N: 182, P_2O_5 : 52.4, K_2O : 372 Kg/ha, Environment: Rainfed, Spacing followed: 90 cm x 45 cm, Rainfall (mm) received during cropping periods: 415 mm

COIMBATORE(TNAU)

The defoliant experiment conducted at Coimbatore revealed that the higher plant height (105.7), higher number of bolls (132.3) and boll weight (5.1) were observed in T_8. Ethrel @3000 ppm +Diuron@400 ppm. Whereas similar plant height of 105 cm and higher number of monopodia (17.7) were found in T_{10}.Thidiazuron @500 ppm +Diuron @400ppm. The higher seed cotton yield (2042.3 kg/ha) was recorded with T_{10}. Thidiazuron @500 ppm +Diuron @400ppm. The same treatment T_{10} registered higher boll opening percentage of 97.8%, Per cent defoliation at 5 days after spraying (94.8%) and Per cent defoliation at 10 days after spraying (96.2%). T_1.Control recorded lesser boll opening percentage and less defoliation percentage (Table 74).

Table 74. Growth and yield characters, Boll opening %, % defoliation and seed cotton yield (kg/ha) under different defoliant treatments

Treatments	Plant height (cm) at harvest	No. of sympodia at harvest	No of bolls /sqm	Boll weight (g)	Seed cotton yield (kg/ha)	Boll Opening percentage	Per cent defoliation at 5 days after spraying	Per cent defoliation at 10 days after spraying
T_1.Control	94	14	111	4.5	1784	84.5	28.7	29.7
T_2.Ethrel @3000 ppm	78	16	110	4.0	1815	92.8	81.3	82.3
T_3.Thidiazuron @500 ppm	83	14	131	4.2	1924	92.3	84.1	92.7
T_4.Sodium chlorate @0.9 %	91	15	107	4.6	1794	90.8	72.7	73.7
T_5.CICR Defoliant	99	15	112	4.6	1748	87.8	91.7	85.1
T_6.Hydrogen cyanamide @5000 ppm	102	15	110	4.5	1751	92.1	66.2	67.2
T_7.T2+5% of urea	104	15	119	4.2	1872	89.2	76.1	77.1
T_8. T_2+Diuron@400 ppm	106	17	132	5.1	1972	94.2	83.3	84.3
T_9.T_2+Sodium chlorate @0.9 %	92	16	112	4.0	1719	93.8	80.7	81.7
T_{10}.T_3+Diuron @400ppm	105	18	122	5.9	2042	97.8	94.8	96.2
SEd	7.55	1.71	9.96	0.54	40.94	2.03	1.64	1.62
CD (5%)	15.45	3.49	20.38	1.09	83.74	4.16	3.36	3.31

Soil pH: 7.8,Available N : 224, P_2O_5 : 28, K_2O : 730 kg/ha, O.C.(%) : 0.52, Environment: Irrigated

SRIVILLIPUTHUR

The defoliant experiment conducted at Srivilliputhur revealed that amongst treatment, T10, which included Diuron with Thidiazuron, achieved the highest seed cotton yield of 2220 kg/ha. The control treatment (T1) recorded the least boll opening percentage of 86.37%. The combination of Thidiazuron with Diuron (T10) led to notable levels of boll opening at 93.47% and the most substantial defoliation at 82.67% after five days. Among the treatments, the combination of Thidiazuron at 500 ppm with Diuron at 400 ppm (T10) achieved the highest lint index at 6.8 g and a superior seed index of 12.6 g. This treatment also exhibited the highest ginning outturn at 41.3%, along with an Upper Half Mean Length of 28.4 mm, The same treatment achieved a remarkable uniformity index of 84.7 and a tenacity of 42.3, reflecting consistent fiber strength and quality(Table 75).

Table 75. Growth and yield characters, Boll opening %, % defoliation and seed cotton yield (kg/ha) under different defoliant treatments

Treatments	Plant height (cm) at harvest	No. of sympodia at harvest	No of bolls/ sqm	Boll weight (g)	Seed cotton yield (kg/ha)	Boll Opening percentage	% defoliation at 5 days after spraying	% defoliation at 10 days after spraying	Earliness index	Trash analysis (%)	Lint Index (g)	Seed Index (g)	Ginning out turn (%)	UHML (mm)	Uniformity index	Micronaire	Tenacity
T_1 - Control	98	17	66	4.82	1929	86.37	4.33	6.33	0.64	1.8	5.4	10.6	33.9	26.0	79.8	3.2	36.0
T_2 - Ethrel @3000 ppm	102	18	73	4.97	1955	90.37	20.00	62.00	0.70	1.9	5.9	11.2	35.3	26.8	80.7	3.4	37.7
T_3 -Thidiazuron @500 ppm	106	18	74	5.22	1908	91.37	68.33	76.67	0.73	1.7	6.4	10.9	35.5	26.8	83.5	4.0	39.7
T_4 - Sodium chlorate @0.9 %	106	19	79	5.11	1960	91.67	35.33	62.00	0.63	2.3	5.8	11.3	23.2	27.0	81.2	4.0	37.3
T_5 - CICR Defoliant	110	19	77	5.43	2150	91.60	75.67	89.00	0.72	2.0	6.2	11.8	36.3	27.3	81.2	3.8	38.3
T_6 - Hydrogen cyanamide @5000 ppm	109	21	87	5.60	1955	90.90	33.67	64.33	0.68	2.6	6.3	11.1	35.2	26.9	81.0	4.0	41.3
T_7 - T2+5% of urea	113	22	89	5.47	2141	91.40	39.67	75.33	0.73	2.5	6.1	11.0	37.2	26.7	80.7	3.9	42.0
T_8 - T_2+Diuron@400 ppm	110	22	86	5.47	1950	93.50	39.00	74.67	0.65	2.3	6.4	11.0	38.8	26.9	81.2	4.3	41.3
T_9 -T_2+Sodium chlorate @0.9 %	112	22	85	5.31	2093	91.50	44.33	78.00	0.78	2.3	6.7	12.0	39.7	27.5	83.4	4.7	41.3
T_{10} - T_3+Diuron @400ppm	111	24	87	5.40	2220	93.47	82.67	91.33	0.63	2.2	6.8	12.6	41.3	28.4	84.7	4.8	42.3
SEd	**1.9**	**1.3**	**4.4**	**0.17**	**103.2**	**1.22**	**2.57**	**2.38**	**0.06**	**0.22**	**0.24**	**0.54**	**5.16**	**1.14**	**1.48**	**0.19**	**1.85**
CD (5%)	**4.1**	**2.7**	**9.2**	**0.36**	**214.88**	**2.56**	**5.40**	**5.00**	**0.13**	**0.47**	**0.50**	**1.12**	**NS**	**NS**	**NS**	**0.41**	**3.87**

Soil parameters of pH: 7.7, Soil EC: 0.6 m mhos cm^{-1}, Organic Carbon (%): 1.8, available N: 190 kg/ha (Low), P_2O_5 :45 kg/ha (High)& K_2O :412 kg/ha (High), recommended spacing (90cmx 20cm), recommended nutrients (120:80:80 kg/ha NPK), Cotton species (RCH 929), environment (rainfed) and total rainfall (480 mm) during cropping period.

CHAMARAJANAGAR

The defoliant experiment conducted at Chamarajanagar revealed that when compared to the control, use of defoliants caused a substantial difference in growth and yield characteristics. Defoliant treatments show non- significant results with regard to plant height. Higher number of bolls (59) and boll weight (5.03g) were recorded in T_{10}.T_3+Diuron @400ppm. Significantly the highest seed cotton yields were obtained with spray of Thidiazuron@500 ppm + Diuron @400 ppm (1489 kg/ha), followed by Thidiazuron@500 ppm (1349 kg/ha) and CICR defoliant (1295 kg/ha). The same trend was observed in defoliation (10 DAS) and boll opening percentages of 90 and 89.3% respectively with the application of Thidiazuron@500 ppm + Diuron @400 ppm, followed by Thidiazuron@500 ppm (85 and 84.4 %, respectively) and CICR defoliant (83 and 83.9 %), respectively. Maximum defoliation and better boll opening may be the reasons for the increased seed cotton yield in these treatments (Table 76).

Table 76. Growth characters, Boll opening, % defoliation and seed cotton yield (kg/ha) under different defoliant treatments

Treatments	Plant height (cm) at harvest	No of bolls/ sqm	Boll weight (g)	Seed cotton yield (kg/ha)	Boll Opening percentage	Per cent defoliation	
						At 5 DAS	At 10 DAS
T_1.Control	136	33	4.29	1057	63.6	0	1
T_2.Ethrel @3000 ppm	130	45	4.48	1165	73.5	10	21
T_3.Thidiazuron @500 ppm	134	54	4.98	1349	84.4	71	85
T_4.Sodium chlorate @0.9 %	137	44	4.32	1146	70.2	23	47
T_5.CICR Defoliant	130	51	4.85	1295	83.9	68	83
T_6.Hydrogen cyanamide @5000 ppm	133	49	4.28	1155	72.3	29	44
T_7.T2+5% of urea	129	45	4.05	1120	68.3	27	48
T_8. T_2+Diuron@400 ppm	133	49	4.16	1246	76.0	26	56
T_9.T_2+Sodium chlorate @0.9 %	134	49	4.52	1273	79.2	24	52
T_{10}.T_3+Diuron @400ppm	131	59	5.03	1489	89.3	84	90
SEd	5.0	8.4	0.20	49.93	4.20	5.03	4.55
CD (5%)	NS	4.03	0.41	104.89	8.83	10.58	9.56
CV	4.6	10.3	5.35	4.97	6.77	16.98	10.56

Soil parameters: soil pH value :8.22, Soil Ec: 0.54 m mhos cm^{-1}, Organic Carbon (%): 0.50, available N : 274.3 kg/ha, P_2O_5 : 28.8 kg/ha, K_2O : 851.4 kg/ha, Environment : Rainfed, Spacing followed: 90 x 60 cm, Rainfall (mm) received during cropping periods: 584 mm

Coimbatore

The defoliants were applied in three soil moisture levels: (M1. No Irrigation, M2.Irrigation 5 days before defoliant application and M3. Defoliant three days before defoliant application). The available soil moisture were 0, 21.3 and 38.7 per cent respectively for M1, M2 and M3 . The maximum and minimum temperatures were 29.0 and 21.3°C, respectively, and relative humidity of 89.0 and 61.5 % were recorded in the forenoon and afternoon during the defoliant application week. The results revealed that soil moisture did not influence seed cotton yield, defoliation, boll opening, and trash content percentage

(Table 77), (Table 78). The seed cotton yield of individual pickings were influenced by defoliant application. The defoliants are inducing of boll opening; hence in first picking effective defoliants treatments were produced significantly higher seed cotton yield than the control. However, subsequent picking control yielded more and reached non-significant results in total seed cotton yield.

The results arrived with the highest Bartlet early index with Thidiazuron at 500ppm (0.96) which was followed by CICR Defoliant (0.93). The highest defoliation on 5 and 10 days after defoliant application recorded with Thidiazuron at 500ppm +Diuron @400ppm (T_{10}) of 77.3 and 88.8 percent, respectively. However, the highest boll opening percentage of 84.32 % was recorded with Ethrel+Diuron @400 ppm (T_8) at 10 days after defoliant application.

Table 77: Seed Cotton Yield (kg/ha) and Bartlet index as influenced by defoliants application

		Seed Cotton Yield (kg/ha)				
	Treatments	First picking	Second picking	Third picking	Total	Bartlet Index
T1	Control	937	246	218	1401	0.84
T2	Ethrel at 3000ppm	1026	339	98	1463	0.88
T3	Thidiazuron at 500ppm	1258	117	28	1403	0.96
T4	Sodium Chlorate@ 0.9%	1082	302	10	1394	0.92
T5	CICR Defoliant	1075	78	94	1247	0.93
T6	Hydrogen Cyanamide 5000ppm	860	311	206	1377	0.83
T7	T2+5% of urea	1148	163	99	1410	0.91
T8	T2+Diuron@400 ppm	913	268	79	1260	0.89
T9	T2+Sodium chlorate @0.9 %	1014	202	62	1277	0.92
T10	T3+Diuron @400ppm	1105	247	140	1492	0.88
	Mean	1042	227	103	1372	0.89
	SE(d)	68.6	19.6	7.4	107.6	
	C.D.(5%)	137.9	39.4	14.9	NS	

Table 78. Defoliation , Boll opening , and trash content percentage as influenced by defoliants application

Sl.NO		Defoliation percentage		Boll opening percentage		
		5 DAD	10DAD	5 DAD	10DAD	Trash content (%)
	Treatments					
T1	Control	-8.7	12.7	56.25	68.02	2.8
T2	Ethrel at 3000ppm	32.3	42.7	73.21	80.68	5.4
T3	Thidiazuron at 500ppm	64.2	78.5	61.2	77.98	7.7
T4	Sodium Chlorate@ 0.9%	57.1	62.1	60.37	79.65	9.6
T5	CICR Defoliant	45.2	57.7	62.81	82.21	6.5
T6	Hydrogen Cyanamide 5000ppm	-4.9	23.5	55.99	77.37	2.8
T7	T2+5% of urea	26.8	45.9	62.93	79.9	6.8
T8	T2+Diuron@400 ppm	26	36	63.37	84.32	8.3
T9	T2+Sodium chlorate @0.9 %	62.8	66.5	61.66	73.14	6.4
T10	T3+Diuron @400ppm	77.3	88.8	64.11	79.11	4.2
	Mean	37.8	51.44	62.01	79.1	6.1

LAM

The results of defoliant experiment revealed that plant growth characters, yield attributes and seed cotton yield were not significantly influenced by defoliant application.However, Boll Opening percentage Per cent and Defoliation 10 days after spraying were significantly influenced by defoliants. The significantly highest registered with Thidiazuron @ 500 ppm+Diuron @400 ppm on Boll Opening percentage Per cent (92.37)and Defoliation 10 days after spraying (93.13) (Table 79)

Table 79. Growth characters , yield attributes , seed cotton yield (kg/ha), Boll Opening and Defoliation percentage as influenced by defoliant application

Treatments	Plant height (cm) at harvest	No of bolls/sqm	Boll weight (g)	Seed cotton yield (kg/ha)	Boll Opening percentage	Per cent Defoliation 10 days after spraying
T_1.Control	94.89	38.05	4.66	1729	78.50	7.23
T_2.Ethrel @ 3000 ppm	104.78	37.58	5.03	1888	88.50	72.90
T_3.Thidiazuron @ 500 ppm	107.44	27.82	4.89	1357	85.27	80.23
T_4.Sodium chlorate @ 0.9 %	106.33	37.85	4.80	1815	79.30	90.23
T_5.CICR Defoliant	100.11	43.46	4.65	1945	75.77	43.33
T_6.Hydrogen cyanamide @ 5000 ppm	100.78	43.92	4.18	1794	78.43	65.52
T_7.T2 + 5% of urea	104.50	34.77	4.95	1716	80.10	78.30
T_8. T_2+Diuron@400 ppm	108.00	42.40	4.67	1968	83.73	85.43
T_9. T_2+ Sodium chlorate @0.9 %	105.89	33.63	4.71	1573	88.23	90.47
T_{10}. T_3 + Diuron @400ppm	103.67	29.33	4.73	1389	92.37	93.13
SEd	**4.52**	**7.53**	**0.34**	**268.3**	**1.67**	**2.39**
CD (5%)	**NS**	**NS**	**NS**	**NS**	**3.41**	**4.89**

AGR XI Developing and testing of organic nutrient, pest and disease management module in cotton based cropping system

NORTH ZONE -SIRSA (CICR)

The trial of testing of organic nutrient, pest and disease management module in cotton based cropping system conducted at SIRSA (CICR) under irrigated conditions revealed that Significantly higher values of plant height (138.9 cm), number of bolls per plant (40.7), boll weight (3.36g), number of monopods (2.14)and sympods (20.88)per plant and seed cotton yield (2101 kg/ha) were obtained with the conventional farming Module-4 [Non organic IPM based production system] over organic farming Modules-1, 2 & 3 but was at par with conventional farming Module-5 [Non organic farmers practice]. Amongst the organic farming modules higher values of plant height (115.4 cm), yield attributes and seed cotton yield (1144 kg/ha) were obtained under organic farming module-3 [High intensive organic production system] over organic farming module-1 [Low cost input based organic production system] and organic farming module-2 [Non-monetary input based organic production system]. The least values of plant height, yield attributes and seed cotton yield were obtained under organic farming module-1 [Low cost input based organic production system] over all other organic farming modules as well as conventional farming modules i.e. farmers' practice. Significantly higher values of wheat grain yield (4,398 kg/ha) (of 2023-24 cropping year) were obtained with the conventional farming Module-4 [Non organic IPM based production system] over organic farming Modules-1, 2 & 3 but was at par with conventional farming Module-5 [Non organic farmers practice]. Amongst the organic farming modules higher values wheat grain yield (2,895 kg/ha) (of 2023-24 cropping year) were obtained under organic farming module-3 [High intensive organic production system] over organic farming module-1 [Low cost input based organic production system] and organic farming module-2 [Non-monetary input based organic production system]. The least values of wheat grain yield (of 2023-24 cropping year) were obtained under organic farming module-1 [Low cost input based organic production system] over all other organic farming modules as well as conventional farming modules i.e. farmers' practice. A similar trend was obtained with respect to cotton equivalent yield and system productivity (of 2023-24 cropping year) (Table 80).

Table 80. Growth and yield attributes, Seed cotton yield (kg/ha) and equivalent yield as influenced by different organic modules at SIRSA

Treatments	Plant height (cm)	Number of monopods per plant	Number of sympods per plant	Number of bolls per plant	Boll weight (g)	Seed cotton yield (kg per ha)	Wheat grain yield (kg/ha) (2023-24)	Cotton equivalent yield of wheat (kg/ha) (2023-24)	Cropping system productivity (kg/ha) (2023-24)
Module-1: Non-monetary input based organic production system	98.6	0.68	9.08	17.5	2.16	840	1,670	536	1327
Module-2: Low cost input based organic production system	109.1	1.01	11.30	19.6	2.30	93	1,964	630	1214
Module-3: High intensive organic	115.4	1.27	14.13	24.4	2.45	1,144	2,895	929	1967

production system									
Module-4 (Control-1): Non organic IPM based production system	138.9	2.14	20.88	40.7	3.36	2,101	4,398	1411	3472
Module-5 (Control-2): Non organic farmers practice	129.1	2.00	19.95	37.2	3.14	1,894	4,039	1296	3031
L.S.D.	**12.72**	**0.269**	**2.452**	**5.413**	**0.348**	**289.52**	**475.22**	--	--

Environment: irrigated; Total rainfall during cropping period: 251.7 mm

HISAR

The first-year trial of testing of organic nutrient, pest and disease management module in cotton-based cropping system conducted at Hisar under irrigated conditions found that the tallest plants were observed under Control 1.Non organic IPM (187 cm), followed by Control 2 .Non organic Farmers practice (184 cm) and Module 2 (181 cm). The number of monopodia per plant was highest in Control 2 (2), and sympodia per plant under Module 1 (28), though differences among treatments were non-significant. The highest number of bolls per square meter was observed in Module 2 and Module 3 (68 each), followed by Control 1 (Non organic IPM) (66). Boll weight was highest under Module 3 (3.49 g), followed by Control 1 (3.45 g), though differences were not statistically significant. The earliest 50% flowering was observed in Module 3 (88 days), while Control 2 (94 days) took the longest to reach 50% flowering. The highest seed cotton yield was recorded under Control 2 (1893 kg/ha), followed by Module 2(1784 kg/ha) and Control 1 (1784 kg/ha each), with no significant differences. The highest seed cotton yield (1893 kg/ha) and lowest dry weight of cotton (4722 g) was achieved under Control 2, followed by Module 2, (1784 kg/ha and 7150 g, respectively) (Table 81).

Table 81. Growth characters, yield attributes, seed cotton yield (kg/ha) and Quality parameters as influenced by different organic modules at Hisar

Treatments	Plant height (cm) at harvest	No. of monopodia at harvest	No. of sympodia at harvest	No of bolls / sqm	Bolls per plant	Boll weight (g)	Days of 50% flowering	Seed cotton yield (kg/ha)	Lint yield kg/ha	Dry weight of cotton kg/ha	Seed Index (g)	Ginning outturn (%)
Module1.Non-monetary input	172	2.05	28	63	24	3.16	91	1646	615.60	6170	7.7	37.4
Module2.Low cost input	181	2.20	26	68	26	3.18	89	1784	624.40	7150	7.2	35.0
Module3.High intensive	177	2.05	26	68	26	3.49	88	1728	618.62	5726	8.0	35.8
Control1.Non organic IPM	187	2.20	24	66	25	3.45	92	1784	624.40	6670	8.1	35.0
Control 2.Non organic FP	184	2.25	24	64	25	3.24	94	1893	673.90	4722	8.5	36.6
SEd	**10.44**	**0.10**	**2.13**	**5.64**	**1.99**	**0.18**	**1.17**	**78.9**		**571**		
CD (5%)	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**2.57**	**NS**		**1259**		

Soil pH: 7.98, Soil EC:1.24 m mhos cm^{-1}, OC(%):0.59 Available N : 267.4 kg/ha, P_2O_5: 28 kg/ha, K_2O: 484 kg/ha, Environment: Irrigated, Rainfall (mm) received during cropping periods: 483.5mm & 21 rainy days

BATHINDA

The first-year trial of testing of organic nutrient, pest and disease management module in cotton-based cropping system conducted at Bathinda under irrigated conditions found that crop growth and yield attributed were found better under organic module 3 as compared to module 1 and 2. High-intensive input-based organic management of nutrients, pest and disease (Module 3) in cotton resulted into significant seed cotton yield improvement as compared to modules with non-monetary inputs (Module 1) and low-cost input-based module (Module 2). Higher seed cotton yield of 2480 kg/ha, higher plant height (177 cm), more number of sympodia (20), higher number of bolls per metre square (113), more bolls per plant (47), increased boll weight (3.75g) and dry weight (6369 kg/ha) were recorded in Control 1.Non organic IPM based management. Whereas lesser seed cotton yield of 1810 kg/ha and lesser dry weight was observed in Module2. Low cost input based management. Module1.Non-monetary input registered lesser plant growth and yield attributes (Table 82).

Table 82.Growth, Yield attributes and seed cotton yield (kg/ha) as influenced by different organic modules at bathinda

Treatments	Plant height (cm) at harvest	No. of monopodia at harvest	No. of sympodia at harvest	No of bolls/ sqm	Bolls per plant	Boll weight (g)	Days of 50% flowering	Seed cotton yield (kg/ha)	Lint yield (Kg/ha)	Dry weight of cotton (Kg/ha)
Module1.Non-monetary input	153	2	16	79	33	3.35	71	1836	633	4400
Module2.Low cost input	156	2	16	84	35	3.45	72	1810	620	4380
Module3.High intensive	169	2	20	100	42	3.69	76	2320	821	5801
Control1.Non organic IPM	177	2	20	113	47	3.75	79	2480	867	6369
Control 2.Non organic FP	163	2	19	97	40	3.62	75	2268	806	5625
SEd	7.0	0.13	1.3	5.3	2.2	0.10	1.0	134	54	342
CD (5%)	15.3	NS	2.9	11.5	4.8	0.22	2.2	293	118	746

Soil parameters: pH: 8.70, EC: 0.18 m mhos cm^{-1}, OC (%): 0.34, Available P_2O_5: 9.5 kg/ha & K_2O: 260 kg/ha, Recommended nutrients: 75 kg N /ha, Environment: irrigated; Total rainfall during cropping period: 269 mm

CENTRAL ZONE

SURAT

The testing of organic nutrient, pest and disease management modules in cotton-based cropping systems conducted at Surat under irrigated conditions revealed that Significant differences were observed in no. of bolls per sqm, bolls per plant and boll weight due to different modules. Control-1 recorded significantly higher no. of bolls per sqm (83), bolls per plant (45), and boll weight (3.89 g) as compared to the rest of other modules. Seed cotton yield showed significant differences due to the application of different treatments. Significantly higher seed cotton yield (2438 kg/ha) was recorded in control-1 which was found at par with control-2 (2368 kg/ha) over the rest of the organic modules. Lint yield showed significant

differences due to different modules. Significantly higher lint yield (850 kg/ha) was recorded in control-1 which was found at par with control-2 (838 kg/ha) over the rest of the organic modules. The dry weight of cotton showed significant difference due to the application of different treatments. Control-1 recorded significantly higher dry weight of cotton (173 g/plant) as compared to rest of the other modules. The highest gross return (Rs. 182850 /ha) was recorded in control-1 followed by control-2. While highest net return (Rs. 118006 /ha) and BC ratio (1.98) were found in control-2 followed by control-1. The lowest gross return (Rs. 73200/ha), net return (Rs. 9728 /ha), and BC ration (0.15) was recorded in module 2. No significant difference was found in quality parameters viz., lint index, seed index and ginning percentage. Range of UHML (25.9 to 27.1 mm), uniformity index (82 to 83 %), micronaire value (4.2 to 4.6 mv), fiber elongation (5.2 to 5.3 %), and tenacity (27.4 to 28.2 g/t) was recorded in different modules. Lesser water use efficiency (0.51 g/ha.mm) and labor use efficiency (Rs.187) were observed in Module 2.Low-cost input. Nutrient use efficiency was found higher in Module 1(Table 83).

Table 83. Yield and quality attributes, seed cotton yield (kg/ha), economics and efficiencies as influenced by different organic modules at Surat

Treatments	No of bolls/ sqm	Boll weight (g)	Seed cotton yield (kg/ ha)	Dry weight of cotton (g/plant)	Gross return	Net return	Benefit Cost ratio	Water use efficiency (kg/ ha.mm)	Labour use efficiency (Rs./ labour)
Module1.Non-monetary input	38	2.70	782	55	78200	19182	0.33	0.54	391
Module2.Low cost input	40	2.62	732	56	73200	9728	0.15	0.51	187
Module3.High intensive	45	2.76	987	67	98700	23610	0.31	0.69	513
Control1.Non organic IPM	83	3.89	2438	173	182850	110485	1.53	1.70	1270
Control 2.Non organic FP	70	3.44	2368	130	177600	118006	1.98	1.65	1457
SEd	3.95	0.07	87	6.54					
CD (5%)	12.18	0.20	267	20.16					

Soil pH: 7.50, EC: 0.80 m mhos cm^{-1}, OC (%):0.64, Available N: 269 kg/ha, P_2O_5: 23.01 kg/ha, K_2O: 585 kg/ha, Recommended spacing: 120 x 45 cm, Recommended nutrients: 160-00-00 NPK kg/ha , Environment: Irrigated, Total rainfall: 1335 mm

JUNAGADH

The first-year trial of testing of organic nutrient, pest and disease management module in cotton-based cropping system conducted at Junagadh under irrigated conditions revealed that different organic management treatments were significantly influenced on growth characters, yield attributes and seed cotton yield of cotton crop. The significantly highest plant height (134 cm) was recorded with the treatment nonorganic IPM based production system which was statistically at par with the treatment of non-organic farmers' practice. Number of boll per square meter (73) and seed cotton yield (2394 kg/ha) were found significantly the highest with application of non-organic IPM-based production system which was statistically at par with the treatment of non-organic farmers' practice. The quality parameters of cotton were improved with the organic management treatments. Significantly the highest span length

(25.95 mm), UI (84.25 %) and fiber elongation (5.15) were recorded under the high intensive organic production system. The highest gross returns (Rs 168657/ha) was recorded with the application of a non-organic IPM based production system having net return (Rs 103310/ha). Cotton production cost can be reduced with the application of non-monetary input (with available farm resources) based organic production system having 2.66 B:C ratio(Table 84).

Table 84. Growth, Yield and quality attributes, seed cotton yield (kg/ha) and economics as influenced by different organic modules at Junagadh

Treatments	Plant height (cm) at harvest	No of bolls/ sqm	Seed cotton yield (kg/ ha)	Cost of cultivation	Gross return	Net return	Benefit Cost ratio	2.5 % Span Length (mm)	Uni formity ratio	Fibre elongation (%)
Module1.Non-monetary input	105	50	1438	38035	101307	63272	2.66	25.95	84.25	5.15
Module2.Low cost input	105	52	1560	46605	109902	63297	2.36	25.25	84.00	5.08
Module3.High intensive	108	54	1691	50900	119131	68231	2.34	24.95	84.00	5.08
Control1.Non organic IPM	**134**	**73**	**2394**	65348	**168657**	**103310**	2.58	23.15	82.50	4.85
Control 2.Non organic FP	**130**	**66**	**2136**	59288	150481	91193	2.54	23.73	82.75	4.98
SEd	6.3	2.69	88					0.31	0.36	0.06
CD (5%)	24.8	10.54	344					1.22	1.42	0.24

Soil parameters of pH: 7.78, Soil Ec: 0.44 m mhos cm^{-1}, OC (%): 0.79, available N: 291 kg/ha, P_2O_5 36.41 kg/ha & K_2O 309 kg/ha, recommended spacing 120 x 45 cm, recommended nutrients 240-50-150 NPK kg/ha, environment: irrigated and total rainfall 2296.30 mm during cropping periods

RAHURI

The first-year trial of testing of organic nutrient, pest and disease management module in cotton-based cropping system conducted at Rahuri under irrigated conditions revealed that the organic Module No. 2 (Low-cost input-based organic production system) recorded maximum seed cotton yield (3356 kg/ha) and it was observed that the yield obtained under organic module 4 (Control 1) (3086 kg/ha) and module no. 5 (control 2) (3105 kg/ha) *i.e* (Non-organic IPM based organic production system and Non-organic farmers practice) were at par with organic module No. 2 (Low-cost input based organic production system). On the basis of economic indices studied, Organic Module no.2 was recorded significantly highest Grain yield (4207kg/ha), Gross monetary return (228237) and net monetary returns (151486) and B:C ratio (3.1) was recorded. Module No. 2 (Low-cost input-based organic production system) recorded maximum seed cotton yield (3356.22 kg/ha) with highest gross monetary returns (Rs.228236.5 ha^{-1}), Net monetary returns (Rs. 151485.80 ha^{-1}) and B:C ratio (3.1) than rest of other modules and performing best as well as economically feasible. Relative production efficiency (29.51 %) and Relative Economic efficiency (63.42%) were found high in Module2.Low cost input (Table 85).

Table 85. Yield and quality attributes, seed cotton yield (kg/ha), economics, efficiencies and wheat grain yield as influenced by different organic modules at Rahuri

Treatments	No of bolls/ sqm	Boll weight (g)	Seed cotton yield (kg/ha)	Cost of cultivation	Gross return	Net return	Benefit Cost ratio	Relative production efficiency (RPE)	Relative Economic efficiency (REE)	Ginning outturn (%)	Lint Index	Seed index (100 seed wt)	Grain yield of wheat (kg/ ha)
Module1.Non-monetary input	43	5.10	2058	59557	139945	80388	2.3	-8.97	6.37	31.2	3.86	11.0	3259
Module2.Low cost input	59	5.90	3356	76751	228237	151486	3.1	29.51	63.42	32.6	3.76	10.4	4207
Module3.High intensive	50	5.60	2810	82196	191056	108860	2.4	11.75	29.73	32.8	4.05	11.0	3717
Control1.Non organic IPM	58	5.60	3086	83129	209854	126725	2.6	18.70	39.14	32.2	4.08	11.3	3846
Control 2.Non organic FP	55	6.05	3104	95035	211104	116069	2.3	0.00	0.00	33.4	4.09	10.9	3530
SEd(±)	**1.95**	**0.20**	198	3245	13999	12139	**0.1**	-	-	-	-	-	**0.72**
CD (5%)	**6.02**	**0.61**	609	10000	43134	37405	**0.3**	-	-	-	-	-	**2.21**

Soil pH : 7.86, Ec: 0.29m mhos cm^{-1}, OC(%): 0.51, available : N : 166 kg/ha, P_2O_5 : 22kg/ha, K_2O : 562 kg/ha, Environment: irrigated, Spacing followed: 90 X 30cm

AKOLA

The trial of testing of organic nutrient, pest and disease management module in Cotton-Soybean Cropping System (Two-year rotation) conducted at Akola under rainfed conditions revealed that the highest soybean grain yield (2743 $Kgha^{-1}$) was recorded in IPM non-organic module followed by module 5 i.e Non-organic farmers practice (2277 $kgha^{-1}$) closely followed by 2271 $kgha^{-1}$ in module-3 i.e. organic high intensive cultivation of soybean. Module 2 (2215 $kgha^{-1}$), module 3 (2271 $kgha^{-1}$), and module 5 (2277 $kgha^{-1}$) were found at par with each other in respect of soybean grain yield. The maximum yield in module 4 might be due to the combination of organic material and inorganic fertilizers management though inorganic fertilizers @ 30:60:30 NPK applied in this treatment which facilitates the immediate availability of nutrients for growth and development of soybean and ultimately the soybean grain yield. Maximum GMR (Rs.138359 ha^{-1}) and NMR of Rs.65323 ha^{-1} were registered in Module 4 i.e. control 1 of IPM with non-organic practices which was found significantly superior over other organic modules. However, the maximum benefit-cost ratio (2.30) was recorded in module 1 i.e. where non-monetary inputs were used.This might be due to less cost of cultivation in these treatments as compared to other organic modules. The minimum NMR and B:C ratio (Rs.43515 ha^{-1} and 1.61) was found in module 3 of high-intensive organic practice. This may be due high cost of cultivation in this module (Table 86).

Table 86. Grain yield (kg/ha) and yield attributes, economics, and efficiencies of soybean as influenced by organic modules

Treatments	Soybean pod Yield (kg/ha)	Test Weight (g)	No. of pods plant^{-1}	No. of grains plant^{-1}	Cost of Cultivation (Rs/ha)	Gross return (Rs/ha)	Net Return (Rs/ha)	B:C ratio	Relative production efficiency (RPE) %	Relative Economic efficiency (REE) %
Module1.non-monetary input	1996	10.93	29	37	43692	100668	56976	2.30	-12.35	-4.61
Module2.Low cost input	2215	11.07	34	44	57190	111727	54537	1.95	-2.72	-8.69
Module3.High intensive	2271	11.10	36	47	71036	114551	43515	1.61	-0.26	-27.14
Control1.Non organic IPM	2743	11.19	40	67	73036	138359	65323	1.89	20.47	9.37
Control2.Non organic	2277	11.13	37	60	55126	114854	59728	2.08	-	-
SEd	118.58	0.14	1.38	2.70	--	5981	5981	--	--	--
CD (5%)	258.37	0.31	3.01	5.88	--	13032	13032	--	--	--

Soil parameters: pH value: 8.07, EC:0.34 m mhos cm^{-1}, O.C. (%): 3.90, Available N : 178 kg/ha, P_2O_5 : 15.2 kg/ha, K_2O : 378.4 kg/ha Recommended spacing of soybean: 45x5 cm, Recommended Fertilizer dose: 30:60:30 Kg NPK/ha ,Environment: Rainfed, Soybean Variety: AMS 100-39 (Amba) ,Total Rainfall during Cropping period: 955.1 mm in 44 rainy days

NANDED

The second-year trial of testing of organic nutrient, pest and disease management module in cotton-based cropping system conducted at Nanded under rainfed conditions revealed that soybean was sown as rotation crop with similar set of treatments. The highest soybean pod yield was recorded in non organic IPM practice (1651 kg/ha) followed farmers practice (1484 kg/ha) . However, by virtue of intercrop (pigeon pea) yield of 379 kg/ha realized in Low-cost organic practice (M1) which surpassed seed cotton equivalent yield in terms of cotton (1092 kg/ha), GMR (Rs. 79155 per ha) and NMR (Rs. 54583/-) significantly than other modules. The low cost organic module was most profitable and remunerative with highest BCR of 3.22. Non organic IPM practice had production efficiency (111.28) whereas low cost organic module was efficient for relative economic efficiency (147.68) and relative input efficiency (1.52) (Table 87).

Table 87. Pod yield (kg/ha), economics and efficiencies of soybean as influenced by organic modules

Treatments	Pod yield (kg/ha)	Cost of cultivation	Gross return	Net return	Benefit Cost ratio	Relative production efficiency (RPE)	Relative Economic efficiency (REE)	Input use efficiency (water, labour& nutrients)
Module1.non-monetary input	896	20488	37504	17016	1.83	54.29	63.28	0.55
Module2.Low cost input	1296	24572	80200	54583	3.22	78.50	231.76	1.52
Module3.High intensive	1474	27808	61693	33885	2.22	89.30	-36.21	0.84
Control 1.Non organic IPM	1651	30217	69104	38887	2.29	100.02	80.71	0.88
Control 2.Non organic	1484	25155	62116	36961	2.47	89.91	100.00	1.00
SEd	92.24		8913	3976	0.16			
CD (5%)	200.98		19419	8662	0.35			

Soil parameters of pH: 8.23, Soil EC: 0.15 m mhos cm^{-1}, OC : 0.38 %, available (kg/ha) N: 110.37 kg/ha, P_2O_5 10.41 kg/ha & K_2O : 716.69 kg/ha, Recommended spacing: 45 x 5 cm, recommended nutrients: 30:60:30 NPK kg/ha, Soybean variety: MAUS 612, environment: rainfed and total rainfall : 1233.8 mm

BHAWANIPATNA

Testing of organic nutrient, pest and disease management module in cotton-based cropping system conducted at Bhawanipatna under rainfed conditions revealed that different growth and yield parameters and seed cotton yield were significantly affected by different modules. Growth characters like plant height of cotton (104.3 cm), No. of sympodial branches (14.66), No. of bolls/m^2 (41.52), boll weight (3.71) and seed cotton yield (1538 kg/ha) were significantly higher in Control-2 (Non-organic Farmers Practice). The next best Module-3 (High intensive input) was at par with control-2 which recorded seed cotton yield (1479 kg/ha). The significantly lowest seed cotton yield (1231 kg/ha) was obtained in Module 1 (Non-monetary inputs). The treatment cost and total cost of cultivation were maximum in Module-3 (Rs.32750/ha and Rs. 77550/ha) followed by Control-1 (Non-organic IPM) (Rs.17844/ha and Rs.62644/ha) and minimum (Rs.3875/ha and Rs.48675/ha) in Module-1(non-monetary inputs). The highest net return of Rs.46902/ha was obtained in Control-2 (non-organic Farmer's Practice) followed by Module-1 and Module-2 with Rs.35023/ha and Rs.32186/ha respectively. B:C ratio was maximum in Control-2 (Non-organic Farmer's Practice) with 1.81 followed by Module -1 (Non-monetary inputs) with 1.72. Nutrient uptake was high in Control 2. Non-organic Farmer's Practice (N-75.47, P-24.89, K-78.91 kg/ha) and found less uptake in Module 1. Non-monetary input (Table 88).

Table 88. Seed cotton yield (kg/ha), economics and nutrient uptake as influenced by different organic modules at Bhawanipatna

Treatments	Seed cotton Yield (kg/ha)	Nutrient uptake (kg/ha)			Treatment Cost (Rs/ha)	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net Return (Rs/ha)	BCR
		N	P	K					
Module1.Non-monetary input	1231	44	13	43	3875	48675	83698	35023	1.72
Module2.Low cost input	1290	50	13	47	10750	55550	87736	32186	1.58
Module3.High intensive	1479	72	24	74	32750	77550	100548	22998	1.30
Control 1.Non organic IPM	1353	55	18	55	17844	62644	91977	29333	1.47
Control 2.Non organic Farmers Practice	1538	75	25	79	12850	57650	104552	46902	1.81
SEd	63.19	3	1	2	127.28	127.28	4297.18	4261.99	0.07
CD (5%)	**137.69**	**6.83**	**2.09**	**3.66**	**277.33**	**277.33**	**9362.75**	**9286.07**	**0.15**

Soil pH: 6.3, Available N: 132 kg/ha, P_2O_5 : 38.4 kg/ha , K_2O: 256 kg/ha, rainfall during cropping period: 992.6 mm, Genotype of cotton: BS 30

KHANDWA

Testing of organic nutrient, pest and disease management module in cotton-based cropping system conducted at Khandwa under rainfed conditions revealed that the highest seed cotton yield of 1555 kg/ha, highest gross return (Rs.101092/ha), net return (Rs.48387/ha) and B:C ratio (1.92) were registered in Module 3.high intensive organic management (Table 89). The lesser yield of 1417 kg/ha was observed in Module 1. Non-monetary input based organic management. Nutrient uptake was found high in Module 3. High intensive input based organic management viz., N-21.04, P-10.4, K-31.07 kg/ha, whereas K was found on Par with Control 1. Non organic IPM. Initial nutrient availability were noticed high in Module 2. Low cost input based organic management.

Table 89. Seed cotton yield (kg/ha**), economics, nutrient uptake and availability as influenced by different organic modules at Khandwa**

Treatments	Nutrient availability (kg/ha)						Gross return (Rs/ha)	Net Return (Rs/ha)	BCR	Seed cotton yield (kg/ha)
	Initial			Final						
	N	P	K	N	P	K				
Module 1. Non-monetary input	236	15	379	236	15	382	92096	42891	1.87	1417
Module 2. Low cost input	237	15	380	234	15	381	98741	45536	1.86	1519
Module 3. High intensive	235	15	373	237	15	377	101092	48387	1.92	1555
Control 1. Non organic IPM	233	15	380	234	15	379	100152	42057	1.72	1541
Control 2. Non organic	235	15	378	236	15	380	100779	40584	1.67	1550
SEd	2.10	0.30	3.54	2.56	0.42	3.57	3125	3125	0.06	121
CD (5%)	5.33	0.75	8.92	6.43	1.07	8.98	7863	7863	0.14	4

Soil parameters: pH: 7.8, EC : 0.53 m mhos cm^{-1}, OC (%): 0.67, Available N: 231.5 kg/ha, P_2O_5: 14.5 kg/ha & K_2O: 364.2 kg/ha, Recommended spacing : 90 X 60 cm, Recommended dose of nutrients: NPK @ 125:60:40 kg/ ha, Environment:rainfed and total rainfall (mm) during cropping periods : 788 mm. Uneven

distribution of rainfall was observed. Water logging and drought spells were occurred during early growth and flowering period.

NAGPUR

Testing of organic nutrient, pest and disease management modules in cotton-based cropping system conducted at Nagpur (CICR) under rainfed conditions revealed that the parameters like plant height, No. of monopodia, No. of sympodia and Boll weight were not found significant differences with different modules. However, number of bolls per square meter and seed cotton yield were influenced significantly by different modules. Non organic module with farmers practice (Control 2) recorded the highest number of bolls per square meter (75) and seed cotton yield (1255 kg/ha) which was closely followed by Control 1 treatment (Non organic IPM). Module1 (Non-monetary input) recorded the lowest seed cotton yield (652.7 kg/ha). Control 2. Non-organic farmer practice registered higher nutrient uptake as well as high initial and final nutrient availability. Lint yield was also noticed high in same treatment (417 kg/ha) (Table 90).

Table 90. Seed cotton yield (kg/ha), quality attributes, nutrient uptake and availability as influenced by different organic modules at Nagpur (CICR)

Treatments	Nutrient availability (kg/ha)						Seed cotton Yield (kg/ha)	Ginning Percentage (%)	seed index (g)	lint index (g)	Lint yield (kg/ha)
	Initial			Final							
	N	P_2O_5	K_2O	N	P_2O_5	K_2O					
Module1.Non-monetary input	180	10	750	182	10	760	653	33.3	10.5	6.10	217.58
Module2.Low cost input	170	9	790	172	9	800	773	34.1	10.8	5.71	263.45
Module3.High intensive	175	9	800	178	10	810	837	34.7	10.9	6.10	290.57
Control1.Non organic IPM	195	12	900	199	12	905	1099	33.2	12.4	5.29	364.38
Control2.Non organic farmer practice	199	12	930	201	13	932	1255	33.2	11.7	6.19	416.91
CD@5%							**385.2**				

Soil pH value : 7.7, O.C.(%) :0.6 6.0, Available. N :200 kg/ha, P2O5:10 kg/ha, K_2O :950 kg/ha, Environment:rainfed, Spacing followed: 60 x 30 cm

SOUTH ZONE

RAICHUR

The trial of an organic nutrient, pest, and disease management module in a cotton-based cropping system conducted at Raichur under irrigated conditions revealed that the highest seed cotton yield of 1952 kg/ha was observed in the Control1 -Non-organic IPM module. Nutrient uptake was not significantly influenced by various organic module treatments. With regard to final nutrient availability, N availability was found higher in module 3 (221kg/ha), module 2 and 3 show on par results regarding P availability. K_2O availability shows non-significant results. The highest treatment cost (Rs. 54727/ha), Gross return (Rs.144450/ha) and net return (Rs. 89723/ha) were recorded in Control 1. Non-organic IPM-based management. The highest relative

production efficiency of 82.9 was observed in Module 1. Non-monetary input and Relative Economic efficiency of 76.8 was observed in Module 2.Low-cost input-based organic management (Table 91).

Table 91. Seed cotton yield (kg/ha), economics, nutrient uptake and availability as influenced by different organic modules at Raichur

Treatments	Seed cotton Yield (kg/ha)	Gross returns (Rs/ha)	Net Returns (Rs/ha)	MBCR	Relative production efficiency (RPE)	Relative Economic efficiency (REE)
Module1.Non-monetary input	1067	78987	53774	0.00	82.9	66.7
Module2.Low cost input	1103	81597	50972	0.15	77.3	76.8
Module3.High intensive	1209	89475	51050	0.10	61.7	76.7
Control1.Non organic IPM	1952	144450	89723	-0.85	0.0	0.0
Control2.Non organic	1740	128741	74790	-0.50	13.5	23.9
SEd	**68**	**5049**	**5049**	**0.14**	**5.5**	**9.4**
CD (5%)	**210**	**15558**	**15558**	**0.42**	**16.8**	**29.0**

Soil pH :8.04, available N : 198 kg/ha,P_2O_5 : 29 kg/ha, K_2O : 246 kg/ha, OC(%) : 0.44, Environment: irrigated, Spacing followed: 75 X 30 cm

DHARWAD

The second year of the imposition of organic module for *hirsutum* cotton variety (ARBC-1651) revealed that Non Organic –IPM (Module 4) recorded the highest seed cotton yield (1615 kg/ha) which was significantly higher as compared to the seed cotton yield obtained from all the organic modules and even with farmers practice i.e., Control-2. Among the organic modules, module - 3 with high intensive organic production system, which includes application of FYM@12 t/ha cotton only, Neem cake @250 kg/ha, Bio N,P& K@2.5 l/ha, Bio micro@0.5 kg/ha, Bio boron@500 g/ha, Bio Zinc@375g/ha & Humic acid@2.5l/ha, mechanical weeding recorded significantly higher seed cotton yield (SCY) of 1179 kg/ha as compared to other organic modules. Growing of green gram as intercrop in cotton (Module-1) reduced the cotton yields drastically (664 kg/ha) as cotton crop growth was stunted in the plots due to moisture stress during the peak growth period of cotton. Soybean grown as an intercrop in Module-2 performed better (1112 kg/ha) these plots was harvested for grain purpose and converted to cotton equivalent yield and considered for statistical analysis. Non organic –IPM i.e., control-1 recorded significantly higher net returns and B:C ratio as compared to other treatments (Rs. 74,809/ha & 2.67) (Table 92). Based on the second year results, among the organic modules it was concluded that for *hirsutum* cotton variety module -3 found optimum for higher cotton yields, net monetary returns and to maintain the soil nutrient status & fiber quality parameters during both the years. During 2023 (drought year) and 2024 (excess rainfall year) module -3 performed better as compared to remaining organic modules.

Table 92. Seed cotton yield (kg/ha), yield attributes, economics, efficiencies, pod yield and Cotton Crop Equivalent as influenced by different organic modules at Dharwad

Modules	Seed cotton yield (kg/ha)	No of bolls/ sqm	Boll weight (g)	Gross return	Net return	Benefit Cost ratio	Relative production efficiency (RPE)	Relative Economic efficiency (REE)	Input use efficiency (water, labour& nutrients)
Module1.Non-monetary input	664	157.00	3.69	49125	18400	1.60	-53.79	-70.59	-29.73
Module2.Low cost input	1112	117.50	3.69	82254	35029	1.74	-22.62	-44.02	8.00
Module3.High intensive	1179	151.75	3.71	87235	45510	2.09	-17.93	-27.27	-4.57
Control1.Non organic IPM	1615	198.50	4.39	119484	74809	2.67	12.40	19.55	2.17
Control2.Non organic	1436	190.00	4.38	106299	62574	2.43	0.00	0.00	0.00
SEd	**64.28**	**11.53**	**0.12**	**4757**	**4757**	**0.11**	--	--	--
CD (5%)	**141.62**	**25.40**	**0.27**	**10480**	**10480**	**0.24**	--	--	--

Soil type medium deep black cotton soil, pH: 7.86, OC (%): 0.87, Available N: 308 kg/ha, P_2O_5 24.75 kg/ha, K_2O : 283 kg/ha, Total rainfall: 1003 mm, Rainy days: 71 days

CHAMARAJANAGAR

The trial of testing of organic nutrient, pest and disease management module in cotton-based cropping system conducted at chamarajanagar under rainfed conditions revealed that the various organic modules had a substantial impact on maize (rotation crop) growth and yield characteristics. Among the modules, the non-organic IPM module (M4) had significantly recorded higher cob length (20.8 cm), number of rows per cob (35), grain weight per cob (177.9 g), shelling percentage (78.8) and maize grain yield (6425 kg/ha) over other modules. Followed by high intensive organic module (M3) with 20.7, 34, 166.8, 78.3 and 6024 kg/ha, respectively, In terms of all the growth and yield parameters studied, it is observed that modules M3, M4 and M5 are statistically comparable to one another. Whereas the lowest values were observed in module-1 for all the parameters studied (Table 93)

Table 93. Growth and Yield attributes of Maize (Chamarajanagar) - Rotation crop

Treatments	Plant height	Cob length (cm)	No. of cobs per plant	No. of seed rows per cob	100 grain weight (g)	Grain weight cob-1 (g)	Cob yield with husk (kg/ha)	Cob yield without husk (kg/ha)	Shelling %	Grain Yield (kg/ha)	Stover yield (kg/ha)	Biological yield (kg/ha)	Harvest index (%)
Module1.Non-monetary input	140.3	17.5	01	29	27.1	123.9	185.1	161.9	76.3	4474	7197	11670	0.38
Module2.Low cost input	151.3	18.0	01	30	29.2	140.2	210.2	184.0	76.1	5064	6955	12019	0.42
Module3.High intensive	166.5	20.7	01	34	30.7	166.8	243.8	213.1	78.3	6024	7915	13938	0.43
Control1.Non organic IPM	165.5	20.8	01	35	31.8	177.9	255.4	225.7	78.8	6425	8361	14786	0.43
Control2.Non organic	158.2	20.3	01	33	30.9	163.7	241.2	212.0	77.0	5912	7699	13611	0.43
SEd	6.89	0.74	-	1.53	1.29	11.80	11.63	11.79	1.69	501.4	439.5	791.9	0.014
CD (5%)	14.9	1.61	-	3.34	2.81	25.7	25.34	25.09	NS	1092	957	1725	0.031
CV	6.22	5.37	-	6.75	6.11	10.79	7.24	8.36	3.10	10.80	8.15	8.48	4.83

Soil pH:8.10, EC (dSm^{-1}):0.35, OC (%):0.47, Available N (kg/ha): 265.3, P (kg/ha): 15.5, K (kg/ha): 743.5, Soil test-based nutrients followed : 150:75:40 kg NPK/ha, Environment:rainfed, Spacing followed: 60 x 30 cm, Rainfall (mm) received during cropping periods: 518.5

NANDYAL

The trial of testing of organic nutrient, pest and disease management module in cotton-based cropping system conducted at Nandyal under rainfed conditions revealed that significantly highest seed cotton yield of 968 kg/ha, increased number of bolls (25) and higher boll weight (3.4g) were recorded in Control 1.Non organic IPM based management study. Among the various modules tested, Module2. Low cost input based management recorded the yield of 809 kg/ha. Lesser yield of 373 kg/ha was observed in Module1.Non-monetary input based management. Higher cost of cultivation (Rs. 73861) and gross return (Rs. 50355) were recorded in Control 1. Benefit cost ratio of 0.96 was observed in Module 2. Low cost input based management. Lint index, seed index and Ginning out turn shows non- significant results (Table 94).

Table 94. Seed cotton yield (kg/ha), yield attributes, economics and quality attibutes of cotton as influenced by different organic modules at Nandyal

Treatments	Seed cotton yield (kg/ ha)	No of bolls/ sqm	Boll weight (g)	Cost of cultivation	Gross return	Net return	Benefit Cost ratio	Relative production efficiency (RPE)	Lint Index (g)	Seed Index (g)	Ginning outturn (%)
Module1.Non-monetary input	373	13	2.8	25489	19393	-6096	0	-49.8	10.6	9.2	31.0
Module2.Low cost input	809	22	3.1	34365	42058	8493	0.96	8.7	9.7	9.0	32.0
Module3.High intensive	548	15	2.9	69305	28487	-40818	0.18	-0.26	8.8	9.1	31.4
Control1.Non organic IPM	968	25	3.4	73861	50355	-23506	0.57	30	10.2	9.4	31.0
Control2.Non organic	744	19	3.2	43360	38691	-4669	0.82	0	8.	9.2	31.0
SEd	63	1.5	0.3				-		0.5	1.0	1.3
CD (5%)	138	3.3	0.6				-		NS	NS	NS

Soil pH value-8.54, Soil Ec: 0.46 m mhos cm^{-1}, Organic Carbon (%): 0.30, Soil bulk density (1.12), Available N : 162, P_2O_5 : 52, K_2O : 367, Environment: rainfed, Spacing followed: 30 cm x 10 cm

LAM

The trial of testing of organic nutrient, pest and disease management module in cotton-based cropping system conducted at LAM under rainfed conditions revealed that the treatment Control-I (Non-organic IPM) recorded significantly higher seed cotton yield (774kg/ha) over rest of the treatments followed by Control-II(Non-organic (Farmers'practice) (660 kg/ha). Module-1 recorded the lowest seed cotton yield (306 kg/ha). The rotational crop results revealed that higher green gram yield (669 kg/ha) was harvested with control-1 which was at par with control-2 and Module-3 and found to be significantly superior over the remaining treatments. The maximum gross returns (₹ 100967/ha), net return (₹ 25302/ha) and benefit-cost ratio (1.85) were recorded with the Control-I (Non-organic IPM) (Table 95).

Table 95. Seed cotton yield (kg/ha), yield attributes and economics of cotton as influenced by different organic modules at LAM

Treatments	Seed cotton yield (kg/ha)	Green gram yield (kg / ha)	Seed cotton equivalent yield (kg/ha)	Gross Return (Rs/ha)			Net Return (Rs/ha)			BCR		
				Cotton	Green gram	Total	Cotton	Green gram	Total	Cotton	Green gram	Total
Module1. Non-monetary input	306	545	772	22928	35006	57934	-7223	17406	10183	0.76	0.96	1.21
Module2. Low cost input	407	559	778	30488	27825	58313	6901	14625	21526	1.29	1.04	1.59
Module3. High intensive	454	653	1012	34028	41856	75884	-1128	24256	23128	0.97	1.38	1.44
Control1. Non organic IPM	774	669	1346	58065	42902	100967	21173	25302	46475	1.57	1.71	1.85
Control2. Non organic (Farmers'practice)	660	654	1220	49500	41967	91467	-4760	24367	19607	0.91	1.59	1.27
Sed	27.2	36.3		-			-			-		
CD (5%)	60	79		-			-			-		

Soil pH: 8.1, EC : 0.36 m mhos cm^{-1}, OC (%): 0.39, Available N: 230 kg/ha, P_2O_5: 43.5 kg/ha and K_2O: 802 kg/ha, Rainfall: 1036 mm and spacing: 30 cm X 10 cm

SRIVILLIPUTHUR

The trial of testing of organic nutrient, pest and disease management module in cotton based cropping system conducted at Srivilliputhur under irrigated conditions revealed that Module 3 observed higher performance registered with 78 bolls per square meter, 20 bolls per plant, and a boll weight of 5.1 g, resulting in an impressive seed cotton yield of 1,875 kg/ha. Control treatments, particularly Control1 recorded , seed cotton yield of 1,750 kg/ha, yet they do not match the superior performance of Module 3 (Table 96). With respect economics and production efficiency, Module 3 stands out with the highest cultivation cost of 83,700 but offers a remarkable gross return of 150,000 and a net return of 66,300, resulting in a benefit-cost ratio of 1.79, indicating a highly favorable economic outcome. Module 1 demonstrates the lowest net return of 33,480 and the least favorable benefit-cost ratio of 1.51, reflecting its comparatively lower economic viability. Moreover, the relative production efficiency (RPE) and relative economic efficiency (REE) metrics reveal that Module 3 not only leads in financial returns but also shows positive efficiency scores, implying better utilization of resources. Overall, the data underscores that Module 3 is the most economical and physical yield.

Table 96. Plant height, **Seed cotton yield (kg/ha), yield attributes, economics and efficiencies of cotton as influenced by different organic modules at Srivilliputhur**

Treatments	Seed cotton yield (kg/ha)	Bolls per plant	No of bolls/ sqm	Boll weight (g)	Gross return (Rs/ha)	Net return (Rs/ha)	Benefit Cost ratio	Relative production efficiency (RPE)	Relative Economic efficiency (REE)
Module1.Non-monetary input	1241	15	61	4.1	99280	33480	1.51	-18.4	-32.1
Module2.Low cost input	1460	19	75	4.8	116800	44200	1.61	-3.9	-10.3
Module3.High intensive	1875	20	78	5.1	150000	66300	1.79	23.4	34.5
Control1.Non organic IPM	1750	19	76	5.2	140000	61500	1.78	15.1	24.7
Control2.Non organic	1520	18	70	5	121600	49300	1.68		
SEd	**128.1**	**2.12**	**2.14**	**0.12**					
CD (5%)	**240.6**	**4.36**	**5.36**	**NS**					

Soil pH : 7.26; Soil EC: 0.6 m mhos cm^{-1}: OC(%): 1.8; Soil bulk density 1.3g/cm^3; C:N ratio: 6.2: 1, Available N : 190 kg/ha (Low), P_2O_5 : 45 kg/ha (High), K_2O : 412 kg/ha (High), Environment:irrigated, Rainfall (mm) received during cropping periods: 480 mm

Coimbatore

The results of different treatments tested in the second year revealed that boll weight (g) was not significantly influenced by different modules. The significantly highest seed cotton yield was recorded with M4. Non-organic IPM-based management (1466 kg/ha) indicated that organic modules (M1, M2 & M3) were produced significantly less (Table 97). The sucking pest population was significantly lower with M4. Non-organic IPM-based management. The pink boll worm in, green and open boll damage were significantly less with M5. Non-organic farmers practice 12.4 and 16.4 percent, respectively. However, the disease incidence grade of alternaria, grey mildew, rust and tobacco streak virus percentages were lower with different organic modules (M1, M2 & M3) as compared to non-organic modules (M4 & M5).

Table 97. Boll weight (g) , Seed cotton yield (kg/ha) , sucking pest population , boll worm (%) damage and disease grade as influenced by organic modules

Modules	Boll wt (g).	SCY (kg/ha)	Jassids / 3 leaves		Pink bollworm (% damage)			Alternaria (grade)	Grey Mildew (G)	TSV (PDI %)	Rust (Grade)
			45 DAS*	90 DAS*	Flower damage#	Green boll damage*	Open boll damage*				
Module: 1 Non-Monetary	4.2	990	3.68 (2.16)	10.32 (3.36)	2.8 (1.95)	19.5 (4.53)	30.2 (5.59)	3.4	3.3	0.58	6.1
Module 2: Low Cost	4.1	1013	6.4 (2.72)	12.04 (3.61)	3.1 (2.03)	21.3 (4.73)	22.2 (4.81)	3.3	2.6	0.82	6.6
Module 3:High Cost	4.3	1113	3.8 (2.19)	7.32 (2.88)	2.6 (1.89)	23.7 (4.97)	18.4 (4.4)	2.8	2.4	0.85	6.9
Module 4: Non-Organic	4.4	1466	1.88 (1.7)	6.04 (2.65)	2.9 (1.97)	14.5 (3.94)	17.3 (4.27)	5.2	4.6	0.86	7
Module 5: Farmers Practice	4.5	1455	2.44 (1.85)	6.68 (2.77)	2.4 (1.84)	12.4 (3.66)	16.4 (4.18)	7.6	7.7	0.9	5
SE(d)	0.75	50.3	0.242	0.334	0.282	0.348	0.414	1.36	1.6	0.24	1.2
C.D.	NS	107.5	0.445	0.545	N/A	0.731	0.869	2.921	3.42	NS	NS

Agronomy XII: Paid trial Bio-efficacy evaluation & effect of "Zeba" for water conservation, growth & yield parameters in Cotton crop.

CENTRAL ZONE-JUNAGADH

The irrigation experiment was conducted at Junagadh to evaluate the efficacy of ZEBA polymer under varied levels of irrigation on cotton growth and yield parameters, seed cotton yield, nutrient and water use efficiency, nutrient uptake and impact on soil properties. Different irrigation treatments significantly influences on plant height, number of boll per square meter and seed cotton yield of *Bt* cotton. The significantly highest plant height (141 cm) and number of bolls per square meter (44) were recorded with treatment irrigation at depletion of 60 % available soil moisture. Seed cotton yield (3031 kg/ha) and stalk yield of *Bt* cotton (5301 kg/ha) were found significantly the highest with same treatment (Table 98). Soil nutrient status were not significantly influences by the irrigation treatments. Different polymer treatment were not significantly influences on growth characters and yield attributes of *Bt* cotton. Seed cotton yield was found numerically maximum (2857 kg/ha) with application of zeba (13 kg/ha) as compare with control.

Table 98. Seed cotton yield (kg/ha), Plant height and Number of bolls as influenced by irrigation schedules and ZEBA polymer

Treatments	I_1. Depletion of 45% of available soil moisture	I_2. Depletion of 60% of available soil moisture	I_3. Depletion of 75% of available soil moisture	I_4.Rainfed control	Mean (Polymer)	ANOVA	SE d	CD (5%)	CV
P_1. Zeba 12.5kg/ha	2938	3043	3024	2424	2857	Irrigation	96	306	9.59
P_2. Control	2861	3020	2925	2308	2778	Polymer	56	NS	
Mean (Irrigation)	2900	3031	2975	2366	2818	I x P	112	NS	7.95
Plant height (cm)									
Treatments	**I_1.**	**I_2.**	**I_3.**	**I_4**	**Mean (Polymer)**	**ANOVA**	**SE d**	**CD (5%)**	**CV**
P_1. Zeba 12.5kg/ha	128	146	140	114	132	Irrigation	3.85	12	8.44
P_2. Control	129	136	133	109	127	Polymer	2.39	NS	
Mean (Irrigation)	128	141	136	111	129	I x P	4.78	NS	7.4
No. of bolls/square meter									
Treatments	**I_1.**	**I_2.**	**I_3.**	**I_4**	**Mean (Polymer)**	**ANOVA**	**SE d**	**CD (5%)**	**CV**
P_1. Zeba 12.5kg/ha	37.9	44.4	40.7	36.1	39.81	Irrigation	1.46	4.68	10.3
P_2. Control	40.7	43.0	43.5	35.1	40.63	Polymer	0.95	NS	
Mean (Irrigation)	39.35	43.75	42.13	35.65	40.22	I x P	1.91	NS	9.48

Soil parameters of pH:7.78, Ec : 0.47 m mhos cm^{-1}, OC (%): 0.81 , available. 301 kg/ha N, P_2O_5 37.41 kg/ha & K_2O 328 kg/ha, recommended spacing 120 x 45 cm, recommended nutrients 240-50-150 NPK kg/ha, Cotton species/type G.Cot.Hy.24 BG-II, environment: irrigated

RAHURI

The irrigation experiment was conducted at Rahuri to evaluate the efficacy of ZEBA polymer under varied levels of irrigation on cotton growth and yield parameters, seed cotton yield, nutrient and water use efficiency, nutrient uptake and impact on soil properties. The results revealed that Application of Zeba @ 12.5 kg/ha recorded significantly higher seed cotton yield (2086 kg/ha). Irrigation Scheduling at 60% of available soil moisture depletion (I_2) recorded significantly higher seed cotton yield (2000 kg/ha). The interaction effect of cultivation of cotton with Zeba (P_1) @ 12.5 kg/ha and scheduling of irrigation at 60% available soil moisture depletion (I_2) recorded higher seed cotton yield (2255 kg/ha) as compared to remaining treatment combinations (Table 99).

Table 99. Seed cotton yield (kg/ha) and Number of bolls as influenced by irrigation schedules and ZEBA polymer

Seed cotton yield									
Treatments	**I_1. Depletion of 45% of available soil moisture**	**I_2. Depletion of 60% of available soil moisture**	**I_3. Depletion of 75% of available soil moisture**	**I_4.Rainfed control**	**Mean (Zeba)**	**ANOVA**	**SE d**	**CD (5%)**	**CV**
P_1 Zeba 12.5 kg/ha	2085	2255	2006	1995	2086	**Irri. Sch. (I)**	36.0	115.2	
P_2 Without Zeba	1912	1744	1630	1369	1664	**Zeba (P)**	39.2	120.9	8.3
Mean (DASM)	1999	2000	1818	1682	1875	I X P	78.5	NS	

No. of Bolls/square metre									
Treatments	**I1.**	**I2.**	**I3.**	**I4**	**Mean (Zeba)**	**ANOVA**	**SE d**	**CD (5%)**	**CV**
P_1 Zeba 12.5 kg/ha	34.6	32.9	33.2	33.4	**33.58**	**Irri. Sch. (I)**	0.85	NS	
P_2 Without Zeba	31.6	31.6	30.6	30.5	**31.15**	**Zeba (P)**	0.59	1.81	7.26
Mean (DASM)	**33.1**	**32.3**	**31.9**	**32.0**	**32.37**	I X P	1.18	NS	

Soil parameters: soil pH: 7.68, Ec: 0.24 m mhos cm^{-1}, OC (%): 0.54, available, N : 190 kg/ha, P_2O_5 : 18 kg/ha , K_2O : 553kg/ha, Environment: Irrigated,

SOUTH ZONE

RAICHUR

The irrigation experiment was conducted to evaluate the efficacy of ZEBA polymer under varied levels of irrigation on cotton growth and yield parameters, seed cotton yield, nutrient and water use efficiency, nutrient uptake and impact on soil properties. The results revealed that irrigation scheduling at the depletion of 45% available soil moisture recorded highest plant height (150 cm), monopodia (1), sympodia (25), number of bolls (35), boll weight (5.45), LAI (5.13), Chlorophyll content (32.2), Dry weight of root (63), Dry weight of stem (196) and Seed cotton yield (2984 kg/ha). The least values were recorded in Rainfed control (I_4). Application of polymer zeba registered a significantly higher seed cotton yield (2793 kg/ha) than the control (2470 kg/ha) (Table 100). Significantly higher Plant height, number of bolls, chlorophyll content and root dry weight were also registered in polymer Zeba applied plots on comparision with control.

Table 100.Growth and yield parameters of Bt cotton as influenced by Zeba application with irrigation schedules

Treatments	Plant height (cm)	No. of Mono-podia/ plant	No. of Sym-podia/ plant	No. of Bolls/ plant	Boll weight (g)	LAI	Chloro-phyll content	Dry weight of root (g)	Dry weight of stem (g)	Seed cotton yield (kg/ha)
Main Plot: Irrigation schedules (I)										
I_1: Depletion of 45% of moisture	151	1.3	25	35	5.45	5.13	32.20	63	196	2984
I_2: Depletion of 60% of moisture	136	1.0	22	31	5.34	4.90	27.46	48	173	2653
I_3: Depletion of 75% of moisture	135	1.0	22	32	5.36	4.83	26.97	50	177	2778
I_4: Rainfed control	120	0.7	18	24	5.30	4.44	22.60	42	161	2110
S.Ed+	**3.6**	**0.13**	**1.3**	**0.60**	**0.06**	**0.13**	**1.74**	**1.23**	**4.48**	**107**
C. D. At 5%	**8.4**	**0.30**	**3.1**	**1.4**	**NS**	**0.31**	**4.01**	**2.81**	**10.27**	**245**
Sub Plot: Polymer (P)										
P_1: Zeba @ 12.5 kg/ha	139.8	1.1	22.7	32.5	5.38	4.92	28.53	53.81	191.51	2793
P_2: Control	130.9	0.9	20.7	28.0	5.35	4.74	26.08	48.89	171.49	2470
S.Ed+	**4.0**	**0.10**	**1.4**	**1.7**	**0.07**	**0.08**	**0.88**	**2.67**	**8.95**	**86**
C. D. At 5%	**8.7**	**NS**	**NS**	**3.7**	**NS**	**NS**	**1.94**	**5.88**	**NS**	**189**

SRIVILLIPUTHUR

The irrigation experiment was conducted to evaluate the efficacy of ZEBA polymer under varied levels of irrigation on cotton growth and yield parameters, seed cotton yield, nutrient and water use efficiency, nutrient uptake, and impact on soil properties. The results revealed that both the application of Zeba and

irrigation scheduling significantly influenced all the parameters. In case of irrigation at the depletion of 45% available soil moisture (ASM) along with Zeba application recorded higher performance in all the growth, yield, and quality attributes. Application of polymer zeba registered significantly higher yield than control. The soil moisture under Zeba-applied plots was higher than that of control. The water use efficiency was also higher under Zeba application than the control. Polymer treatment 1 (P_1) demonstrated superior performance compared to Polymer treatment 2 (P_2) across all tested irrigation conditions. For P_1, the yields were recorded at 1900 kg/ha for I_1, 1716 kg/ha for I_2, 1595 kg/ha for I_3, and 1559 kg/ha for I_4, resulting in a mean yield of 1692 kg/ha. In contrast, P_2 yields were lower, with results of 1543 kg/ha for I_1, 1510 kg/ha for I_2, 1430 kg/ha for I_3, and 1380 kg/ha for I_4, leading to a mean yield of 1465 kg/ha. The results further revealed that the mean yield across the irrigation treatments showed that increasing irrigation levels resulted in correspondingly increasing yields, with I_1 achieving a mean of 1721 kg/ha, I_2 at 1613 kg/ha, I_3 at 1513 kg/ha, and I_4 at 1470 kg/ha, culminating in an overall mean of 1580 kg/ha. These findings indicate that polymer application (P_1: Zeba @ 12.5 kg/ha) significantly enhances crop yield in all levels of soil moisture depletion as compared to control (Table 101).

Table 101. Seed cotton yield (kg/ha) as influenced by irrigation schedules and ZEBA polymer

Seed cotton yield (kg/ha)									
Treatments	**I_1. Depletion of 45% of available soil moisture**	**I_2. Depletion of 60% of available soil moisture**	**I_3. Depletion of 75% of available soil moisture**	**I_4. Rainfed control**	**Mean (Polymer)**	**ANOVA**	**SE d**	**CD (5%)**	**CV**
P_1: Zeba @ 12.5 kg/ha	1900	1716	1595	1559	**1692**	Irrigation	21.49	44.37	6.66
P_2: Control	1543	1510	1430	1380	**1465**	Polymer	27.69	67.76	8.59
Mean (irrigation)	**1721**	**1613**	**1513**	**1470**	**1580**				

Soil parameters: pH: 7.7, Soil EC: 8.26 m mhos cm^{-1}, OC (%): 0.7, available N 190 kg/ha (Low), P_2O_5 45 kg/ha (High) & K_2O 412 kg/ha (High), recommended spacing:90 x 20cm, recommended nutrient:120:80:80 kg/ha of NPK , Cotton specie: RCH 929, environment (rainfed) and total rainfall (480 mm) during cropping periods

COIMBATORE

The irrigation experiment was conducted to evaluate the efficacy of ZEBA polymer results revealed that irrigation at depletion of 75% available soil moisture (ASM) recorded the highest seed cotton yield (2285 kg/ha) which was on par with that of 60% and 45% ASM and significantly higher than rainfed control. Application of polymer zeba registered significantly higher yield (2286 kg/ha) than control. The soil

moisture under zeba applied plots were higher than that of without zeba application. The water use efficiency was also higher in Depletion of 45% of available soil moisture (3.3) and zeba application (4.2) than control (Table 102).

Table 102. Growth, yield parameters, Seed cotton yield and Water use efficiency of Bt cotton as influenced by Zeba application with irrigation schedules

Treatments	Plant height (cm)	Monopodia (No/plant)	Sympodia (No/plant)	Bolls (No. /m^2)	Boll weight (g)	Seed cotton yield (Kg/ha)	Water use efficiency (kg /ha / mm)
Irrigation							
I_1. Depletion of 45% of available soil moisture	108	1.4	21	53	5.3	2345	2.87
I_2. Depletion of 60% of available soil moisture	106	1.3	19	49	5.1	2228	3.08
I_3. Depletion of 75% of available soil moisture	103	1.2	17	47	4.9	2135	3.28
I_4. Rainfed control	98	1.1	16	43	4.8	1250	2.19
SEd	5.2	0.08	1.06	2.6	0.24	82	
CD (P=0.05)	NS	NS	2.14	5.6	NS	164	
Polymer application							
P_1. Zeba 12.5 kg / ha	109.5	1.6	18.7	52.1	5.2	2376	4.2
P_2 – Control	103.2	1.4	16.2	48.6	4.9	1453	2.5
SEd	5.3	0.08	0.92	2.6	0.26	42	
CD (P=0.05)	NS	NS	1.87	5.3	NS	85	
Interaction	NS	NS	NS	NS	NS	NS	

Soil parameters: soil pH value: 8.1, available N : 224, P_2O_5 : 28, K_2O : 730, O.C.(%) : 0.52, Recommended fertilizer level: 120 : 60 : 60 Kg NPK / ha, Recommended spacing : 90 x 45 cm, Environment: irrigated

Soil Science

Exp 1. To study the impact of Phosphorus and Potassium fertilization on yield and quality of desi cotton HISAR

The trial was conducted to study the impact of phosphorus and Potassium fertilization on yield and quality of desi cotton. Seed cotton yield showed a significant increase from 848 kg/ha in T_1 to 1672 kg/ha in T_8, reflecting the positive impact of nutrient application. The economic analysis revealed that the cost of cultivation ranged from ₹60,900/ha in T1 to ₹71,425/ha in T8. Gross returns increased progressively, with T8 achieving the highest gross return of ₹1,18,723/ha, compared to ₹60,189/ha in T1 causing a loss in net returns (-₹711/ha) but significantly improved in nutrient-enriched treatments, peaking at ₹47,298/ha in T8. The benefit-cost ratio (BCR) followed a similar trend, increasing from 0.99 in T1 to 1.66 in T8, indicating that higher nutrient applications, especially potassium, substantially enhanced economic profitability. The nutrient analysis of the plant and soil samples showed that nutrient uptake and soil nutrient availability vary across different treatments. Plant nitrogen (N) uptake ranged from 2.01% in T1 to 2.24% in T8, while phosphorus (P) uptake increased from 0.79% in T1 to 1.38 % in T5. Potassium (K) uptake also improved significantly, rising from 1.35% in T1 to 1.76% in T8. Soil nutrient availability followed a similar pattern, with the highest N (315.9 kg/ha), P (30.0 kg/ha), and K (333.5 kg/ha) observed in T8. These results indicate that treatments with higher potassium and phosphorus applications, particularly T8 and T5, enhanced nutrient uptake and availability in the soil (Table 103).

Table 103. To study the impact of Phosphorous and Potassium fertilization on the yield and quality of *desi* cotton

Treatments	Seed cotton yield (kg/ha)	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Marginal Benefit Cost Ratio	Plant nutrient content (%)		
						N	P	K
T1: Control	848	60900	60189	-711	0.99	2.01	0.79	1.35
T2: RDN	978	69175	68955	266	1.00	2.01	0.89	1.46
T3: RDN+P @ 10 kg/ha	1033	69672	73337	3665	1.05	2.06	1.21	1.50
T4: RDN+P @ 15 kg/ha	1142	69921	81070	11150	1.16	2.10	1.31	1.55
T5: RDN+P @ 20 kg/ha	1181	70169	83856	13687	1.20	2.08	1.38	1.52
T6: RDN+K @ 15 kg/ha	1434	69925	101825	31900	1.46	2.12	1.00	1.58
T7: RDN+K @ 30 kg/ha	1545	70675	109665	38990	1.55	2.14	1.05	1.61
T8: RDN+K @ 45 kg/ha	1672	71425	118723	47298	1.66	2.24	1.10	1.76
SEd	24.0					0.02	0.05	0.03
CD (5%)	73.6					0.04	0.11	0.06

Soil Ph: 7.8, Soil EC: 0.09 m mhos cm^{-1}, Organic Carbon (%) 0.41, available N: 298.2 kg/ha, P_2O_5: 27 kg/ha, K_2O: 311.5 kg/ha, desi variety, rainfed with 483.5 mm rainfall & 21 rainy day

HISAR

Exp 2. To study the impact of Silicon fertilization on yield and quality of Bt cotton hybrid

The trial was conducted to study the impact of Silicon fertilization on yield and quality of Bt cotton hybrid. The results revealed that the seed cotton yield was significantly enhanced by silicon application, with the highest yield observed in T5 (2083 kg/ha), indicating the beneficial effects of RDF combined with 2% silicon. Silicon application (1–3%) resulted in enhanced fiber quality, as reflected in the superior lint index, seed index, and GOT, with marginal variations among silicon treatments. These results underscore the benefits of combining RDF with orthosilicic acid for cotton quality enhancement. The economic analysis revealed significant benefits of integrating silicon into nutrient management. The cost of cultivation ranged from Rs. 48,400/ha in T1 (control) to Rs. 60,788/ha in T6 (RDF + 3% Si). Gross return was highest in T5 (RDF + 2% Si), reaching Rs. 1,37,693/ha, resulting in a net return of Rs. 77,249/ha. Additionally, T5 exhibited the highest benefit-cost ratio (BCR) of 2.28. Treatments using orthosilicic acid (1–3%) consistently outperformed others, showing notable improvements in profitability, which underscores their economic viability in cotton production. This is due to the fact that silicon application reduces the need for chemical interventions for disease and pest control, as well as minimizing the associated labor expenses. Plant nutrient uptake improved with the application of silicon. Nitrogen (N) uptake was highest in T5 (RDF + 2% Si) at 1.58%, followed by T6 (RDF + 3% Si) at 1.49%. Phosphorus (P) uptake peaked at 0.70% in T5, with a slight decline in T6. Potassium (K) uptake showed minimal variation across treatments, ranging from 0.53% in T1 (Control) to 0.59% in T5 (Table 104).

Table 104. Seed cotton yield, Economics and Plant nutrient uptake as influenced by silicon fertilization

Treatments	Seed cotton yield (kg/ha)	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Marginal Benefit Cost Ratio	Plant nutrient uptake (%)		
						N	P	K
T1: Control	1375	48400	54360	5960	1.12	1.27	0.26	0.53
T2: RDF	1810	72256	117199	44943	1.62	1.40	0.42	0.55
T3: RDF + Salicylic acid @ 100 ppm	1649	60746	105170	44424	1.73	1.34	0.38	0.54
T4: RDF + Si (1%) (Orthosilicic acid)	1942	60100	127160	67060	2.12	1.45	0.54	0.57
T5: RDF + Si (2%) (Orthosilicic acid)	2083	60444	137693	77249	2.28	1.58	0.70	0.59
T6: RDF + Si (3%) (Orthosilicic acid)	2032	60788	133873	73085	2.20	1.49	0.58	0.58
SEd	34.2	-NA-	-NA-	-NA-	-NA-	0.01	0.03	0.002
CD (5%)	73.5	-NA-	-NA-	-NA-	-NA-	0.03	0.07	0.004

Soil pH: 7.9, Soil EC: 0.12 m mhos cm^{-1}, Organic Carbon (%): 0.45, available N 302.4 kg/ha, P_2O_5: 28 kg/ ha, K_2O 322 kg/ha, Bt cotton, 67.5 x 60 cm, 175:60:60:25 (N:P:K:$ZnSO_4$ kg/ha, respectively) rainfed with 483.5 mm rainfall & 21 rainy days

HISAR

Experiment 3. Estimation of soil parameters of bulk density, infiltration rate, hydraulic conductivity, soil Ph, EC (m mhos cm^{-1}), CEC (mi.equ./100 g of soil), soil organic carbon, Total and available N, P and K in conservation agriculture experiment carried out in Hisar

The study was carried out for Estimation of soil parameters of bulk density, infiltration rate, hydraulic conductivity, soil Ph, EC (m.mhos cm^{-1}), CEC (m.eq./100 g of soil), soil organic carbon, Total and available N, P and K in conservation agriculture experiment in Hisar. The bulk density (BD) was found to be the highest in both topsoil and subsoil in T1 (1.42 and 1.44 g/cc) compared to T2, T5, and T7, which showed relatively lower BD values among all treatments. The infiltration rate was higher in T1 and T3 (14.6 cm/hr) compared to T5, which had the lowest rate (13.8 cm/hr). The hydraulic conductivity values followed the same trend. The total NPK content was found to be better in the cotton grown under T7 treatment compared to T1. Similarly, T7 resulted in better availability of NPK in the soil (Table 105).

Table 105. Soil parameters and Nutrient availability as influenced by conservation agriculture

Treatments	Bulk density		Infiltration rate (cm/hr)	Hydraulic conductivity (mm/hr)	Total N P K (%)			Available N P K (kg/ha)		
	0-15 cm	16-30 cm			N	P	K	N	P	K
T_1	1.42	1.44	14.6	2.44	1.24	0.26	0.56	286.5	23.3	292.3
T_2	1.31	1.35	14.3	2.39	1.43	0.42	0.57	309.9	25.7	336.7
T_3	1.40	1.43	14.6	2.43	1.30	0.32	0.56	298.2	25.0	307.3
T_4	1.37	1.39	14.5	2.42	1.37	0.42	0.56	302.9	25.0	322.0
T_5	1.31	1.35	13.8	2.31	1.45	0.58	0.58	313.6	26.0	341.3
T_6	1.34	1.38	14.5	2.42	1.37	0.42	0.57	305.2	25.0	328.2
T_7	1.32	1.36	14.5	2.41	1.51	0.63	0.58	316.4	26.0	348.7
SEd	0.01	0.01	0.1	0.01	0.02	0.04	0.00	0.6	0.4	2.6
CD (5%)	0.02	0.03	0.2	0.03	0.05	0.09	0.00	1.4	0.8	5.8

Soil pH: 8.1, Soil EC: 0.14 m mhos cm^{-1}, Organic Carbon (%): 0.45, available N 312.2 kg/ha, available P_2O_5 29 kg/ha, available K_2O 338 kg/ha, rainfed with 483.5 mm rainfall & 21 rainy days

PHY I MANAGEMENT OF SQUARE SHEDDING IN COTTON

NORTH ZONE - BATHINDA

The square shedding experiment results at Bathinda revealed that the treatments significantly influenced growth and yield attributes. Among treatments, the highest plant height of 161.6 cm, sympodia (21.53), high number of bolls per plant (66.33), and boll weight (4.39 g) were recorded in T_4: 2,3,5 triiodobenzoic acid (TIBA) @ 25g/ha. The treatment recorded significantly the highest seed cotton yield of 2153 kg/ha. The lesser seed cotton yield of 1450 kg/ha was recorded in T_{10}: NAA @30ppm.The highest fruit shedding percentage of 37.76 % and more number of aborted fruiting sites/plant 20.67 were observed in T_8: IAA @ 2 5PPM+ kinetin@ 20ppm (Table 106).

Table 106. Growth parameters, yield attributes, physiological parameters and seed cotton yield influenced by various chemical treatments at Bathinda

S. No.	Code	Plant height (cm)	No. of monopodia	No. of Sympodia	No. of bolls/ plants	Bolls weight	SCY/Plot (Kg/ ha)	Total fruiting sites/ plant	Fruit shedding %	No. of aborted fruiting sites/ plant
1	T_1:Ascorbic acid 0.6mmM	151.3	1.93	15.80	48.33	3.88	1580	60.67	20.33	12.33
2	T_2:Sucrose @ 5%+ 0.6mM Ascorbic acid	145.6	2.00	19.60	47.67	3.93	1960	62.00	23.09	14.33
3	T_3:Tricontanol @ 2.5 ppm	154.3	1.60	19.07	65.33	4.12	1906	70.67	7.77	5.67
4	T_4: 2,3,5 tri iodobenzoic acid (TIBA) @25g/ha	161.6	1.80	21.53	66.33	4.39	2153	72.33	8.61	6.00
5	T_5: Silver thiosulphate @ 7.5 uM	129.3	1.67	19.67	46.67	3.80	1966	61.67	24.33	14.67
6	T_6: Mepiquat chloride (MC) @24.5 g/ha	145.0	1.60	19.20	49.00	3.66	1920	61.67	20.94	12.67
7	T_7: GA @100 ppm	132.0	1.60	19.13	36.67	3.69	1913	55.67	34.54	19.00
8	T_8: IAA @25PPM+ kinetin@20ppm	124.0	1.33	15.30	34.00	3.54	1530	54.67	37.76	20.67
9	T_9: Glycine betaine @3g/ha	133.3	2.13	19.00	40.00	3.59	1900	58.67	31.90	18.67

10	T_{10}: NAA @30ppm	130.6	1.60	14.50	43.00	3.61	1450	59.67	27.78	16.67
11	T_{11}: Forchlorfenuron 0.1%	153.0	1.60	19.00	51.33	3.92	1900	64.67	21.16	13.33
12	T_{12}: Control (Water spray)	143.0	1.67	18.07	49.00	3.75	1806	63.67	23.01	14.67
	CD(5%)	**10.95**	**0.10**	**2.19**	**7.40**	**0.18**	**219**	**5.29**	**3.47**	**3.03**

Soil pH value: 8.0, available N : 145 kg/ha, P_2O_5 : 15.20 kg/ha, K_2O : 225 kg/ha, Spacing followe: 67.5x 75 cm, Environment: irrigated

SURAT

The square shedding experiment conducted at Surat results revealed that Growth Characters influenced by chemical treatments viz., Plant height, no. of aborted fruit site per plant and Boll per plant were significantly deviated due to chemical spray while No. of main stem node, No. of fruiting branch per plant were non-significantly differed among treatments. Boll per plant was also found to be higher in T_8, T_{11} and T_{12} treatments. Chlorophyll content on dry weight (11.6 mg/g DW) was also found to be higher in T-8 treatments. Total no. of fruiting sites per plant and boll weight, fruit shedding (%), and seed cotton yield were found to significantly differ among treatments. Highest fruit shedding was found in T_1 (53.3%) treatment followed by T_6. Seed cotton yield was found highest in T_8 (955 kg/ha) which was at par with T_{11} (947.4). Treatment T_8 - IAA @25ppm+ kinetin@20ppm showed the highest boll per plant and the second highest seed cotton yield (Table 107).

Table 107.Growth parameters, yield attributes, physiological parameters and seed cotton yield (kg/ha) influenced by various chemical treatments at Surat

Treatments	Plant height (cm)	No. of main stem nodes	No. of fruiting branches/ plant	No. of open bolls/ plant	Bolls/ plant	No. of aborted fruiting sites/plant	Chlorophyll (mg/g dry weight)	Seed cotton yield (kg/ha)	Boll weight (gm)	Total fruiting sites/ plant	Fruit shedding%
T_1. Ascorbic Acid @0.6 mM	87	25	17	18	18	21	10.3	853	3.03	39	53.3
T_2. Sucrose @ 5 % + 0.6mM Ascorbic Acid	105	25	18	25	25	20	10.0	801	2.98	45	45.1
T_3.Triacontanol@ 2.5 ppm	98	25	17	22	22	19	9.3	869	2.90	41	46.6
T_4.2, 3,5 tri iodobenzoicacid (TIBA)@ 25 g/ha	101	24	16	24	24	17	10.1	854	2.27	40	41.4
T_5.Silver thiosulphate@7.5µM	96	23	15	20	20	17	10.4	829	3.11	37	45.7
T_6.Mepiquat chloride (MC) @ 24.5 g ha^{-1}	72	22	15	17	17	18	10.0	719	3.59	35	51.1
T_7.GA @100 ppm	100	23	15	20	20	17	9.9	885	2.91	36	45.6
T_8.IAA @25ppm+ kinetin@20ppm	96	23	15	25	25	17	11.6	955	2.91	42	40.5
T_9.Glycine betaine@3g /ha	94	22	15	23	23	18	10.0	816	2.78	41	43.8
T_{10}.NAA @30ppm	96	23	15	23	23	19	10.5	823	3.24	42	45.2
T_{11}.Forcholorfenuron 0.1% (CPPU 1L/ha)	97	26	18	25	25	21	10.5	947	2.88	46	45.0
T_{12}.Control (Water spray)	98	25	17	25	25	21	10.5	811	2.42	46	46.0
S.Ed	**4.6**	**0.8**	**0.8**	**0.9**	**0.9**	**0.8**	**0.93**	**38.7**	**0.16**	**1.2**	**1.41**
CD@5%	**13.6**	**NS**	**NS**	**2.7**	**2.7**	**2.4**	**0.31**	**113.7**	**0.47**	**3.7**	**4.10**
CV	**8.4**	**5.8**	**8.9**	**7.2**	**7.2**	**6.8**	**0.44**	**7.9**	**9.43**	**5.4**	**5.33**

Soil pH:7.15, O.C(%) : 0.44, Available N : 410.2 kg/ha, P_2O_5: 25.30 kg/ha, K_2O:465.5 kg/ha, EC: 0.63 m mhos cm^{-1}, Rainfall:938.8, Rainy day:64

CICR (Sirsa)

The square shedding experiment conducted at CICR (Sirsa) results revealed that amongst the chemicals tested, the significantly higher plant height was recorded with spray application of GA @ 100 ppm (T_7) over Mepiquat chloride (MC) @ 24.5 g / ha (T_6) and 2, 3,5 tri iodobenzoicacid (TIBA)@ 25 g/ha (T_4). The second best treatment w. r. t. plant height was with the application of NAA @ 30 ppm (T_{10}). Significantly higher values of number of monopodia, sympodia and bolls per plant were obtained with the application of Glycine betaine @ 3 g / ha (T_9) over control (T_{12}) Control (water spray). The second best treatment w. r. t. number of monopodia and sympodia per plant were with spray application of GA @ 100 ppm (T_7). A non-significantly higher values of total fruiting sites per plant was obtained with the application of Silver thiosulphate @ 7.5 µM (T_5). Significantly lower values of number of aborted fruiting sites per plant as well as fruit shedding percentage was obtained with the application of Glycine betaine @ 3 g / ha (T_9) over control (T_{12}) Control (water spray). The second best treatment w. r. t. aborted fruiting sites per plant as well as fruit shedding percentage was obtained with spray application of GA @ 100 ppm (T_7). Boll weight of 4.07 g was significantly higher with the application of Mepiquat chloride (MC) @ 24.5 g / ha (T_6) over control (T_{12}) Control (water spray). The second best treatment w. r. t. boll weight was obtained with spray application of Glycine betaine @ 3 g / ha (T_9) (3.91 g). The seed cotton yield was significantly higher with the application of Glycine betaine @ 3 g / ha (T_9) (3133 kg/ha) over control (T_{12}) Control (water spray) as well as Ascorbic Acid @ 0.6 mM (T_1), Sucrose @ 5 % + 0.6 mM Ascorbic Acid (T_2), Silver thiosulphate @ 7.5 µM (T_5) and (T_{11}) Forcholorfenuron 0.1 % [CPPU]. All other treatments were at par with each other (Table 108).

Table 108. Growth parameters, yield attributes, physiological parameters and seed cotton yield (kg/ha) as influenced by various chemical treatments at CICR (Sirsa)

Treatment details	Plant height (cm)	Number of sympods per plant	Number of monopods per plant	No. of aborted fruiting sites/plant	Total fruiting sites/plant	Fruit shedding percentage	Number of bolls per plant	Boll weight (g)	Seed cotton yield (kg per ha)
T_1 - Ascorbic Acid @ 0.6 mM	144	20	1	19	53	36.3	33	3.49	2459
T_2 - Sucrose @ 5 % + 0.6 mM Ascorbic Acid	147	21	1	21	52	40.0	31	3.30	2397
T_3 - Triacontanol@ 2.5 ppm	153	21	2	18	54	33.6	36	3.65	2691
T_4 - 2, 3,5 tri iodobenzoicacid (TIBA)@ 25 g/ha	127	22	2	18	54	33.0	36	3.44	2743
T_5 - Silver thiosulphate @ 7.5 µM	143	19	2	20	55	36.9	35	3.29	2537
T_6 - Mepiquat chloride (MC) @ 24.5 g /ha	114	26	2	17	54	30.5	38	4.07	2815
T_7 - GA @100 ppm	159	27	2	13	53	25.3	39	3.73	3029

T_8 - IAA @25 ppm + kinetin @ 20ppm	150	26	2	14	53	26.7	39	3.65	2874
T_9 - Glycine betaine @ 3 g /ha	147	28	2	12	54	22.3	42	3.91	3133
T_{10} - NAA @ 30 ppm	155	24	2	17	55	31.3	38	3.68	2702
T_{11} - Forcholorfenuron 0.1 % [CPPU]	153	20	2	20	52	38.2	32	3.47	2374
T_{12} - Control (water spray)	141	19	1	23	53	43.5	30	3.11	2024
CD (5%)	**20.3**	**4.0**	**0.28**	**3.7**	**NS**	**4.02**	**5.9**	**0.37**	**501.8**

Soil parameters: pH: 8.1; EC:0.34 m mhos cm^{-1}; OC (%) :0.32; Available P_2O_5 :12.1 kg/ha; Available K_2O:230.5 kg/ha, Recommended nutrients: 150 N kg/ha; 30 P_2O_5 kg/ha and 25 K_2O kg/ha ,Environment: irrigated; Total rainfall during cropping period: 251.7 mm (from April, 2024 to November, 2024).

SOUTH ZONE

DHARWAD

The square shedding experiment conducted at Dharwad results revealed that T5 (Silver thiosulphate @7.5µM) showed the highest values across several metrics, including number of fruiting branches/plant (54)**,** number of open bolls/plant (25)**,** boll number/plant (29**)**, and chlorophyll content (2.94 mg/g)**.** This suggests that silver thiosulphate enhances plant growth and boll development more effectively than other treatments. T9 (Glycine betaine @3g/ha) also performed strongly with a plant height of 169 cm**,** 52 fruiting branches/plant, and 28.0 bolls/plant**,** showing its potential to improve cotton yield through better plant growth and fruiting efficiency. This treatment also recorded the second-highest chlorophyll content (2.92 mg/g)**.**T_8 (IAA @25ppm + kinetin @20ppm) was another standout, with 51 fruiting branches/plant and 28 bolls/plant**,** alongside a relatively high chlorophyll content (2.86 mg/g). It shows promise in enhancing cotton plant vitality and boll formation.T_2 (Sucrose @5% + 0.6mM Ascorbic Acid) also showed positive results, with 45 fruiting branches/plant and 25 bolls/plant, suggesting that a combination of sucrose and ascorbic acid may aid in fruiting and boll development.T_3 (Triacontanol @ 2.5 ppm)**,** T4 (TIBA @25 g/ha**)**, and T6 (Mepiquat chloride @ 24.5 g ha^{-1}) also exhibited moderate improvement in growth, with values showing a more balanced effect on fruiting and boll formation compared to the higher-performing treatments. The control (T_{12} - water spray) performed the weakest in terms of growth, with the lowest values in several key parameters, including plant height (148 cm)**,** fruiting branches/plant (46**)**, and boll number (26)**.** However, it still maintained a moderate chlorophyll content (2.54 mg/g).T5 (Silver thiosulphate @7.5µM) stands out in terms of boll weight (5.90 g) and seed cotton yield (2562 kg/ha), marking it as the most effective treatment in increasing both boll size and yield. Additionally, it had the lowest fruit shedding percentage (33.18%), indicating that it helped minimize fruit loss and improve productivity.T9 (Glycine betaine @3g/ha) also showed excellent performance, with a relatively high boll weight (5.75 g) and seed cotton yield (2450 kg/ha). It also exhibited a moderate fruit shedding rate (34.58%) and good earliness (50.80), suggesting it promotes both cotton growth and early maturity.T8 (IAA @25ppm + kinetin @20ppm) demonstrated strong performance in boll weight (5.40 g) and seed cotton yield (2350 kg/ha), alongside a moderate fruit shedding percentage (35.50%). Its earliness

(51.20) was also favorable, pointing to its role in accelerating cotton development.T3 (Triacontanol @ 2.5 ppm) and T4 (TIBA @ 25 g/ha) were also effective, producing boll weights of 4.00 g and 4.35 g, and yields of 2110 kg/ha and 2180 kg/ha, respectively. While their fruit shedding percentages were higher than that of Silver thiosulphate, their performance still showed positive results.The control (T12 - water spray) treatment yielded 2250 kg/ha, with moderate boll weight (4.90 g) and fruit shedding (41.35%). While not the highest performer, it still showed decent results compared to other treatments.Treatments like T2 (Sucrose + Ascorbic Acid), T6 (Mepiquat chloride), and T7 (GA @ 100 ppm) also showed potential, with seed cotton yields ranging from 2200 kg/ha to 2280 kg/ha, and boll weights between 4.56 g and 5.20 g (Table 109). However, their fruit shedding percentages were slightly higher compared to the top-performing treatments.Silver thiosulphate emerged as the most beneficial treatment for cotton growth, showing the highest boll weight and yield, while also minimizing fruit shedding. Glycine betaine and IAA + Kinetin also performed well, particularly in enhancing boll weight and promoting early maturity.

Table 109 . Plant growth characters, yield attributes, physiological parameters and seed cotton yield (kg/ha) as influenced by different growth regulators treatments at Dharwad

Treatments	Plant height (cm)	No. of main stem nodes	No. of fruiting branches/plant	No. of open bolls/plant	No. of mononopodia at harvest	No. of Bolls/plant	No. of aborted fruiting sites/plant	Chlorophyll (mg/g dry weight)	Seed cotton yield (Kg/Ha.)	Boll weight (gm)	Total fruiting sites/ plant	Fruit shedding%
T_1.Ascorbic Acid @0.6 mM	157	19	40	20	2	23	23	2.13	1950	3.85	46	49.78
T_2.Sucrose @ 5 % + 0.6mM Ascorbic Acid	157	22	45	23	3	25	17	2.43	2200	4.56	38	40.00
T_3.Triacontanol@ 2.5 ppm	146	21	43	22	2	24	19	2.28	2110	4.00	48	44.16
T_4.2, 3,5 tri iodobenzoicacid (TIBA)@ 25 g/ha	161	22	44	22	2	25	18	2.38	2180	4.35	38	41.51
T_5.Silver thiosulphate@7.5 µM	163	25	54	25	3	29	14	2.94	2562	5.90	47	33.18
T_6.Mepiquat chloride (MC) @ 24.5 g ha^{-1}	148	23	46	24	3	27	15	2.60	2280	5.20	45	35.44

T_7.GA @100 ppm	146	21	42	21	2	24	20	2.18	2090	3.90	44	46.47
T_8.IAA @25ppm+ kinetin@20ppm	172	24	51	25	3	28	15	2.86	2350	5.40	47	35.50
T_9.Glycine betaine@3g /ha	169	24	52	25	3	28	15	2.92	2450	5.75	43	34.58
T_{10}: NAA @30ppm	141	24	49	24	3	27	16	2.82	2300	4.68	39	36.89
T_{11}.Forchlorfenuron 0.1%	140	20	42	20	2	24	21	2.22	2050	4.10	46	47.45
T_{12}. Control(water spray)	148	23	46	23	3	26	18	2.54	2250	4.90	38	41.35
SED	9.8	1.5	3.1	1.7	0.20	1.5	1.1	0.17	167.7	0.39	0.74	3.53
CD @ 5%	20.3	3.1	6.4	3.5	0.4	3.1	2.4	0.35	347.7	0.82	1.5	6.95
CV	7.8	8.3	8.3	9.2	9.3	7.3	8.3	8.32	9.2	10.31	2.08	10.23

Soil pH value: 7.0-7.5, available N :256 kg/ha, P_2O_5 : 34 kg/ha, K_2O : 515 kg/ha,O.C.(%):0.54

PHY 2 Growth and development of *arboreum c*otton in response to growth regulator

CENTRAL ZONE

SURAT

The experiment was conducted at Surat to know the effect of different flower-inducing growth regulators on the growth and development of *arboreum* cotton found that the plant height, No of monopodia and No. of sympodia were significantly deviated due to growth regulators. The height significantly deviated due to date of sowing whereas number of sympodia and monopodia where non- significantly deviated. Number of Bolls per square meter and yield per plant were significantly deviated due to interaction of date of sowing and growth regulators which indicated that effect of growth regulator were significantly deviated in different environment. Seed cotton yield (kg/ha) and plant population revealed that plant population was not affected due to growth regulators (GR) and time of sowing. The seed cotton yield (kg/ha) was significantly affected due to DS. The significantly higher seed cotton yield was observed in normal sowing (D1) (741 kg/ha) which was followed by D2 (D1+20 days) (475 kg/ha) and D3 (D2+20 days) (550 kg/ha). The interaction of date of sowing and GR was significantly deviated which indicated that the effect of GR was depend on environment (Date of Sowing). The treatment G2. Detopping on 20th node applied in normal condition showed significantly higher seed cotton yield (612 kg/ha) (Table 110). The significant deviation in number of flower was observed due to time of sowing and growth regulators at flowering stage and 30 Days after flowering. Significantly higher no of flowers was observed in G_2 treatment. The interaction of Treatment and time of sowing for number of flower at different stages showed significant deviation which indicate that date of sowing may also influence the effect of different treatment. The pooled analysis of three years showed the significant deviation due to date of sowing was observed in number of boll per sqr which was in normal sowing, whereas boll weight was significantly highest due to G_2 and G_4. The seed cotton yield was highest in nomal sowing and treatment G_2 i.e. detopping on 20th node. The seed cotton yield (kg/ha) was significantly affected due to DS. The significantly higher seed cotton yield was observed in normal sowing (D_1) which was followed by D_2 (D_1+20 days) and D_3 (D_2+20 days)**.**

Table 110. Seed cotton yield (kg/ha) and boll weight (g) as influenced by different growth regulators treatments in *arboreum* at surat

Treatments		Seed cotton yield (kg/ha)				Boll weight (g)			
		D1. Normal sowing	D2. D1+20 days delay	D3. D2+20 days delay	Mean	D1. Normal sowing	D2. D1+20 days delay	D3. D2+20 days delay	Mean
G_1	Control	691	520	545	585	37.30	28.06	29.42	**31.59**
G_2	Detopping on 20th node	911	499	426	612	49.21	26.97	23.03	**33.07**
G_3	Gibberellic acid @ 100 ppm at 45 &60 DAS+ Detopping on 20th node	781	390	571	581	42.17	21.03	30.87	**31.36**
G_4	Ethrel@8.5µM at 45 DAS +Detopping on 20th node	730	415	534	559	39.73	22.40	28.81	**30.32**

G_5	Homobrassinolide @ 0.2 ppm at 45 & 60 DAS +Detopping on 20th node	591	552	673	605	31.93	29.89	36.37	**32.73**
Mean		741	475	550			**25.67**	**29.70**	
ANOVA		**GR**	**D**	**GRXD**		**GR**	**D**	**GRXD**	
SE d		32.4	48.5	56.1		1.37	1.85	2.38	
CD (5%)		NS	138.3	137.4		NS	5.30	5.75	

Soil pH: 7.17, Available N: 459.15 kg/ha, P_2O_5: 23.80 kg/ha, K_2O: 465.33 kg/ha, EC:0.60 m mhos cm^{-1}, Total rain fall-1335, Rainy days-54

SOUTH ZONE

Dharwad

The experiment was conducted to know the effect of different flower-inducing growth regulators on the growth and development of *arboreum* cotton in response to climate change. The highest Seed Cotton Yield was observed in G5. Homobrassinolide @ 0.2 ppm at 45 & 60 DAS + Detopping on 20th Node under normal sowing (D_1) conditions with 1498 kg/ha. The lowest Seed Cotton Yield was recorded in G_3. Gibberellic Acid @ 100 ppm at 45 & 60 DAS + Detopping on 20th Node under delayed sowing conditions (D3), with 456 kg/ha. G5. Homobrassinolide @ 0.2 ppm at 45 & 60 DAS + Detopping on the 20th Node had the highest average seed cotton yield (1138 kg/ha) across all conditions. The highest number of bolls/square meters was observed in G5. Homobrassinolide under normal sowing conditions (D1), with 21 bolls per square meter. The lowest number of bolls/square meters was recorded in G1. Control under the delayed sowing condition (D3), with 9 bolls per square meter. G5. Homobrassinolide treatment showed the highest average number of bolls (17) across all conditions. The highest boll weight was observed in G4. Ethrel @ 8.5µM at 45 DAS + Detopping on 20th Node under normal sowing conditions (D1), with 2.3 g. The lowest boll weight was recorded in G1. Control and G2. Detopping on 20th Node under the delayed sowing condition (D3), both with 1.7 g. G4. Ethrel treatment had the highest average boll weight (2.1g) across all conditions (Table 111).

Table 111. Seed cotton yield (kg/ha) and single plant yield (g) as influenced by different growth regulators treatments in *arboreum* at Dharwad

Treatments	Seed cotton yield (kg/ha)				Single plant yield (g)			
	D_1. Normal sowing	D_2. D_1+20 days delay	D_3. D2+20 days delay	Mean	D_1. Normal sowing	D_2. D1+20 days delay	D_3. D2+20 days delay	Mean
G1.Control	1300	840	589	910	2.8	2.7	2.6	2.7
G2.Detopping on 20th node	1254	879	623	919	3.0	2.9	2.8	2.9
G3.Gibberellic acid @ 100 ppm at 45 &60 DAS+ Detopping on 20th node	1020	570	456	682	2.4	2.3	2.1	2.2
G4.Ethrel@8.5µM at 45 DAS +Detopping on 20th node	1135	612	513	753	2.5	2.4	2.4	2.4
G5.Homobrassinolide@0.2 ppm at 45 & 60 DAS +Detopping on 20th node	1498	1020	895	1138	3.5	3.3	3.2	3.3

G6.Salicylic acid 100ppm @45 &60 DAS+detopping on 20th node	1358	946	714	1006	3.1	3.0	2.8	3.0
G7.Planofix @100ppm @45 &60 DAS+detopping on 20th node	1046	896	641	861	3.3	3.2	3.1	3.2
Mean	1261	811	632		2.9	2.8	2.7	
ANOVA	GR	D	GR x D		GR	D	GRXD	
SE d	53.06	35.64	27.44		0.23	0.22	0.21	
CD (5%)	111.48	74.89	57.66		0.50	0.48	0.46	

Soil pH: 7.0-7.5, Available N:256 kg/ha, P_2O_5 : 34 kg/ha, K_2O : 515 kg/ha, O.C.(%): 0.54, Spacing followed: 60x 15cm.

PHY III DRONE-BASED FOLIAR APPLICATION OF NUTRIENTS IN COTTON

CENTRAL ZONE

SURAT

The trial was conducted at Surat to test Growth Characters influenced by drone spray of KNO_3 treatments. Plant height, No. of monopodia, No. of sympodia, Boll per sq. meter, Boll weight, yield, and protein content were non-significantly deviated due to chemical spray through drone and manual spray while the highest seed cotton yield was observed in T_7 (2959 kg/ha) followed by T5 (2910 kg/ha) (Table 112). Boll weight and no. of boll per sq. metre were not significant due to treatments. Plant height, No. of monopodia, No. of sympodia and protein content in leaf were non-significantly differed among the treatments. Phyto-toxicity rate of 3 was noticed in T_6. Drone spray of KNO_3 @10%. The highest Net return and Marginal cost ratio were observed in the Manual spray of KNO_3 followed by the Drone spray of KNO_3 @ 8%.

Table 112. Growth parameters, yield attributes, protein, and seed cotton yield (kg/ha) influenced by various foliar applications at Surat

Treatments	Plant height (cm) at harvest	No. of Monopodia at harvest	No. of sympodia at harvest	Boll per sq meter	Boll weight (g)	Final plant population (no/net plot)	Seed cotton yield (kg/ha)	Protein (mg/g of Fresh leaf)	Phyto-toxicity rate
T_1. Drone spray of KNO_3 @1%	99	0.4	21	58	3.51	210	2343	9.06	0.0
T_2. Drone spray of KNO_3 @2%	110	0.6	21	64	3.38	188	2643	9.19	0.0
T_3.Drone spray of KNO_3 @4%	109	0.8	24	58	3.62	192	2685	9.32	0.0
T_4.Drone spray of KNO_3 @6%	111	0.2	22	66	3.47	209	2730	9.26	1.0
T_5.Drone spray of KNO_3 @8%	111	0.4	24	68	3.74	192	2910	9.21	1.5
T_6.Drone spray of KNO_3 @10%	114	0.8	20	64	3.34	216	2354	9.33	3.0
T_7.Control (Manual spray 2% KNO_3)	112	1.2	23	66	3.70	182	2959	9.43	0.0
T_8. Absolute control	105	0.6	22	59	3.46	201	2644	9.42	0.0
SEm	5.97	0.12	1.4	5.1	0.12	5.15	221	0.170	-
CD (5%)	NS	NS	NS	NS	NS	NS	NS	NS	-

Soil pH:7.25, EC:0.58 m mhos cm $^{-1}$, Available N : 400.20 kg/ha, P_2O_5 : 20.40 kg/ha, K_2O: 492.35kg/ha, OC.(%) : 3.4, Total rainfall:1335 Rainy days-54

SOUTH ZONE

DHARWAD

The experiment was carried out at Dharwad to test the drone-based foliar application of nutrients in cotton. The analysis of plant growth and yield parameters under different KNO_3 treatments indicates that T3 (Drone spray of KNO_3 @4%) resulted in the best overall performance, with the highest plant height (185 cm), number of sympodia (32), boll count per square meter (169), boll weight (5.8 g), and seed cotton yield (2179 kg/ha)**.** This suggests that a 4% KNO_3 concentration significantly enhances cotton growth and productivity. T_7 (Manual spray @2%) also showed strong results, with a plant height of 181 cm, 30 sympodia, and a yield of 2143 kg/ha, demonstrating that manual application is effective but slightly less productive than drone spraying. However, treatments with higher KNO_3 concentrations (6%, 8%, and 10%) did not show further yield improvements, with T_4 (6%) and T_6 (10%) yielding 1957 kg/ha and 1988 kg/ha, respectively**,** indicating that excessive KNO_3 application may not be beneficial and could potentially lead to diminishing returns. The absolute control (T8) had the lowest plant height (167 cm), number of sympodia (21), and yield (1933 kg/ha), reinforcing the importance of KNO_3 application for improved cotton productivity. Overall, the findings suggest that 4% KNO_3 applied via drone spraying is the most effective treatment for maximizing cotton growth and yield, while higher concentrations do not provide additional agronomic benefits and may lead to inefficiencies in resource use. The yield and protein content of seed cotton were influenced by various plant growth and yield parameters under different potassium nitrate (KNO_3) treatments. The highest seed cotton yield (2179 kg/ha) was observed in T3 (drone spray of KNO_3 @4%), which also exhibited the highest plant height (185 cm), number of sympodia (32), boll number per square meter (169), and boll weight (5.8 g). Notably, the protein content in T3 was also among the highest (20.17% after the first spray and 16.95% after the second spray), suggesting a positive correlation between yield and protein content. Similarly, T4 (KNO_3 @6%) exhibited the highest protein content (24.85% after the first spray and 18.97% after the second spray), but its yield (1957 kg/ha) was lower than T3, indicating that excessive KNO_3 concentration may not always enhance yield proportionally. The lowest protein content (9.03%) and yield (1933 kg/ha) were recorded in the absolute control (T8), reinforcing the importance of KNO_3 application. Moreover, manual spraying (T7) resulted in a slightly lower yield (2143 kg/ha) compared to T3, suggesting that drone spraying at optimal KNO_3 concentrations may improve nutrient efficiency (Table 113).Overall, treatments that promoted better plant growth, boll production, and boll weight contributed to higher seed cotton yield and protein content, highlighting the interactive role of nutrient management in cotton productivity.

Table 113.Growth parameters, yield attributes, protein and seed cotton yield (kg/ha) influenced by various foliar applications at Dharwad

Treatments	Plant height (cm) at harvest	No. of Monopodia at harvest	No. of sympodia at harvest	No. Boll per sq meter	Boll weight (g)	Final plant population (no/net plot)	Seed cotton yield (kg/ha)	Protein content	
								After Ist Spray	After IInd Spray
T_1. Drone spray of KNO_3 @1%	171	3	24	156	5.0	328	1996	18.97	15.86
T_2. Drone spray of KNO_3 @2%	170	3	25	159	4.9	329	2001	19.94	16.71
T_3.Drone spray of KNO_3 @4%	185	3	32	169	5.8	332	2179	20.17	16.95
T_4.Drone spray of KNO_3 @6%	175	3	23	153	5.2	327	1957	24.85	18.97
T_5.Drone spray of KNO_3 @8%	177	3	27	161	5.2	330	2015	22.52	11.01
T_6.Drone spray of KNO_3 @10%	172	3	24	155	4.7	326	1988	17.85	11.68
T_7.Control (Manual spray 2% KNO_3)	181	3	30	163	5.6	331	2143	16.50	10.42
T_8. Absolute control	167	2	21	149	4.5	323	1933	16.85	9.03
SEd	8.8	0.21	1.7	10.9	0.26	24.9	146	1.17	0.74
CD (5%)	NS	0.44	3.7	23.4	0.56	53.5	313	2.51	1.59

Soil pH value: 7.0-7.5, available N :256 kg/ha, P_2O_5 : 34 kg/ha, K_2O : 515 kg/ha, O.C.(%):0.54, Spacing: 90 x 30cm.

BIO CHEM 1. Screening of Cotton genotypes for abiotic stress tolerance and estimation of seed oil, gossypol and protein

HISAR

The screening of Cotton genotypes for abiotic stress tolerance and estimation of seed oil, gossypol and protein results at Hisar found that the specific leaf weight (SLW) increased in most of the genotypes, whereas, the plant height, relative water content (RWC) was found to decrease in rainfed condition as compared to irrigated condition. The genotypes HAU Bt 1353, HAU Bt 14, H 1098 and PAU Bt 03 showed maximum increase in specific leaf weight under rainfed conditions as compared to irrigated control. The proline content increased in most of the genotypes in rainfed conditions as compared to irrigated conditions. The highest and lowest proline content was observed in HAU Bt 19 and HAU Bt-12 genotypes under rainfed conditions, respectively. The genotypes HAU Bt 19, HAU Bt 05, H 1353, and PAU Bt 03 showed maximum increase in proline content under rainfed conditions as compared to irrigated control (Table 114).The highest and lowest sugar content was observed in HAU Bt 08 and H 1353 genotypes under rainfed conditions, respectively, whereas under irrigated conditions genotypes HAU Bt 05 and HAU Bt 19 showed the highest and lowest sugar content, respectively. The average boll weight under irrigated conditions was significantly higher in most of the genotypes. The genotype HAU Bt 13 showed the highest seed cotton yield under irrigated and rainfed conditions. Cotton seed yield under irrigated conditions differs significantly from the rainfed condition, however, the least decrease in seed cotton yield was observed in HAU Bt 08 followed by HAU Bt 19, and HAU Bt 13 genotypes. The crude oil, crude protein and gossypol content decreased significantly under drought conditions in all the genotypes. The genotypes,

HAU Bt 11 and HAU Bt 12 performed best because of high degree indices for SLW and proline content and very less reduction in RWC and seed cotton yield under rainfed conditions (Table 115).

Table 114. Physiological characters, biochemical constituents and seed cotton yield (kg/ha) as influenced by water stress in cotton genotypes

Genotypes (B)	RWC (%)		SLW (mg/cm^2)		Proline content (µmoles/g) of tissue		Total Sugar (%)		Seed cotton yield (kg/ha)		Boll Weight (g)	
	IR (A)	RF (A)	IR (A)	RF (A)	IR (A)	RF(A)	IR (A)	RF (A)	IR (A)	RF(A)	IR (A)	RF(A)
HAU Bt-05	75.94	66.62	6.29	6.25	1.33	1.53	2.57	2.37	1,748	1,646	3.60	3.18
HAU Bt-10	76.91	69.13	5.89	6.47	1.40	1.70	2.44	2.33	1,680	1,338	3.55	3.36
HAU Bt-11	78.89	68.50	6.20	6.17	1.06	1.17	2.21	2.53	1,217	1,269	3.81	3.61
HAU Bt-15	82.36	77.96	5.10	5.56	1.04	1.36	2.06	2.61	1,372	1,304	3.31	2.68
HAU Bt-19	72.42	73.54	5.63	5.55	1.19	1.44	1.92	2.69	1,407	1,323	3.81	3.53
HAU Bt-12	72.79	72.15	5.73	5.70	0.99	1.14	2.19	2.24	1,954	1,578	3.50	3.56
HAU Bt-13	74.62	73.03	5.41	6.29	1.23	1.27	2.19	2.37	2,161	1,715	4.27	3.63
HAU Bt-14	71.88	68.88	5.00	7.29	0.97	1.25	2.47	2.78	1,285	1,372	3.10	3.26
HAU Bt-08	73.00	73.83	6.51	6.33	1.01	1.16	2.36	2.83	2,057	1,773	3.56	3.37
HAU Bt-09	79.11	69.24	5.60	5.97	1.05	1.24	2.15	2.52	1,466	1,612	3.41	3.16
HAU Bt-04	76.21	68.64	5.40	6.23	1.16	1.32	2.44	2.73	1,063	1,097	3.47	3.44
PAU Bt-03	69.19	72.40	7.49	9.03	0.91	1.24	2.33	2.72	1,749	1,646	3.48	3.26
H1098i	79.17	74.28	7.71	6.18	0.89	1.18	2.30	2.13	1,304	1,508	3.88	3.82
H-1353	84.84	71.85	5.66	9.44	0.84	1.17	2.21	2.07	824	892	3.43	3.10
Mean	76.24	71.43	5.97	6.60	1.08	1.30	2.27	2.49	1,520	1,434	3.58	3.35
	C.D.	SE(d)	C.D.	SE(d)	C.D.	SE(d)	C.D. (5%)	SE (d)	C.D.	SE(d)	C.D. (5%)	SE (d)
A	0.35	0.18	0.16	0.08	0.03	0.01	0.12	0.06	36.3	17.6	0.09	0.04
B	0.93	0.47	0.41	0.21	0.08	0.04	0.32	0.16	96.1	46.6	0.23	0.11
A X B	1.32	0.67	0.58	0.29	0.10	0.054	0.45	0.23	135.9	65.9	0.32	0.16

Soil pH value : 7.9, Soil Ec: 0.12 m mhos cm^{-1} , OC (%):0.39, Available N : 296.8 kg/ha, P_2O_5 : 26 kg/ha K_2O: 301 kg/ha, Rainfall: 483.5 mm, Rainy days: 21 rainy days

Table 115. Evaluation of cotton genotypes for seed oil, gossypol and protein

Genotypes (B)	Crude Oil (%)		Crude Protein (%)		Total Gossypol (%)	
	IR (A)	RF(A)	IR (A)	RF(A)	IR (A)	RF(A)
HAU Bt-5	18.75	17.20	12.645	10.485	0.47	0.46
HAU Bt-10	19.45	18.10	22.965	20.26	0.41	0.41
HAU Bt-11	17.60	17.25	21.285	18.34	0.43	0.43
HAU Bt-15	17.60	17.55	22.125	20.56	0.50	0.46
HAU Bt-19	16.70	16.40	14.625	13.66	0.47	0.45
HAU Bt-12	17.60	16.20	20.86	19.905	0.47	0.41
HAU Bt-13	18.05	18.30	20.44	20.14	0.43	0.46
HAU Bt-14	16.15	16.10	18.64	15.4	0.42	0.41
HAU Bt-08	15.55	16.40	22	20.665	0.42	0.41
HAU Bt-09	16.65	17.15	25.065	21.63	0.42	0.43
HAU Bt-04	15.15	15.85	20.08	15.34	0.41	0.39
PAU Bt-03	17.20	17.45	21.7	21.34	0.40	0.42
H 1098i	17.45	17.25	19	17.385	0.47	0.41

H-1353	18.40	17.80	18.76	16.7	0.42	0.43
Mean	17.25	17.13	20.014	17.986	0.44	0.43
	C.D.	**SE(d)**	**C.D. (5%)**	**SE(d)**	**C.D.**	**SE(d)**
A	0.092	0.045	0.181	0.088	0.005	0.003
B	0.251	0.122	0.478	0.232	0.014	0.007
A X B	0.355	0.173	0.676	0.328	0.02	0.01

Soil pH : 7.9, Soil Ec: 0.12 m mhos cm^{-1} , OC (%):0.39, Available N : 296.8 kg/ha, P_2O_5 : 26 kg/ha, K_2O: 301 kg/ha, Rainfall: 483.5 mm, Rainy days: 21 rainy days

SURAT

The screening of Cotton genotypes for abiotic stress tolerance and estimation of seed oil, gossypol and protein results at Surat revealed that Boll weight, Boll per Sq.mtrs and seed cotton yield were significantly deviated under rainfed and irrigated conditions. Boll weight, Boll per Sq.mtrs and seed cotton yield showed significantly higher under irrigated as compared to rainfed conditions. Seed cotton yield was found significantly higher in genotypes GJHV-600 in both irrigated and rainfed conditions (Table 116).

Relative water content (RWC), SLW (Specific Leaf weight) and SLA (Specific Leaf Area) have significantly differed between genotypes in rainfed as well as in irrigated conditions. The GSHV-271 showed significantly higher RWC (%) followed by G.Cot-16 under rainfed. Germination (%), root shoot ratio, Root length and seed vigor did not significantly differ under rainfed and irrigated conditions. Nutrient uptakes significantly differed in all genotypes under rainfed and irrigated conditions except P uptake in rainfed. Total chlorophyll content and proline content were significant due to genotypes under rainfed. Reducing sugar was found significant in rainfed conditions but it was higher in rainfed conditions compared to irrigated conditions. Chlorophyll stability has significantly differed among all genotypes in rainfed and irrigated conditions. Chlorophyll stability index was found significantly highest in GJHV-600 followed by GISV 419 under rainfed conditions (Table 117).

Table 116. Physiological parameters and seed cotton yield (kg/ha) of genotypes as influenced by moisture stress conditions at Surat

Genotypes	Seed cotton yield (kg/ha)		RWC (%)		SLW (mg/cm²)		SLA (cm²/mg)		Root/shoot ratio	
	irrigated	rainfed	Irri-gated	rainfed	Irri-gated	rain-fed	Irri-gated	Rain-fed	Irri-gated	Rain-fed
GJHV-600	2453	2086	93.27	80.03	1.06	0.93	0.94	1.07	0.29	0.27
GSHV-269	1980	1974	96.49	78.58	1.20	1.22	0.83	0.82	0.30	0.27
GISV-419	2282	1916	94.46	75.21	1.17	0.74	0.85	1.35	0.29	0.24
GJHV-602	2065	1827	89.31	73.83	1.00	1.16	1.00	0.87	0.26	0.24
GISV-421	2819	2083	87.25	79.86	1.40	1.33	0.71	0.75	0.29	0.29
GSHV-271	2004	1885	92.65	81.11	1.18	1.38	0.85	0.72	0.33	0.25
LRA-5166	1627	1498	88.07	73.77	1.35	1.60	0.74	0.63	0.30	0.27
G.Cot-16	2223	1950	88.79	80.77	1.43	1.17	0.70	0.85	0.28	0.25
SE(d)	154	99.2	1.42	0.98	0.032	0.027	0.024	0.019	0.02	0.01
C.D. (5%)	468	301	3.08	2.14	0.069	0.058	0.052	0.041	NS	NS

Soil pH: 7.20, EC-0.60 m mhos cm^{-1}, Avail.N-360.0kg/ha, Available P2O5-24.25kg/ha, Avail K_2O-485.20kg/ha, Total rainfall-1335 mm, Rainy days-54, Spacing-120x45 cm

Table 117. Physiological parameters of genotypes as influenced by moisture stress condition at Surat

Genotypes	Reducing Sugar (mg/g of tissue)		Chlorophyll stability (%)		Protein (mg/g of tissue)	
	irrigated	rainfed	irrigated	rainfed	irrigated	rainfed
GJHV-600	19.58	21.60	85.66	79.13	7.91	10.81
GSHV-269	20.24	21.35	84.45	77.28	7.63	10.91
GISV-419	20.67	23.23	81.95	79.43	7.88	9.51
GJHV-602	19.94	22.24	82.34	76.60	7.60	10.33
GISV-421	20.99	20.23	84.16	76.24	7.72	10.92
GSHV-271	20.26	22.43	81.02	74.82	7.12	10.81
LRA-5166	20.83	22.89	82.21	72.22	6.97	10.52
G.Cot-16	20.01	20.63	82.40	69.54	7.26	11.16
SE(d)	0.64	0.44	1.13	1.14	0.12	0.54
C.D. (5%)	NS	0.97	2.45	2.47	0.26	NS

Soil pH: 7.20, EC-0.60 m mhos cm^{-1}, Avail.N-360.0kg/ha, Available P2O5-24.25kg/ha, Avail K_2O - 485.20kg/ha, Total rainfall-1335 mm, Rainy days-54, Spacing-120x45 cm

DHARWAD

The screening of Cotton genotypes for abiotic stress tolerance and estimation of seed oil, gossypol and protein results at Dharwad revealed that among IET hirsutum lines, IET-47082 (1017 kg/ha), IET-47089 (1162 kg/ha) yielded maximum, among IET-hirsutum (C), IET-47124 (1168 kg/ha), IET-47125 (1096 kg/ha) was high yielding and the *arboreum* pre-released culture line, DDCC 2115 yielded 792 kg/ha were comparable with that of their respective checks. The lines IET-47123, IET-47124, IET-47125 exhibited high RWC (38.43, 38.74, 39.82%), and proline (2.45, 2.43, and 2.86 µmol.g^{-1} of tissue) and carbohydrates (38.70, 39.01, 35.58 mg/g) accumulation under rainfed conditions with high CSI (75.05, 85.99 and 83.44%), root/shoot ratios (0.38, 0.38 and 0.41) .Therefore based on the physiological and biochemical parameters it was evident that the lines IET-47123, IET-47134, and IET-47125 were found to be drought tolerant. Seed oil, protein and gossypol content in cotton seeds were varying significantly . Mean oil content was found to be 20.44%. Mean protein content in seed was found to be 20.66 mg/g. Mean gossypol content in seed was found to be about 4.78 mg/g seed. Oil and protein content in seeds was maximum in IET-47089 (20.69%, 22.16 mg/g), IET-47121 (21.28% and 21.72 mg/g), IET-47123 (21.30%, 21.31 mg/g) and IET-47125 (20.33%, 21.90 mg/g), whereas in DDCC-2115 (18.52%, 22.59 mg/g) respectively (Table 118).

Table 118. Physiological parameters, Seed Cotton Yield and Root/shoot ratio (kg/ha) of genotypes as influenced by moisture stress condition at Dharwad

	Genotypes	RWC (%)			Chlorophyll content (mg/g fr. wt.)			Seed Cotton Yield (kg/ha)			Root/shoot ratio		
		Rainfed	Irrigated	Mean	Rainfed	Irrigated	Mean	Rainfed	Irrigated	Mean	Rainfed	Irrigated	Mean
0	IET-47081	32.92 (34.99)	32.60 (34.79)	32.76 (34.89)	3.68	3.05	3.37	489	414	451	0.33	0.27	0.30
2	IET-47082	36.77 (37.32)	33.66 (35.44)	35.22 (36.37)	3.87	3.01	3.44	1164	870	1017	0.38	0.27	0.33
3	IET-47083	31.95 (34.40)	30.10 (33.82)	31.03 (33.82)	3.23	3.12	3.18	1011	979	995	0.34	0.28	0.31
4	IET-47084	32.43 (34.69)	28.82 (32.44)	30.62 (33.57)	3.58	3.1	3.34	502	439	471	0.31	0.29	0.30
5	IET-47085	37.06 (37.48)	31.69 (34.23)	34.37 (35.85)	3.21	2.99	3.10	1023	895	959	0.32	0.27	0.30
6	IET-47086	37.94 (38.00)	39.28 (38.78)	38.61 (38.39)	3.23	3.79	3.51	942	868	905	0.27	0.27	0.27
7	IET-47087	35.09 (38.30)	35.39 (36.48)	35.24 (36.39)	3.71	3.22	3.96	631	689	660	0.40	0.20	0.30
8	IET-47088	35.39 (36.48)	39.08 (38.67)	37.24 (37.58)	3.84	3.81	3.83	916	837	877	0.36	0.30	0.33
9	IET-47089	34.97 (36.23)	33.17 (35.14)	34.07 (35.69)	3.26	3.38	3.32	1305	1018	1162	0.23	0.26	0.24
10	IET-47121	33.49 (35.34)	30.03 (33.20)	31.76 (34.27)	2.90	2.45	2.68	587	581	584	0.35	0.31	0.33
11	IET-47122	35.19 (36.37)	34.68 (36.05)	34.93 (36.21)	2.88	2.95	2.92	803	703	753	0.29	0.34	0.32
12	IET-47123	38.43 (38.29)	32.26 (34.58)	35.34 (36.43)	3.44	3.56	3.50	740	870	805	0.37	0.39	0.38
13	IET-47124	38.74(38.47)	28.57(32.28)	33.65 (35.38)	3.21	3.12	3.17	1115	1222	1168	0.38	0.38	0.38
14	IET-47125	39.82 (39.11)	39.69 (39.02)	39.76 (39.07)	2.81	2.45	2.63	1057	1135	1096	0.49	0.32	0.41
15	IET-47126	36.94 (37.40)	35.40 (36.48)	36.17 (36.94)	3.27	3.66	3.47	942	784	863	0.33	0.26	0.30
16	Sahana (LC/ZC)	37.02 (37.46)	34.98 (36.23)	36.00 (36.84)	3.56	3.12	3.34	1324	1300	1312	0.34	0.19	0.27
17	DDCC-2115	24.19 (29.44)	27.43 (31.56)	25.81 (30.50)	2.45	2.21	2.33	965	620	792	0.22	0.49	0.35
18	DLSa-17 (LC/ZC)	33.75 (35.49)	30.30 (33.37)	32.02 (34.43)	2.78	2.34	2.56	682	655	668	0.18	0.18	0.18
	Mean	35.12 (36.29)	33.17 (35.11)	34.15 (35.65)	3.27	3.13	3.20	900	827	863	0.33	0.29	0.31
		MP	**Genotype (SP)**	**Interaction**	**MP**	**Genotype (SP)**	**Interaction**	**MP**	**Genotype (SP)**	**Interaction**	**MP**	**Genotype (SP)**	**Interaction**
	SEm	0.325	0.050	0.333	0.026	0.063	0.015	26.9	87.48	114	0.004	0.024	0.033
	CD (5%)	NS	0.146	5.758	NS	0.198	0.097	NS	252	NS	NS	0.069	0.102

Values in parenthesis are arc sine transformed

Biochem 1B: Screening genotypes for salinity stress tolerance and estimation of seed oil, gossypol and protein

HISAR

The trial on Screening genotypes for salinity stress tolerance and estimation of seed oil, gossypol and protein results found that the seeds of test entries of HAU Bt trial were evaluated for crude protein, oil and total gossypol content. The data revealed that average boll weight, and seed cotton yield under salt stress conditions differed significantly among the genotypes. The boll weight was found highest in genotype HAU Bt 11 (4.30g). The maximum seed cotton yield was observed in the genotype HAU Bt 12 (2067 kg/ha) followed by PAU Bt 03, HAU Bt 08, HAU Bt 13 and HAU Bt 09. The genotypes H 1353 had the highest potassium-to-sodium ratio followed by HAU Bt 15, and HAU Bt 11. The gossypol content was highest in genotype HAU Bt 14 while it was lowest in genotype HAU Bt 12 and HAU Bt 10. The highest crude oil was observed in the HAU Bt 09 and HAU Bt 13 and the highest protein content was observed in the PAU Bt 03 genotypes. Among all the genotypes screened for salt tolerance H 1353, HAU Bt 11 and HAU Bt 12 genotypes performed best(Table 119).

Table 119. Evaluation of cotton genotypes for seed crude oil, crude protein and gossypol content

Genotypes	Crude Oil (%)	Crude Protein (%)	Total Gossypol (%)	Boll wt (g)	Seed Cotton Yield (kg/ha)	K^+/Na^+
HAU Bt-5	16.55	11.675	0.42	3.49	1,234	1.07
HAU Bt-10	17.05	20.74	0.39	3.28	1,317	1.12
HAU Bt-11	15.65	18.64	0.45	4.30	1,450	2.27
HAU Bt-15	16.45	21.765	0.43	2.86	1,437	2.49
HAU Bt-19	15.35	14.86	0.46	3.14	1,128	1.84
HAU Bt-12	16.45	21.1	0.38	3.18	2,067	1.72
HAU Bt-13	17.30	20.745	0.42	3.59	1,543	1.24
HAU Bt-14	16.45	15.645	0.48	3.12	1,431	1.22
HAU Bt-08	15.15	20.903	0.45	3.62	1,966	1.44
HAU Bt-09	17.45	21.918	0.40	3.37	1,514	1.60
HAU Bt-04	16.15	15.959	0.41	3.43	1,724	1.24
PAU Bt-03	15.50	21.945	0.44	3.35	2,061	1.35
Bt 1098i	17.10	17.385	0.45	3.48	1,092	2.13
H-1353	15.30	16.315	0.40	3.46	402	2.63
C.D.	0.96	0.888	0.028	0.41	86	0.060
SE(d)	0.44	0.407	0.013	0.20	42	0.028

Soil pH value: 7.9, & Soil EC: 6.9 m mhos cm^{-1} , Available N : 296.8 kg/ha,P_2O_5 : 26 kg/ha, K_2O: 301 kg/ha, Rainfall: 483.5 mm, Rainy days: 21 rainy days

SURAT

The trial was conducted to evaluate the Cotton genotypes for Seed oil, Gossypol and Protein. The results showed non-significant variations amongst the genotypes in rainfed and irrigated conditions because of sufficient rainfall. Higher oil content was observed in GJHV-600 (17.8%) both under rainfed and irrigated conditions. Gossypol content ranges from 0.65 to 0.72 % in different genotypes in both conditions. Significant lower gossypol content was found in G.Cot-16 and GISV-419(0.65 %) under irrigated conditions. In rainfed conditions, GISV-419 and LRA-5166 showed lower gossypol. The highest protein content was observed in LRA-5166 (19.92%) in rainfed conditions (Table 120).

Table 120. Evaluation of cotton genotypes for seed oil, gossypol and protein

Genotypes	Oil content (%)		Protein content (%)		Total Gossypol (%)	
	Rainfed	Irrigated	Rainfed	Irrigated	Rainfed	Irrigated
GJHV-600	17.8	17.66	18.30	16.97	0.70	0.72
GSHV-269	17.3	17.10	19.42	17.83	0.72	0.68
GISV-419	16.7	17.12	18.37	19.89	0.71	0.65
GJHV-602	16.9	16.94	17.88	19.05	0.72	0.70
GISV-421	17.0	17.18	18.47	17.83	0.66	0.69
GSHV-271	17.5	17.28	17.98	17.32	0.69	0.66
LRA-5166	17.7	17.31	19.92	17.09	0.66	0.69
G.Cot-16	17.0	17.46	19.25	17.67	0.65	0.70
SE d	0.35	0.32	0.37	0.49	0.013	0.015
CD (5%)	NS	NS	0.79	1.06	0.027	0.033

Soil pH:7.20, EC-0.60 m mhos cm^{-1}, Available N-360.0kg/ha, P_2O_5 -24.25kg/ha, K_2O-485.20kg/ha Total rainfall-1335 mm, Rainy days-54, Spacing-120x45

BIO CHEM. 2 Analysis of biochemical constituents of preparing for climate change (AGR VI), Canopy management (AGR VIII), defoliants (AGR X), square shedding (PHY I) and Drone use (PHY III)

Hisar (Defoliant experiment)

The Analysis of biochemical constituents of defoliants experiments revealed that the ethylene concentration was determined using PEGA. The highest ethylene concentration (0.166) was found in Ankur 555 after the Thidiazuron @500 ppm+ Diuron @400ppm (T10) spray, leading to the degradation of chlorophyll content, increase in the activity of cell wall degrading enzymes such as cellulases (49.81) and pectinases (57.16). This treatment showed decline in sugar content also, which may be attributed to the increased activity of cell wall degrading enzymes, resulting in the degradation of cell wall components and used as an energy source for transport. The lowest relative water content and protein content were observed in the T10 treatment (Table 121).

Table 121. Effect of defoliants on cell wall degrading enzymes and different biochemical constituents in cotton leaves after application of different defoliants

Defoliants	Cellulase	Pectinase	Ethylene	SPAD	Sugar	RWC	Protein
T1.Control	28.71	48.24	0.054	52.65	2.51	78.58	4.14
T2.Ethrel @3000 ppm	32.25	48.65	0.057	50.55	2.45	76.48	3.99
T3.Thidiazuron @500 ppm	33.86	51.04	0.062	51.13	2.47	76.87	4.03
T4.Sodium chlorate @0.9 %	35.02	50.69	0.068	50.33	2.41	76.20	3.89
T5.CICR Defoliant	36.21	52.20	0.075	47.10	2.21	76.00	4.00
T6.Hydrogen cyanamide @5000 ppm	37.64	52.33	0.09	44.85	2.30	76.13	3.87
T7.T2+5% of urea	37.94	52.59	0.107	45.05	2.13	75.65	3.62
T8. T2+Diuron@400 ppm	40.54	52.11	0.12	43.25	2.01	74.88	3.39
T9.T2+Sodium chlorate @0.9 %	41.50	54.41	0.121	43.23	1.97	74.52	3.71
T10.T3+Diuron @400ppm	49.81	57.16	0.166	42.48	1.86	73.10	3.49
C.D.	6.57	4.47	0.054	0.98	0.29	0.68	0.38
SE(d)	3.18	2.17	0.026	0.48	0.14	0.34	0.19

Soil pH value:7.91, EC :0.12 m mhos cm^{-1}, Soil type: Sandy loam, OC (%): 0.46

Hisar-Climate change experiment

A land configuration experiment was conducted at Hisar to mitigate the effects of water logging stress on the cotton crop. This experiment highlights the importance of adopting appropriate land configurations and treatments to improve the physiological responses of cotton under waterlogged conditions. The land configuration did not show significant effects on primary and secondary metabolites of cotton plants. The sugar content differed significantly, the highest sugar content observed in A_2W_1 (ridges and furrow with chemical-based control). Whereas soluble protein differed non-significantly, the highest value (6.52) was recorded in A_3W_2 (salicylic acid @ 0.5 mM, single spray). The tannin and gossypol content showed significant differences among the subplot treatment (Table 122). The tannin content was notably higher in A_3W_2 (salicylic acid @ 0.5 mM, single spray) treatment. The malondialdehyde (MDA) content varied significantly among the main plots and subplot treatments. The hydrogen peroxide (H_2O_2) and MDA, both were highest in A_1W_1 (broad bed furrow with chemical-based control) and lowest H_2O_2 in A_2W_2 (control and farmers' practice). The low content of H_2O_2 and MDA in treatments sprayed with salicylic acid @ 0.5 mM indicates the recovery of plant from water logged conditions (Table 123).

Table 122.Effect of plant growth regulator on stress indicator (H2O2, MDA, DPPH, Tannin) under water logging management studies in cotton

Treatments	Tannin				H_2O_2				MDA				DPPH			Mean A
	W1	W2	W3	Mean A	W1	W2	W3	Mean A	W1	W2	W3	Mean A	W1	W2	W3	
A1	0.492	0.45	0.448	0.463	22.142	20.46	18.955	20.519	9.327	5.787	7.327	7.48	82.209	82.58	81.854	82.214
A2	0.388	0.458	0.439	0.429	21.753	17.829	18.645	19.409	8.463	5.75	5.883	6.699	82.878	83.865	82.139	82.961
A3	0.494	0.504	0.491	0.496	21.054	19.074	19.034	19.721	9.39	5.627	5.887	6.968	81.469	84.983	80.952	82.468
Mean	0.458	0.47	0.46		21.65	19.121	18.878		9.06	5.721	6.366		82.185	83.809	81.648	
ANOVA	**A**	**W**	**W*A**	**A*W**	**A**	**W**	**W*A**	**A*W**	**A**	**W**	**W*A**	**A*W**	**A**	**W**	**W*A**	**A*W**
CD	0.035	N/A	0.036	0.044	N/A	0.766	N/A	N/A	0.273	0.303	0.555	0.505	N/A	0.964	1.883	2.044
SE(d)	0.014	0.009	0.016	0.019	0.506	0.348	0.603	0.706	0.096	0.138	0.238	0.217	0.542	0.438	0.758	0.823
SE(m)	0.01	0.006	0.017	0.013	0.358	0.246	0.619	0.499	0.068	0.097	0.117	0.153	0.383	0.31	0.664	0.582

Soil pH value:7.91, EC :0.12 m mhos cm-1, Soil type: Sandy loam, OC (%):0.46, Environment:irrigated, A1.Broad Bed Furrow with chemical based weed control, A2. Ridges& Furrow with chemical based weed control, A3. Control –Farmers Practice, W1. Nitrogen @20kg/ha + Potassium @20kg/ha, W2. Salicylic acid @0.5mM single spray, W3. Control

Table 123.Effect of plant growth regulator on various metabolites (Sugar, Phenol, Gossypol) under water logging management studies in cotton

Treatments	Sugar				Phenol				Soluble Protein				Gossypol			
	W1	W2	W3	Mean A	W1	W2	W3	Mean A	W1	W2	W3	Mean A	W1	W2	W3	Mean A
A1	3.787	4.187	3.615	3.863	0.445	0.489	0.47	0.468	4.92	6.238	5.453	5.537	0.297	0.287	0.297	0.294
A2	4.37	4.083	3.379	3.944	0.515	0.516	0.523	0.518	5.965	6.224	6.161	6.117	0.271	0.347	0.33	0.316
A3	4.097	4.159	4.228	4.161	0.439	0.482	0.465	0.462	6.042	6.526	6.182	6.25	0.264	0.233	0.28	0.259
Mean	4.085	4.143	3.741		0.466	0.496	0.486		5.642	6.329	5.932		0.277	0.289	0.303	
ANOVA	**A**	**W**	**W*A**	**A*W**	**A**	**W**	**W*A**	**A*W**	**A**	**W**	**W*A**	**A*W**	**A**	**W**	**W*A**	**A*W**
CD	N/A	0.287	0.56	0.851	N/A	N/A	N/A	N/A	0.587	0.53	N/A	N/A	0.028	N/A	0.038	0.04
SE(d)	0.301	0.136	0.235	0.357	0.019	0.02	0.034	0.034	0.235	0.25	0.434	0.425	0.011	0.01	0.017	0.017
SE(m)	0.213	0.096	0.368	0.252	0.014	0.014	0.024	0.024	0.166	0.177	0.288	0.301	0.008	0.007	0.014	0.012

Soil pH value:7.91, EC :0.12 m mhos cm^{-1}, Soil type: Sandy loam, OC (%):0.46, Environment:irrigated, A1.Broad Bed Furrow with chemical based weed control, A2. Ridges& Furrow with chemical based weed control, A3. Control –Farmers Practice, W1. Nitrogen @20kg/ha + Potassium @20kg/ha, W2. Salicylic acid @0.5mM single spray, W3. Control

SURAT-square shedding experiment

The data recorded during *kharif* 2024 for various biochemical parameters and biochemical constituent of management of square shedding in cotton at 90DAS revealed that the Protein, reducing sugar, phenol, tannin, flavanoid and gossypol content were non-significant due to the treatments. Protein, reducing sugar, phenol, tannin, flavanoid and gossypol content was found in range of 8.61 to 9.07 mg/g, 20.18 to 23.76 mg/g, 7.61 to 9.26 mg/g, 28.35 to 29.59%, 5.44 to 9.83 mg/g and 0.60 to 0.72% respectively. The Protein content was numerically higher in treatment T_{12}.Control (Water spray) which was followed by T_1.Ascorbic Acid @0.6 mM while reducing sugar was non-significantly among the treatments. The treatment T_1.Ascorbic Acid @0.6 mM showed higher phenol content. However secondary metabolites, Tannin was non-significant. Flavanoid was numerically higher in T_1.Ascorbic Acid @0.6 mM followed by T_4.2, 3,5 tri iodobenzoicacid (TIBA)@ 25 g/ha while gossypol content was higher in T_{12}.Control (Water spray) (Table 124).

Table 124. Primary and secondary metabolites as influenced by square shedding treatments

Treatments	Protein (mg/g of FW tissue)	Reducing sugar (mg/g of FW tissue)	Phenol (mg/g of FW tissue)	Tannin (g/100g of dry tissue)	Flavanoid (mg/g of FW tissue)	Gossypol (%)
T_1.Ascorbic Acid @0.6 mM	8.90	22.06	9.26	28.58	9.83	0.68
T_2.Sucrose @ 5 % + 0.6mM Ascorbic Acid	8.74	22.01	8.89	29.24	8.25	0.63
T_3.Triacontanol@ 2.5 ppm	8.66	23.76	8.87	29.59	6.45	0.67
T_4.2, 3,5 tri iodobenzoicacid (TIBA)@ 25 g/ha	8.81	22.37	8.57	28.35	9.82	0.65
T_5.Silver thiosulphate@7.5µM	8.61	21.24	7.61	28.73	8.86	0.65
T_6.Mepiquat chloride (MC) @ 24.5 g ha^{-1}	8.75	23.60	8.86	28.46	5.63	0.60
T_7.GA @100 ppm	8.79	22.32	8.78	29.42	9.22	0.61
T_8.IAA @25ppm+ kinetin@20ppm	8.69	21.65	8.46	29.53	5.70	0.65
T_9.Glycine betaine@3g /ha	8.75	21.19	8.49	28.67	8.94	0.60
T_{10}.NAA @30ppm	8.85	21.06	8.19	28.64	5.44	0.64
T_{11}.Forcholorfenuron 0.1% (CPPU 1L/ha)	8.78	21.65	8.31	28.88	7.03	0.61
T_{12}.Control (Water spray)	9.07	20.18	8.11	28.95	8.99	0.72
S. Ed	0.158	1.15	0.37	0.82	0.50	0.025
CD (5%)	NS	NS	0.79	NS	1.06	0.052

Soil pH: 7.10, EC: 0.63 m mhos cm^{-1}, Available N: 430.00 kg/ha, P2O5: 25.25 kg/ha, K2O:410.50kg/ha, Total rainfall-1335 mm, Rainy days-54

SURAT-drone use experiment

The data was recorded during *kharif* 2024 for various biochemical parameters from leaf samples after 24 hours of potassium nitrate spray revealed that the protein, reducing sugar, phenol, tannin, flavonoid and Gossypol content ranged from 9.06 to 9.43 mg/g, 20.31 to 22.78 mg/g, 5.45 to 6.83 mg/g, 11.36 to 14.95 %, 4.76 to 6.58 mg/g and 0.75 to 0.82 % respectively. Protein content, Tannin, and Gossypol content were non-significant due to treatment however Reducing sugar content, and Phenol were significantly higher **T_1**. Drone spray of KNO3 @1% while Flavonoid content was higher in **T_3.** Drone spray of KNO3 @4% (Table 125).

Table 125. Primary and secondary metabolites as influenced under drone use

Treatments	Protein (mg/g of tissue)	Reducing sugar (mg/g of tissue)	Phenol (mg/g of tissue)	Tannin (g/100g of dry tissue)	Flavanoid (mg/g of tissue)	Gossypol (%)
T_1 .Drone spray of KNO3 @1%	9.06	22.78	6.83	14.95	5.25	0.79
T_2. Drone spray of KNO3 @2%	9.19	22.11	5.45	11.36	5.21	0.78
T_3. Drone spray of KNO3 @4%	9.32	21.55	7.65	12.57	6.58	0.78
T_4. Drone spray of KNO3 @6%	9.26	20.77	6.35	13.82	6.43	0.75
T_5. Drone spray of KNO3 @8%	9.21	22.42	6.31	13.97	6.39	0.80
T_6. Drone spray of KNO3 @10%	9.33	20.62	5.70	13.82	4.76	0.82
T_7. Control (Manual spray 2% KNO3)	9.43	20.52	6.05	14.08	5.41	0.76
T_8. Absolute control	9.42	20.31	5.76	13.25	4.90	0.75
S. Ed	0.24	0.72	0.57	1.02	0.27	0.037
CD (5%)	NS	1.54	1.21	NS	0.57	NS

Soil pH-7.25 EC-.0.58m mhos cm-1, Available N-400.20 kg/ha, P2O5 -20.40kg/ha, K_2O-492.35kg/ha, Total rainfall-1335 mm, Rainy days-54

SURAT- Growth retardants experiment

The data recorded during *kharif* 2024 for various biochemical parameters from leaf samples in HDPS revealed that the Protein, reducing sugar, phenol content, tannin, flavonoid, and gossypol content was found in the range of 8.29 to 9.28 mg/g, 18.61 to 21.91mg/g, 5.70 to 6.32 mg/g, 11.32 to 12.75 %, 6.51 to 8.04 mg/g and 0.82 to 0.86 % respectively. Protein content was numerically higher in G8 (.Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)+Detopping) followed by G7 (Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray) . The reducing sugar was significant in treatmentsG1. Control .The treatment G5 (Mepiquat chloride@45ppm at square initiation and 15 days after first spray) showed higher phenol content which was followed by G2. Detopping. Tannin content was found highest in G6 while it was lowest in G8. Flavanoid and Gossypol content were non-significant in treatments (Table 126).

Table 126. Primary and secondary metabolites as influenced under HDPS

Treatments	Protein (mg/g of FW tissue)	Reducing sugar (mg/g of FW tissue)	Phenol (mg/g of FW tissue)	Tannin (g/100g of dry tissue)	Flavanol (mg/g of FW tissue)	Gossypol (%)
G1. Control	9.06	21.91	5.87	11.77	6.51	0.86
G2. Detopping	8.46	19.85	6.12	11.86	7.77	0.83
G3. Mepiquat chloride@45ppm at square initiation	8.56	20.83	6.08	11.44	7.72	0.82
G4. Mepiquat chloride@45ppm at square initiation +Detopping	8.72	21.24	6.04	11.89	7.22	0.82
G5. Mepiquat chloride@45ppm at square initiation and 15 days after first spray	8.29	19.13	6.32	11.50	7.25	0.83
G6. Mepiquat chloride@45ppm at square initiation and 15 days after first spray +Detopping	8.79	18.82	6.00	12.75	8.02	0.82
G7. Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)	9.03	21.29	5.70	11.56	8.04	0.83
G8.Mepiquat chloride@45ppm at square initiation and 15 days after first spray and 15 days after second spray (need based)+Detopping	9.28	18.61	5.99	11.32	6.76	0.83
S. Ed	0.348	0.937	0.298	0.721	0.680	0.023
CD (5%)	NS	2.02	NS	NS	NS	NS

Soil pH:7.30, EC:.0.62m mhos cm-1, Avail.N:400.50 kg/ha, P2O5:23.50 kg/ha, Avail K:480.50 kg/ha, Total rainfall-938.8 mm, Rainy days-64

SURAT- Climate change experiment

The data recorded during *kharif* 2024 for various biochemical parameters from leaf samples at 90 DAS revealed that the Protein content, Tannin content, phenol and Flavanoid content were not influenced by treatments. The reducing sugar content was significantly deviated due to land configuration. Gossypol content was non-significant among water logging condition (Table 127).

Table 127. Primary and secondary metabolites as influenced by climate change experiment

	W_1 : Nitrogen @20kg/ha + Potassium @ 20kg/ha	W_2 : Salicylic acid @0.5mM single spray	W_3 : Control	Mean	W_1 : Nitrogen @20kg/ha + Potassium @ 20kg/ha	W_2 : Salicylic acid @0.5mM single spray	W_3 : Control	Mean
Treatments	**Tannin(g/100g dry wt)**				**Phenol(mg/g)**			
L_1 : Broad Bed Furrow with chemical based weed control	20.10	20.42	20.42	20.3	6.95	6.57	6.19	6.6
L_2 : Ridges & Furrow with chemical based weed control	20.68	20.11	20.11	20.3	5.59	5.70	6.14	5.8
L_3 : Control –Farmers Practice (Flat bed)	17.19	19.13	19.13	18.5	5.50	5.18	6.28	5.7
Mean	19.3	19.9	19.9		6.0	5.8	6.2	
ANOVA	**L**	**W**	**LxW**		**L**	**W**	**LxW**	
S. Ed	0.49	0.54	0.94		0.25	0.21	0.36	
CD (5%)	NS	NS	NS		NS	NS	NS	
Treatments	**Reducing sugar (mg/g)**				**Flavanol (mg/g)**			
L_1 : Broad Bed Furrow with chemical based weed control	19.24	18.76	19.69	19.2	7.52	6.05	5.29	6.3
L_2 : Ridges & Furrow with chemical based weed control	19.31	18.46	17.87	18.5	7.42	6.38	5.31	6.4
L_3 : Control –Farmers Practice (Flat bed)	20.28	19.04	18.81	19.4	7.27	6.40	6.05	6.6
Mean	19.6	18.8	18.8		7.4	6.3	5.6	
ANOVA	**L**	**W**	**LxW**		**L**	**W**	**LxW**	
S. Ed	0.14	0.15	0.26		0.27	0.50	0.88	
CD (5%)	0.41	NS	NS		NS	NS	NS	

SURAT-defoliant experiment

The data was recorded during *kharif* 2024 for various biochemical parameters from leaf samples 24 hours after defoliant spray revealed that the Protein, reducing sugar, phenol, tannin, flavanol, and Gossypol content ranged from 8.85 to 9.50 mg/g, 18.46 to 20.41 mg/g, 5.41 to 7.69 mg/g, 13.93to 17.63 %, 5.06 to 5.94 mg/g and 0.54 to 0.57 % respectively. Protein content, reduced sugar and Gossypol content did not significantly differ by treatments; However tannin content was significantly higher in G10. (Thidiazuron @500 ppm+Diuron @400ppm) followed by G7.(Ethrel @3000 ppm+5% of urea). Flavanoid was significantly higher due to treatment G4 (Sodium chlorate @0.9 %) which was followed by G2 (Ethrel @3000 ppm) and G6.(Hydrogen cyanamide @5000 ppm) (Table 128).

Table 128.Primary and secondary metabolites as influenced under defoliant spray

Treatments	Protein (mg/g of tissue)	Reducing sugar (mg/g of tissue)	Phenol (mg/g of tissue)	Tannin (g/100g of dry tissue)	Flavanol (mg/g of tissue)	Gossypol (%)
CD (5%)	NS	NS	0.28	1.33	0.12	NS
G1. Control	8.98	19.23	6.64	13.96	5.21	0.56
G10. T_3+Diuron @400ppm	9.22	18.67	5.69	17.63	5.28	0.55
G2. Ethrel @3000 ppm	8.92	18.82	5.41	14.14	5.86	0.55
G3. Thidiazuron @500 ppm	8.96	19.08	6.28	14.11	5.06	0.56
G4. Sodium chlorate @0.9 %	9.30	20.41	7.69	13.93	5.94	0.54
G5. CICR Defoliant	9.50	19.28	7.58	16.45	5.71	0.55
G6. Hydrogen cyanamide @5000 ppm	9.24	20.21	7.17	15.47	5.74	0.57
G7. T2+5% of urea	9.15	18.46	6.39	17.50	5.68	0.56
G8.T_2+Diuron@400 ppm	9.09	19.39	6.61	15.38	5.71	0.56
G9. T_2+Sodium chlorate @0.9 %	8.85	18.72	5.21	17.22	5.57	0.57
S. Ed	0.24	0.69	0.13	0.62	0.061	0.012

Soil pH-7.10 EC-.0.62m mhos cm-1, Available N-460.00 kg/ha, P2O5: 21.10kg/ha, K_2O-502.30kg/ha, Total rainfall-1335 mm, Rainy days-54

DHARWAD-Climate change experiment

The genotype KCH-100 was sown at ARS, Dharwad, during 2024-25 to study the effect of water logging and drought management by chemical sprays. The genotype was evaluated for biochemicals induced by moisture stress. The results showed that the primary metabolites (carbohydrates and protein) were significantly increased by the application of salicylic acid @ 100 ppm (D_2) (33.12, 21.27 mg/g) and Glycine Betaine @ 100 ppm (D_1) (30.34, 20.70 mg/g) spray compared to the control (29.12, 18.66 mg/g). The same treatments salicylic acid@100 ppm (D_2) and glycine betaine @ 100 ppm (D_1) increased the secondary metabolites, tannins (7.60, 7.65 mg/g), phenols (3.63, 3.62 mg/g), flavonoids (6.21, 6.23 mg/g)) compared to the control (6.76, 3.52, 4.81 mg/g), respectively, but did not affect the expression of gossypol (Table 129).

Table 129.Flavonoid and gossypol content as influenced by land configuration and osmoprotectants at Dharwad

Land Configuration	Flavonoids (mg/g fr. wt.)				Gossypol (mg/g fr. wt.)			
	D_1.Glycine Betaine @ 100 ppm	D_2. Salicylic acid @ 100 ppm	D_3 Control	**Mean**	D_1.Glycine Betaine @ 100 ppm	D_2. Salicylic acid @ 100 ppm	D_3 Control	**Mean**
A_1.Broad Bed Furrow	5.89	5.73	4.54	5.39	1.37	1.38	1.38	1.38
A_2.Ridges& Furrow	7.35	7.80	5.67	6.94	1.62	1.63	1.63	1.63
A_3.Control Farmers practice	5.46	5.11	4.21	4.93	1.04	0.99	1.02	1.02
Mean	6.23	6.21	4.81	5.75	1.34	1.33	1.34	1.34
	MP	**SP**	**Interaction**		**MP**	**SP**	**Interaction**	
SEm	0.327	0.496	0.774		0.204	0.009	0.205	
CD (5%)	1.319	NS	NS		NS	NS	NS	

Soil pH :7.5, available N: 225 kg/ka,P_2O_5 : 35 kg/ha, K_2O : 555 kg/ha, O.C.(%) : 5.6, Environment: Rainfed

DHARWAD- square shedding experiment

The cotton genotype DCH-32 (BG-II) was investigated for the management of square shedding by using different chemicals. The results indicated that the treatment T5 (Silver thiosulphate@7.5µM) and T9 (Glycine betaine@3g/ha) induced significantly higher accumulation of protein 26.99 and 23.12 mg/g respectively, whereas the secondary metabolites, tannins of 3.29 and 3.87 mg/g, phenols of 1.86 and 1.86 mg/g, flavonoids of 5.99 and 5.69 mg/g, and gossypol of 1.65, 1.46 mg/g were found respectively comparable to the control (Table 130).

Table 130. Primary and secondary metabolites level as influenced by growth retardants

Treatments	Carbohydrates	Proteins	Tannins	Poly-phenols	Flavonoids	Gossy-pol
	(mg/g fr. wt.)					
T_1.Ascorbic Acid @0.6 mM	41.47	18.80	4.32	2.08	6.60	1.42
T_2.Sucrose @ 5 % + 0.6mM Ascorbic Acid	49.29	20.05	4.13	2.12	7.28	1.40
T_3.Triacontanol@ 2.5 ppm	43.14	19.30	4.35	2.48	8.66	1.41
T_4.2, 3,5 tri iodobenzoicacid (TIBA)@ 25 g/ha	44.49	16.92	4.14	2.42	8.52	1.50
T_5.Silver thiosulphate@7.5µM	53.33	26.99	3.29	1.86	5.99	1.65
T_6.Mepiquat chloride (MC) @ 24.5 g ha^{-1}	46.16	21.50	3.73	1.96	6.42	1.55
T_7.GA @100 ppm	40.38	18.49	4.71	2.27	7.76	1.39
T_8.IAA @25ppm+ kinetin@20ppm	44.34	19.54	4.07	1.97	6.96	1.35
T_9.Glycine betaine@3g /ha	49.68	23.12	3.87	1.86	5.69	1.46
T10: NAA @30ppm	44.03	21.52	4.16	2.27	7.64	1.59
T11.Forchlorfenuron 0.1%	47.97	22.11	5.39	3.14	8.25	1.40
T12. Control(water spray)	38.84	17.73	3.71	1.24	5.60	1.35
Mean	41.47	20.51	4.16	2.14	7.11	1.46
SEM	3.642	1.480	0.448	0.339	0.378	0.201
CD (5%)	NS	4.369	NS	NS	1.117	NS

DHARWAD-canopy management experiment

The cotton genotype MRC-7373 (BG-II) was investigated for the management of canopy by performing detopping and foliar application of growth retardants. Biochemical estimations in the hybrid due to the chemical sprays showed that proteins (28.66 mg/g) significantly increased in the treatment T6 (Mepiquat chloride@45ppm at square initiation and 15 days after first spray + Detopping) which was well correlated with higher yield (2245 kg/ha) recorded by the treatment T6. The results was followed by T2. (Detopping) which registered protein (25.73 mg/g). The secondary metabolites estimation found that tannins (7.46 mg/g), phenols (3.31 mg/g), flavonoids (9.88 mg/g) and gossypol (1.92 mg/g) recorded in T6 leaf samples were comparable to the control respectively of 6.37, 2.92, 8.44, 1.49 mg/g. The metabolite data indicated that detopping (T2) and T6 increased the primary metabolites without significantly affecting the secondary metabolites (Table 131).

Table 131. Primary and secondary metabolites in MRC-7373, as influenced by growth retardants, sprays for canopy management

Treatments	Carbohydrates	Proteins	Tannins	Poly-phenols	Flavonoids	Gossypol
	(mg/g fr. wt.)					
T1. (Control)	34.22	23.39	6.37	2.92	8.44	1.49
T2. (Detopping)	37.67	25.73	7.17	3.62	8.66	1.35
T3. (MC @ SQI)	36.46	24.90	7.93	4.02	11.04	1.72
T4. (MC @SQI + detopping)	35.40	27.19	7.58	3.62	11.54	1.58
T5. (MC @SQI + 15 DAFS)	37.73	24.43	6.95	3.01	11.25	2.08
T6. (MC @SQI + 15 DAFS + detopping)	40.49	28.66	7.46	3.31	9.88	1.92
T7 .(MC @SQI + 15 DAFS + 15 DASS)	38.21	25.31	7.75	3.76	11.14	2.01
T8. (MC @SQI + 15 DAFS + 15 DASS + detopping)	35.17	26.98	8.35	4.23	11.99	2.10
Mean	36.92	25.82	7.45	3.56	10.38	1.78
SEM	1.446	0.949	0.375	0.270	0.582	0.248
CD (5%)	NS	2.907	NS	0.827	1.784	NS

Soil pH value: 7.0-7.5, O.C.(%.):0.54available N :256 kg/ha,P_2O_5 : 34 kg/ha,K_2O: 515 kg/ha, Spacing followed: 90X30 cm

DHARWAD-drone spray experiment

The cotton genotype MRC-7373 (BG-II) was evaluated for its response to drone-based nutrient spray at various concentrations. The yield was increased in the treatment T3 (Drone spray of KNO_3 @4%) and T7 (Manual spray 2% KNO_3) (2178, 2142 kg/ha) compared to the control (1932 kg/ha) respectively. The biochemical estimations in the hybrid showed that the primary metabolites of carbohydrates (37.77, 37.22 mg/g) and protein (27.03, 30.61 mg/g)) were found increased in the treatments T_3 and T_7 compared to the control (33.18 and 19.34 mg/g) respectively, whereas, the secondary metabolites were unaffected in the treatments compared to the control (Table 132 and 133). The results suggest that the spraying of nutrients KNO_3 @ 4% was better comparable with the hand spray of KNO_3 @2% which is evident from the yield data.

Table 132. Primary and secondary metabolites in MRC-7373 as influenced by drone-based first-foliar sprays of nutrients

Treatments	Carbohydrates	Proteins	Tannins	Polyphenols	Flavonoids	Gossypol
	(mg/g fr. wt.)					
T_1. KNO_3 @1%	34.64	23.37	7.09	2.58	9.76	2.11
T_2. KNO_3 @2%	33.85	18.41	7.08	2.64	9.85	1.71
T_3.KNO_3 @4%	37.77	27.03	6.26	2.34	9.37	1.79
T_4.KNO_3 @6%	33.54	24.84	7.10	2.56	9.80	1.51
T_5. KNO_3 @8%	34.30	20.75	7.11	2.25	9.96	1.65
T_6. KNO_3 @10%	32.88	25.74	6.99	2.53	9.79	1.62

T_7.Control (Manual spray 2% KNO_3)	37.22	30.61	6.90	2.43	9.44	1.64
T_8. Absolute control	33.18	19.34	6.64	2.24	9.14	1.40
Mean	34.79	24.16	6.93	2.42	9.65	1.74
SEM	0.243	0.269	0.052	0.016	0.068	0.002
CD (5%)	0.746	0.823	0.159	0.048	0.207	0.007

Soil pH value: 7.0-7.5, Available N :256 kg/ha, P_2O_5 : 34 kg/ha, K_2O : 515 kg/ha, O.C.(%):0.54, Spacing followed: 90 X 30 cm

Table 133.Primary and secondary metabolites in MRC-7373 as influenced by drone-based second-foliar sprays of nutrients

Treatments	Carbohy drates	Proteins	Tannins	Polyphenols	Flavonoids	Gossypol
	(mg/g fr. wt.)					
T_1. KNO_3 @1%	31.20	13.08	3.59	0.76	9.35	1.56
T_2. KNO_3 @2%	31.25	12.07	3.59	0.81	9.34	1.67
T_3.KNO_3 @4%	32.13	15.96	3.44	0.74	7.66	1.42
T_4.KNO_3 @6%	31.73	12.11	3.47	0.76	7.82	1.41
T_5. KNO_3 @8%	28.14	13.83	3.74	0.82	8.05	1.29
T_6. KNO_3 @10%	30.75	14.67	3.70	0.67	8.54	1.23
T_7.Control (Manual spray 2% KNO_3)	32.03	16.15	3.29	0.73	7.87	1.34
T_8. Absolute control	29.54	11.34	3.16	0.65	7.51	1.16
Mean	30.85	13.65	3.50	0.76	7.29	1.38
SEM	0.827	0.060	0.021	0.007	0.110	0.002
CD (5%)	NS	0.184	0.063	0.022	0.336	0.006

Soil pH value: 7.0-7.5, Available N :256 kg/ha, P_2O_5 : 34 kg/ha, K_2O : 515 kg/ha, O.C.(%):0.54, Spacing followed: 90 X 30 cm

DHARWAD-defoliant experiment

The experiment was conducted to study the effect of defoliants to facilitate the mechanical picking of cotton. The biochemical results revealed that the Spraying of defoliants showed differential expression of primary and secondary metabolites. The yield obtained in different treatments was increased due to the defoliant spray compared to the control plot (2169 kg/ha). Similarly, the primary and secondary metabolites recoded in the control was low compared as the treated plots (Table 134).

Table 134.Primary metabolites and Secondary metabolites in MRC-7373 as influenced by defoliant spray

Treatments	Carbohydrates (mg/g fr. wt.)	Proteins (mg/g fr. wt.)	Tannins	Polyphenols	Flavonoids	Gossypol
T1.Control	20.50	20.82	3.72	3.82	7.85	2.40
T2.Ethrel	31.72	26.98	8.76	4.64	8.21	2.21
T3.Thidiazuron	38.79	26.56	8.99	4.55	8.12	2.25
T4.Sodium chlorate	38.49	24.80	5.27	4.26	8.21	1.50
T5.CICR defoliant	26.86	25.45	4.25	4.90	4.93	1.14
T6.Hydrogen cyanamide	31.54	22.94	8.70	4.47	8.12	2.51
T7.T2 + 5% urea	27.55	23.35	7.45	4.49	8.19	2.61
T8.T2+ Diuron	27.44	26.81	8.26	4.30	7.97	2.48
T9.T2+ sodium chlorate	36.23	22.55	8.11	4.24	8.39	2.21
T10.T3 + Diuron	29.18	23.62	5.69	4.57	8.08	2.80
Mean	30.83	24.39	6.92	4.53	7.81	2.16
SEM	**1.137**	**1.108**	**0.827**	**0.339**	**0.081**	**0.288**
CD (5%)	**3.404**	**3.317**	**2.477**	**1.014**	**0.241**	**0.862**

Soil pH value: 7.0-7.5, Available N :256 kg/ha, P_2O_5 : 34 kg/ha, K_2O : 515 kg/ha, O.C.(%):0.54, Spacing followed: 90 X 30 cm

BIO CHEM 3. Influence of biochemical constituents on the incidence of pink bollworm in cotton
HISAR

The biochemical constituents analysis of leaves and green bolls of cotton correlated with green boll damage (GBD), Locule Damage, and Larvae/20 bolls of pink bollworm. In raw bolls, tannin content showed nonsignificant correlation with locule damage and GBD(Table 135). The same result was observed with total phenol, proline, Gossypol, and sugar. In leaf samples, tannin content showed non significant correlation with locule damage and GBD, but a significant positive correlation with phenol content (Table 136).

Table 135.Correlation between different parameters in raw boll of pink boll worm infested cotton

	Proline	Sugar	Gossypol	Tanin	Phenol	GBD	Locule Damage	Larvae/ 20 bolls
Proline	1							
Sugar	-0.750^{NS}	1						
Gossypol	-0.605^{NS}	0.613^{NS}	1					
Tanin	-0.544^{NS}	0.676^{NS}	0.841*	1				
Phenol	-0.539^{NS}	0.648^{NS}	0.926**	0.975**	1			
GBD	-0.241^{NS}	0.249^{NS}	0.215^{NS}	0.138^{NS}	0.080^{NS}	1		
Locule	-0.118^{NS}	0.079^{NS}	0.121^{NS}	-0.052^{NS}	-0.077^{NS}	0.972**	1	
Larvae/ 20	-0.160^{NS}	-0.076^{NS}	0.103^{NS}	-0.138^{NS}	-0.135^{NS}	0.885**	0.944**	1

Table 136.Correlation between different parameters in leaf of pink boll worm infested cotton

	Proline	Sugar	Gossypol	Tanin	Phenol	GBD	Locule Damage	Larvae/20 bolls
Proline	1.000**							
Sugar	-0.713^{NS}	1.000**						
Gossypol	-0.087^{NS}	0.098^{NS}	1.000**					
Tannin	-0.438^{NS}	0.595^{NS}	0.280^{NS}	1.000**				
Phenol	-0.235^{NS}	0.433^{NS}	0.529^{NS}	0.737^{NS}	1.000**			
GBD	0.234^{NS}	-0.393^{NS}	-0.391^{NS}	-0.869*	-0.583^{NS}	1.000**		
Locule	0.316^{NS}	-0.351^{NS}	-0.500^{NS}	-0.889**	-0.640^{NS}	0.972**	1.000**	
Larvae/20	0.262^{NS}	-0.298^{NS}	-0.585^{NS}	-0.866*	-0.835*	0.885**	0.944**	1.000**

DHARWAD

To study the plant biochemical that influence the incidence of PBW larvae, eight better performing cotton cultivars in south zone belonging to *G. hirsutum* species were sown in field at Agricultural Research Station, Dharwad, during 2024-25. Results indicated that the cultivars, ARBC-1601, CPD-1652, DSC-1651, CPD Bt—2451, and CPD Bt-2452 yielded > 1200 kg/ha compared to the other cultivars. Among the genotypes evaluated ARBC-1651 exhibited lesser mean larval infestation (2.67 larvae/20 bolls) with boll damage of 15% (Table 137). The genotype also exhibited higher expression of mean primary (total carbohydrates & soluble proteins 24.23, 17.37 mg/g) and secondary metabolites (Tannins, phenols, flavonoids, gossypol as 7.03, 2.63, 5.43 and 1.40 mg/g) content across the different tissues (leaf, bract, rind and raw seed) respectively. The biochemicals thus expressed in the genotype were therefore involved in conferring tolerance to PBW. In contrast, the cultivar DSC-1651 exhibited high incidence of insect larvae (4 larvae/20 bolls) and boll damage (18%) accompanied with least accumulation of mean value of secondary metabolites (Tannins, phenols, flavonoids, gossypol as 4.08, 1.69, 2.56, 1.88 mg/g) respectively (Table 138). The differences in the expression of primary and secondary metabolites therefore influence the incidence of PBW in cotton.

Table 137.Green boll and locule damage due to PBW larvae as influenced by cotton genotypes

Genotypes	No. of Green boll	Transformed value	No. of bad bolls	Transformed value
G1- ARBC-1601	10.33	3.364	4.53	2.35
G2 – ARBC-1651	12.87	3.716	2.73	1.926
G3- CPD-1652	10.67	3.412	3.93	2.218
G4 – DSC-1651	12.77	3.705	3.67	2.152
G5- CPD-Bt 2351	7.33	2.884	3.53	2.12
G6- CPD Bt – 2352	11.13	3.479	4.27	2.294
G7 – CPD Bt 2451	9.00	3.158	3.97	2.226
G8 - CPD Bt 2452	13.03	3.743	2.80	1.949
Mean	10.89	3.43	3.68	2.15
SEM		**0.118**		**0.082**
CD (5%)		**5.936**		**0.251**

Table 138. Primary and secondary metabolites of cotton genotypes in different plant parts

Genotype	Plant parts	G1-ARBC-1601	G2 – ARBC-1651	G3-CPD-1652	G4 – DSC-1651	G5-CPD-Bt 2351	G6- CPD Bt – 2352	G7 – CPD Bt 2451	G8 - CPD Bt 2452	Mean	SEM	CD (5%)
Carbohydrates (mg/g fr. wt.)	Leaf	32.77	33.58	35.89	30.89	38.29	32.34	35.01	37.1	34.48	0.438	1.341
	bract	17.91	24.29	22.37	21.73	20.35	16.12	16.46	20.7	19.99	1.039	3.183
	rind	14.89	13.37	15.37	14.79	18.94	14.93	13.25	18.78	15.54	0.188	0.576
	Raw Seed	20.39	25.68	24.11	24.06	23.92	19.5	19.55	26.07	22.91	0.45	1.377
Proteins (mg/g fr. wt.)	Leaf	23.98	23.6	25.1	19.63	24.35	21.69	25.19	20.96	23.06	1.133	3.47
	bract	14.72	16.37	17.22	14.43	17.52	16.93	10.87	12.07	15.02	0.635	1.945
	rind	11.64	16.23	11.12	10.35	13.64	7.41	8.86	7.47	10.84	0.409	1.253
	Raw Seed	13.95	13.26	11.08	11.68	15.31	11.49	11.85	14.97	12.95	0.502	1.537
Tannins (mg/g fr. wt.)	Leaf	9.18	9.82	9.39	8.03	8.92	8.32	9.13	7.89	8.84	0.018	0.056
	bract	4.73	6.58	2.58	3.13	4.56	2.03	4.28	4.29	4.02	0.038	0.117
	rind	5.17	7.89	2.77	2.24	4.18	4.15	1.85	2.01	3.78	0.04	0.122
	Raw Seed	4.28	3.81	1.82	2.92	5.71	5.15	3.26	2.71	3.71	0.032	0.098
Polyphenols (mg/g fr. wt.)	Leaf	2.61	3.62	2.74	1.63	1.57	1.92	2.73	2.23	2.61	0.114	0.348
	bract	1.3	1.66	0.83	1.22	1.05	1.63	0.71	0.9	2.73	0.106	0.323
	rind	1.54	2.47	1.24	1.23	1.27	1.79	1.93	1.16	2.73	0.232	0.711
	Raw Seed	2.86	2.76	1.54	2.69	1.31	3.27	2.16	2.03	2.73	0.051	0.155
Flavonoids (mg/g fr. wt.)	Leaf	8.08	9.32	7.82	4.77	6.76	6.74	7.17	5.91	7.07	0.047	0.145
	bract	2.54	2.88	2.05	1.87	2.32	1.88	2.62	2.7	2.36	0.156	0.479
	rind	2.59	7.33	2.48	1.93	2.55	4.45	1.39	1.12	2.98	0.834	0.272
	Raw Seed	2.38	2.19	1.29	1.66	3.29	1.97	1.81	1.63	2.03	0.096	0.293
Gossypol (mg/g fr. wt.)	Leaf	1.96	1.89	1.28	1.4	1.3	2.11	1.73	1.49	1.64	0.019	0.057
	bract	2.27	2.28	1.25	2.26	2.25	1.83	1.47	2.65	2.03	0.14	0.429
	rind	1.66	2.28	1.8	2.64	2.25	2.94	1.34	1.41	2.04	0.185	0.568
	Raw Seed	1.4	2.28	1.28	1.21	2.25	1.38	1.99	1	1.6	0.301	NS

SURAT

The data was recorded during *kharif* 2024 for various biochemical parameters from different parts revealed that the Protein content was non-significantly deviated between genotypes before pink bollworm infestation but it was significant after infestation in leaf. However, Protein content was higher compared to health leaf in all entry after infections. It was higher in GSHV-276 (8.39 mg/g) genotypes after infections in leaf. Tannin content was found significant among genotypes in healthy and infected parts of cotton but in all the parts compared to healthy, infected parts showed higher content of tannin due activation of secondary metabolic pathways by infestation of pink bollworms. Highest tannin content was found in infected seeds (23.16 g/100dry wt.) and lower in healthy leaf (12.27 g/ 100dry wt.). Phenol content was found higher in all infected parts compared to healthy parts, it was higher in GSHV-276 (14.75 mg/g) in infected seeds compared to all others parts. Reducing sugar content was non-significant between genotypes in leaf, square, boll rind and seeds. Also reducing sugar increased in infected parts compared to healthy parts of cotton. Flavanoid content was significant between genotypes in all the parts before and after infection. Gossypol content was higher in seeds of all genotypes compared leaf, square and boll rind while square showed lower gossypol content compared to others parts in infected as well healthy parts and it was significant differed in all parts before and after infestation of pink boll worms. From the study, it can be concluded that Biochemical parameters like Protein, Reducing sugar, Phenol, Tannin, Flavanol were increased in all the plants parts at peak periods of pink boll infestation (Table 139).

Table 139. **Primary and secondary metabolites as influenced by pink boll worm incidence**

Bio chemical constituents	Genotypes	Leaf		Square		Boll rind		Seed (%)	
		Before pink boll worm attack	After pink boll worm attack	Before pink boll worm attack	After pink boll worm attack	Before pink boll worm attack	After pink boll worm attack	Before pink boll worm attack	After pink boll worm attack
Protein (mg/g of tissue)	GSHV-271	6.99	7.21	9.51	9.73	9.69	10.75	21.52	24.17
	GSHV-272	7.34	7.38	9.34	10.02	9.90	11.02	21.15	23.91
	GSHV-273	6.53	7.57	9.60	10.00	9.79	11.11	20.31	24.15
	GSHV-274	7.08	7.54	9.17	9.98	9.98	10.73	21.14	24.01
	GSHV-275	7.53	8.18	8.76	10.20	9.35	11.23	20.24	23.85
	GSHV-276	7.73	8.39	8.90	10.03	9.49	10.88	20.47	23.76
	GSHV-277	7.74	8.34	9.28	10.28	9.47	11.00	20.57	23.29
	GSHV-266	7.64	8.33	8.90	9.90	9.84	11.18	21.34	23.19
		Genotypes	**Time of Samples**	**Parts**	**GxTxP**				
	S. Ed	0.143	0.072	0.102	0.410				
	CD (5%)	NS	0.143	0.203	NS				
Tannin (g/100g of dry wt)	GSHV-271	12.90	14.59	15.21	16.88	16.22	18.09	20.40	21.70
	GSHV-272	13.22	14.26	15.45	16.46	16.13	17.82	20.91	22.65
	GSHV-273	12.98	14.47	14.74	17.32	15.78	17.53	20.11	22.70
	GSHV-274	12.33	13.82	15.27	15.99	15.48	16.76	20.56	20.82
	GSHV-275	12.27	13.85	15.51	16.04	15.84	16.42	20.76	21.62

	GSHV-276	12.95	14.29	16.04	16.07	16.10	17.48	20.84	23.16
	GSHV-277	12.42	14.29	14.53	15.93	15.42	16.80	21.39	21.01
	GSHV-266	13.01	14.14	14.92	15.87	15.30	16.82	20.65	21.67
		Genotypes	**Time of Samples**	**Parts**	**GxTxP**				
	S. Ed	0.193	0.097	0.136	0.546				
	CD (5%)	0.38	0.19	0.27	NS				
Phenol (mg/g)	GSHV-271	6.44	7.41	5.65	6.61	9.52	11.63	10.29	13.74
	GSHV-272	6.51	7.19	5.52	6.89	9.19	10.98	10.12	13.94
	GSHV-273	6.62	7.13	5.87	6.40	8.75	11.49	10.02	13.81
	GSHV-274	6.94	7.31	5.86	6.19	8.64	11.07	9.93	13.65
	GSHV-275	6.83	7.23	5.75	6.02	9.11	11.37	9.73	14.63
	GSHV-276	7.06	7.17	5.92	6.01	8.77	11.50	10.38	14.32
	GSHV-277	7.05	7.13	5.62	6.14	8.74	11.56	10.62	14.63
	GSHV-266	7.24	7.54	5.78	6.12	8.31	11.10	10.34	14.75
		Genotypes	**Time of Samples**	**Parts**	**GxTxP**				
	S. Ed	0.159	0.080	0.112	0.450				
	CD (5%)	NS	0.15	0.22	NS				
Reducing sugar (mg/g)	GSHV-271	16.69	18.97	15.11	16.33	20.63	22.13	22.42	24.67
	GSHV-272	15.90	18.82	15.17	16.00	19.75	22.56	21.59	25.29
	GSHV-273	16.79	19.03	15.82	16.02	19.84	22.49	23.04	25.50
	GSHV-274	17.38	18.23	15.98	15.84	20.67	22.62	22.36	23.77
	GSHV-275	16.08	19.02	15.50	15.71	19.45	21.75	23.18	24.28
	GSHV-276	16.07	18.74	16.10	15.75	19.08	21.18	23.25	23.59
	GSHV-277	16.61	19.22	15.45	16.03	19.89	21.37	22.97	24.61
	GSHV-266	16.14	18.82	15.64	15.99	20.45	22.29	23.27	24.59
		Genotypes	**Time of Samples**	**Parts**	**GxTxP**				
	S. Ed	0.227	0.114	0.161	0.643				
	CD (5%)	NS	0.22	0.31	NS				
Flavanol content (mg/g)	GSHV-271	6.23	6.52	7.00	7.97	7.68	10.16	8.60	10.64
	GSHV-272	5.79	6.61	7.17	7.96	7.46	10.07	8.78	10.78
	GSHV-273	6.65	6.92	6.12	8.22	6.88	10.06	7.71	10.02
	GSHV-274	6.34	6.74	6.14	8.88	7.08	9.95	8.49	10.45
	GSHV-275	6.34	7.63	5.20	8.83	6.52	10.35	8.55	10.22
	GSHV-276	6.22	6.64	5.33	9.22	5.57	10.04	8.55	10.38
	GSHV-277	6.74	6.79	5.51	7.67	7.64	10.73	7.61	9.61
	GSHV-266	6.73	6.84	6.98	8.08	7.76	10.96	8.59	10.16
		Genotypes	**Time of Samples**	**Parts**	**GxTxP**				

	S. Ed	0.096	0.048	0.068	0.270				
	CD (5%)	0.189	0.095	0.134	0.535				
Gossypol (%)	GSHV-271	0.81	0.97	0.57	0.62	0.65	0.83	0.90	0.99
	GSHV-272	0.87	0.92	0.54	0.60	0.63	0.79	0.91	0.96
	GSHV-273	0.86	0.92	0.55	0.64	0.68	0.83	0.98	0.97
	GSHV-274	0.88	0.97	0.55	0.62	0.65	0.80	0.96	0.98
	GSHV-275	0.79	0.98	0.58	0.64	0.68	0.83	0.90	0.98
	GSHV-276	0.87	0.91	0.54	0.67	0.65	0.84	0.92	0.96
	GSHV-277	0.85	0.89	0.56	0.66	0.65	0.78	0.93	0.95
	GSHV-266	0.86	0.93	0.55	0.65	0.64	0.75	0.93	0.97
		Genotypes	**Time of Samples**	**Parts**	**GxTxP**				
	S. Ed	0.018	0.005	0.007	0.029				
	CD (5%)	NS	0.010	0.014	0.056				

Soil Ph:7.15, EC-.0.55 m mhos cm^{-1}, Available N:405.60 kg/ha, P2O5:20.40kg/ha, K2O:490.00kg/ha, Total rainfall-1335 mm, Rainy days-54

Plant Protection Entomology Results

The result obtained from the entomological experiments conducted at various locations under All India Coordinated Research Project on Cotton during 2024-25 has been described as under.

Ent.1 (a): Preliminary screening of breeding material for resistance to insect pests (National & Zonal Trials)

NORTH ZONE

The results obtained from North Zone screening trials are presented in Table No.1-17. The following genotypes were identified as tolerant/moderately tolerant to leafhopper& whitefly as indicated below.

Trial No.	Leafhopper cultures	Whitefly cultures	Thrips cultures
Arboreum Cotton			
Br 22a (NT)	CISA 8-1 (1 out of 13)	CISA 6-11 (1 out of 13)	PBD 161,RG 944 (2 out of 13)
Br 25a PHT (NT)	GVDH 111/22,AAH 51 (2 out of 9)	CISAA 23-2, AAH 51 (2 out of 9)	GVDH 111/22, AAH 51 (2 out of 9)
Br 24 a (CVT) (ZT)	-	RG 913 (1 out of 5)	-
Br 25a (CHT)(ZT)	KR 160 (1 out of 10)	KR 160 (1 out of 10)	KR 160, KR162 (2 out of 10)

NT - National trials; ZT - Zonal trials.

CENTRAL ZONE

The results obtained from Central Zone screening trials are presented in Table No.18-47. The following genotypes were identified as tolerant/moderately tolerant to leafhopper& whitefly as indicated below.

Trial No.	Type of Rating	Leafhopper cultures	Whitefly cultures	Thrips cultures
Hirsutum Cotton				
Br 03 a/b (IRR)	**R**	CNH-22197(CC), FC 4003 (2 out of 8)	CNH-22197(CC), FC 4002 (2 out of 8)	CNH-22196(CC) (1 out of 8)
Br 03 a/b (RF)	**R**	CNH-22197(CC) (1 out of 8)	16301 DB (1 out of 8)	FC 4002 (1 out of 8)
Br 03c (PVT) (IRR)	**R**	-	-	AKH 2018-C (1out of 10)
	T	-	GSHV 269 (1out of 10)	
Br 03c (PVT) (RF)	**HR**	AKH 1514, (1 out of 10)	SurakshaCC (1out of 10)	AKH 1514 (1out of 10)
	R	Suraksha CC (1 out of 10)	-	-
Br 02c (IET) (IRR)	**HR**	RHC 2018 (1 out of 28)	-	-
	R	BS 277-24, RHC 2107, (2 out of 28)	SurakshaCC, CNH 3001, BS 277-24, RHC 1904, ADB 755 (5 out of 28)	AKH 2009 (1 out of 28)
Br 02c (IET) (RF)	**R**	SurakshaCC,GISV 419, (2 out of 28)	SurakshaCC, GSHV 271,NDLH 2097, AKH 2002 (4 out of 28)	SurakshaCC, NDLH 2092-3, CNH 3002 (3 out of 28)
	T	ADB 755 (1 out of 28)	-	-
Br 05c (CHT) (IRR)	**R**	KGHH– bio-2409 (1 out of 10)	KGHH– bio-2409, KGHH– VS-2318-1 (2 out of 10)	-
Br 05c (CHT) (RF)	**R**	KGHH– bio-2409, Partech 29 (2 out of 10)	GSHH 08/2019, Partech 30 Plus (2 out of 10)	KGHH– bio-2409, Bunny (CC) (2 out of 10)
Arboreum Cotton				
Br 22 b		AKA 2016-1, HD584, KGA-VS-2413(3 out of 22)	CNA 1089, JLA1913, JLA 1518, GBAV-173, NDLA3167-1 (5 out of 22)	GAM 316, NDLA 3167-1, GBAV 179, CNA 1089, JLA 1913 (5 out of 22)
Br 25b (PHT)		AAH 53(1 out of 8)	AAH 51, GVDH 111/22 (2 out of 8)	-
Br 24 b		JLA 1707(1 out of 8)	-	-
Br 32 b		DDhc-2451, GVhv 1262 (2 out of 12)	GShv 836/17 (1 out of 12)	GShv 836/17(1 out of 12)
Barbadense Cotton				
Br-14a (CVT)		CCB 22-2 (1 out of 8)	CCB 23-1 (1 out of 8)	CCB 22-1 (1 out of 8)

HR-highly resistant, R-resistant, T-tolerant

SOUTH ZONE

The results obtained from South Zone screening trials are presented in Table No.48-73. The following genotypes were identified as tolerant/moderately tolerant to leafhopper& whitefly as indicated below.

Trial No.	Type of Rating	Leafhopper cultures	Whitefly cultures	Thrips cultures
Hirsutum Cotton				
Br. 02c (IRR)	**R**	CNH 3001, AKH 2009, NDLH 2097 (3 out of 28)	NH 768, ADB 755 (2 out of 28)	SurakshaCC, CNH 3001, L 1822, (3 out of 28)
	T	-	L 1822 (1 out of 28)	AKH 2018-6 (1 out of 28)
Br. 02c (RF)	**R**	SurakshaCC, CNH 3001, AKH 2009 (3 out of 28)	L 1822, NH 768, KGH 2411, NDLH 2097 (4 out of 28)	SurakshaCC,CNH 3001,L 1822, (3 out of 28)
	T	NH 768, (1 out of 28)		
Br. 05c (CHT) (IRR)	**R**	Bunny (CC) (1 out of 6)	-	Bunny (CC) (1 out of 6)
	T		Bunny (CC) (1 out of 6)	
Br. 05c (CHT) (RF)	**R**	KGHH-VS-2318-1 (1 out of 6)	KGHH-VS-2318-1 (1 out of 6)	Partech 28 (1 out of 6)
Br. 03c (PVT) (IRR)	**R**	GBHV 257 (1 out of 5)	AKH 10-3 (1 out of 5)	AKH 10-3 (1 out of 5)
Br. 03c (PVT) (RF)	**R**	-	AKH 10-3 (1 out of 5)	-
	T	-	-	AKH 10-3 (1 out of 5)
Br. 03 a/b (PVT) (IRR)	**R**	FC 4003 (1 out of 8)	CNH-22196 CC (1 out of 8)	-
Br. 03 a/b (PVT) (RF)	**R**	FC 4003, CNH-22197(CC) (2 out of 8)	CNH-22196 CC (1 out of 8)	-
Arboreum Cotton				
Br- 22b		DAS 2451, AKA 2016-1, KGA-VS-2412 (3 out of 22)	GAM 316, CNA 1089, HD 584, KGA-VS-2413 (4 out of 22)	GBAV 173, JLA 1913, (2 out of 22)
		-	-	DAS 2451, HD 579(2 out of 22)
Br-24b (CVT)		CNA 1084, CNA 1085 (2 out of 6)	DDCC 1 (CC) (1 out of 6)	DWDa 2252, CNA 1085 (2 out of 6)
Barbadense Cotton				
Br-14a (CVT)		SIMA B-8 (1 out of 8)	CCB 23-1 (1 out of 8)	-

HR-highly resistant, R-resistant, T-tolerant (Further subjected to advance screening)

The common cultures reported tolerant/resistant in more than one zone (2024-25)

Trial No.	Leafhopper cultures– Tolerant/ Moderately tolerant	Whitefly cultures– Tolerant/ Moderately tolerant	Thrips cultures– Tolerant/ Moderately tolerant
Hirsutum Cotton			
Br. 02c (IRR)	-	ADB 755	-
Br. 02c (RF)	Suraksha (CC)	NDLH 2097	Suraksha (CC)
Br. 05c (CHT) (IRR)	-	-	-
Br. 05c (CHT) (RF)	-	-	-
Br. 03c (PVT) (IRR)	-	-	-
Br. 03c (PVT) (RF)	-	-	-
Br. 03 a/b (PVT) (IRR)	FC 4003	-	-
Br. 03 a/b (PVT) (RF)	CNH-22197 (CC)	-	-
Arboreum Cotton			
Br- 22b	-	GAM 316	JLA 1913
Br-24b (CVT)	-	-	-
Barbadense Cotton			
Br-14a (CVT)	-	CCB 23-1	-

Ent. 1(b) - Advance screening of promising entries for development of repository for sucking pests (*Hirsutum* Cotton) (Table No. 74-89)

NORTH ZONE

North Zone	Leafhopper	Faridkot, Bathinda
	Whitefly	Faridkot & Sirsa
	Thrips	Hisar and Sirsa
	Pink Bollworm	Hisar and Bathinda

Promising Entries in North Zone

Pest	Name of Entry	
Leafhopper	CNH 1155, CNH 1156, CNH 1157, SCS 1001, LD 491**(5)**	**Promoted to Ent.1(c)**
Whitefly	NGP 117,HS 310, LK 861, SCS 1001, EC 344385, RS 2013, LPS 141, CNH 115, CNH 1156, CNH 1157 **(10)**	
Thrips	LPS 141**(1)**	
Pink Bollworm	Experiment not conducted by the concerned Entomologist	

CENTRAL ZONE

Central Zone	Leafhopper	Surat, Bhawanipatna, Nanded, Junagarh and Rahuri
	Thrips	Akola, Junagarh and Rahuri
	Pink Bollworm	Junagarh, Nanded, Nagpur and Rahuri

Promising Entries in Central Zone

Pest	Name of Entry	
Leafhopper	GSHV 269, GBHV 257**(2)**	**Promoted to Ent.1(c)**
Thrips	GSHV 266**(1)**	
Pink Bollworm	Experiment not conducted by the concerned Entomologist	

South Zone

South Zone	Leafhopper	Coimbatore, Dharwad and Raichur
	Thrips	Coimbatore, Nandyal and Srivilliputtur
	Pink Bollworm	Coimbatore , Raichur and Srivilliputtur

Promising Entries in South Zone

Pest	Name of Entry	
Leafhopper	AKH 13, NDLH 1938**(2)**	**Promoted to Ent.1(c)**
Thrips	-	
Pink Bollworm	NDLH 1938, **(1)**	

ENT. 1(c) Evaluation of promising entries from Ent. (1b) for creation of repository for sucking pests tolerant genotypes (*Hirsutum* Cotton) (Table No. 90-111)

North Zone: Details of the centres allotted screening activities

North Zone	Leafhopper	Faridkot, Bathinda
	Whitefly	Faridkot & Sirsa
	Thrips	Hisar and Sirsa
	Pink Bollworm	Hisar and Bathinda

Promising Entries in North Zone

Pest	Name of Entry	Remarks
Leafhopper	Experiment not conducted by the concerned Entomologist	Further subjected to morpho-physiological and biochemical analysis
Whitefly	NGP 127, NGP 102, LK 861, DHY 286, EC 700090, BGDS 1063, LPS 141, RS 2013**(8)**	
Thrips	LPS 141, RS 2013**(2)**	
Pink Bollworm	Experiment not conducted by the concerned Entomologist	

Central Zone:Details of the centers allotted screening activities

Central Zone	**Leafhopper**	**Surat, Bhawanipatna, Nanded, Junagarh and Rahuri**
	Thrips	**Akola, Junagarh and Rahuri**
	Pink Bollworm	**Junagarh, Nanded, Nagpur and Rahuri**

Promising Entries in Central Zone

Pest	Name of Entry	Remarks
Leafhopper	GISV 216, GJHV 522, AKH 1302, NH 737, AKH 2013-3, GJHV 548, CNH 1157, NDLH 1938**(8)**	

Thrips	AKH 1013-3, GISV 216, GJHV 522, CNH 1155**(4)**	Further subjected to morpho-physiological and biochemical analysis
Pink Bollworm	Experiment not conducted by the concerned Entomologist -	

South Zone:Details of the centers allotted screening activities

South Zone	Leafhopper	Coimbatore, Dharwad and Raichur
	Thrips	Coimbatore, Nandyal and Srivilliputtur
	Pink Bollworm	Coimbatore , Raichur and Srivilliputtur

Promising Entries in South Zone

Pest	Name of Entry	Remarks
Leafhopper	AKH 13, CNH 1156, CNH 1157, GTHV 13/28, NH 1157, NDLH 1938,GSHV 269, GSHV 266, RCH 1651, RHC 1409, GBHV 257**(11)**	Further subjected to morpho-physiological and biochemical analysis
Thrips	-	
Pink Bollworm	-	

Ent.2: Seasonal dynamics to develop suitable forecasting model (Table No 112-188)

North Zone

S.N.	States	Genotypes (Sucking pests)	Genotypes (Bollworm)		Center Name
			Non-Bt	BG-II Hybrid	
1	Haryana	Ganganagar Ageti, RS-2013	HS-6	RCH-650BG-II	Sirsa, Hisar
2	Punjab	Ganganagar Ageti, RS-2013	HS-6	RCH650BG-II	Faridkot, Bathinda
3	Rajasthan	Ganganagar Ageti, RS-2013	HS-6	RCH 650 BG-II	Sriganganagar

North Zone- Population Range and Peak Activity Period (SMW)

Population range and peak activity of sucking pests

Centre Name	Population Range and Peak Activity Period (SMW) of sucking pests /3leaves			Natural Enemies/plant (Range & SMW)
	Leafhopper	Thrips	Whitefly	
Sirsa	0.13-11.20 (28)	0.00-59.33 (30)	6.07-70.07 (29)	0.00-9.27 (30)
Hisar	0.13-7.13 (27)	0.20-42.80 (30)	0.53-32.47 (39)	0.00-2.00 (33)
Bathinda	0.20-14.40 (32)	2.80-91.80 (30)	5.60-55.80 (29)	0.00-2.00 (32)
Faridkot	0.00-4.50 (36)	0.00-213.00 (29)	0.70-120.90 (29)	0.00-25.50 (29)
Sriganganagar	0.00-9.89 (32)	0.00-58.89 (30)	1.01-49.00 (36)	0.00-2.97 (38)

In north zone, leafhopper peaked between 27-36, Thrips between 29-30 and Whitefly between 29-39 SMW.

Population range and peak activity of Bollworms.

Centre Name	Population Range and Peak Activity of Bollworm					
	Non- Bt Cotton			Bt Cotton		
	Earias spp. (larvae/5plant)	Fruiting Body Damage (%)	GBD (%) ABW/SBW/TC	*Earias spp.* (larvae/5plent)	Fruiting Body Damage (%)	GBD (%) ABW/SBW/TC
Sirsa	0.00-0.93 (42)	0.00-16.76 (41)	0.00-29.11 (41)	0.00	0.00	0.00
Hisar	0.00-0.40 (42)	0.00-40.00 (43)	0.00-8.00 (43)	0.00	0.00-20.00 (43)	0.00
Bathinda	0.60-1.00 (37)	12.66-14.66 (38)	-	-	5.33-10.66 (41)	-
Faridkot	0.10-0.40 (38)	2.38-7.14 (37)	-	-	3.00 (37)	-
Sriganganagar	0.00-1.68 (34)	0.00	0.00-17.00 (36)	0.00-1.32 (31)	0.00	0.00-1.73 (43)

Fruiting body damage (%) peaked between 37-43 SMW in Non-Bt & 34-41 SMW in Bt-cotton.

Population range and peak activity of Pink Bollworm

Centre Name	Population Range and Peak Activity of Bollworm			
	Non- *Bt* Cotton		*Bt* Cotton	
	Rosette Flower (%)	Larvae of *P. gossypiella* (Nos.) *	Rosette Flower (%)	Larvae of *P. gossypiella* (Nos.) *
Sirsa	0.00	20.00	0.00	12.50
Hisar	-	0.75	-	0.75
Bathinda	-	0.00	-	0.00
Faridkot	-	14.89	-	7.78
Sriganganagar	0.00-11.00 (28)	3.25	0.00-9.00 (38)	8.25

*-Larvae recorded from bolls collected during 90,105,120 and 135 DAS through destructive sampling.

Green boll damage, open boll damage and locule damage (%) range due to PBW

Centre Name	Range of Pink Bollworm Damage					
	Non- *Bt* Cotton (Damage %)			*Bt* Cotton (Damage %)		
	Green boll Damage (%)	Open Boll Damage (%)	Locule Damage (%)	Green boll Damage (%)	Open Boll Damage (%)	Locule Damage(%)
Sirsa	27.00	27.74	18.24	21.00	11.06	6.06
Hisar	3.50	3.87	2.54	3.00	2.48	1.38
Bathinda	0.00	0.00	0.00	0.00	0.00	0.00
Faridkot	-	-	-	-	-	-
Sriganganagar	14.25	20.00	0.00	20.50	30.00	3.30

LEAFHOPPER: In North zone the peak activity of Leafhopper was recorded from 27th to 36th SMW at different locations. **In Haryana at** Sirsa **peak of leafhoppers, was observed during 28th SMW and population ranged between** (0.13-11.20/3 leaves), **at** Hisar **peak of leafhoppers, was observed during 27th SMW, population ranged between** (0.13-7.13/3 leaves). **In Punjab at** Bathinda**, maximum population of leafhopper was observed during 32nd SMW and population range was** 0.20-14.40/3 leaves**. In Faridkot, leafhopper infestation was found maximum in 36th SMW and population range was** 0.00-

11.20/3 leaves**. At** Sriganganagar, **peak leafhopper infestation was reported during 32nd SMW and population range was** 0.00-9.89/3 leaves**.**

WHITEFLY: In North zone the peak activity of Whitefly was recorded from 29th to 39th SMW at different locations. **In Haryana at** Sirsa & Hisar **whitefly adult population was at its peak during 29th SMW** (6.07-70.07 adults/ 3 leaves) **&39th SMW** (0.53-32.47 adults/3 leaves), **respectively. In Punjab at** Bathinda & Faridkot, **peak period for population of whitefly adults was observed during 29thSMW and population ranged between** (5.60-55.80 adults/3 leaves)**& (**0.70-120.90 adults/3 leaves) **respectively. At** Sriganganagar, **whitefly peak appeared during 36th SMW** (1.01-49.00 adults/3 leaves)**.**

THRIPS: In North zone the peak activity of thrips was recorded from 27th to 36th SMW at different locations. **In Haryana, at** Sirsa & Hisar, **thrips showed their peak infestation during 30th SMW** (0.00-59.33 thrips/ 3 leaves) **&**(0.20-42.80 thrips/3 leaves)**, respectively. In Punjab,** Bathinda **and** Faridkot **thrips/3 leaves showed its peak infestation during 30th**(0.00-91.80 thrips) **and 29th SMW** (0.00-213.00 thrips), **respectively. At** Sriganganagar **population of thrips ranged between** 0.00-58.89 thrips/3 leaves **with a peakduring 30th SMW.**

NATURAL ENEMIES (NE)**:** In North Zone, in general activity period of generalist predators was recorded between 29th to 38th SMW. **In** Haryana, **at** Sirsa & Hisar **peak activity of NE was recorded during 30th &33rd SMW and the population ranged between (**0.00-9.27/plant) &(0.27-1.60/plant), **respectively. In Punjab, population range of predators per plant ranged between** 0.00-2.00/plant **in Bathinda (peak during 32nd SMW) and** 0.00-25.50/plant **in Faridkot (peak during 29th SMW). At** Sriganganagar**, predator's population ranged between**0.00-2.97/plant **with peak during 38th SMW.**

BOLLWORMS (Non-Bt): In North Zone, **population of *H. armigera* and *S. litura* found to be zero at all the centers of north zone. Population of *Earias spp*. ranged from 0.00-1.68/ 5 plants and maximum at** Sriganganagar **during 34th SMW. Fruiting body damage was found maximum at** Hisar(0.00-40.00 percent) **during 43rd SMW. Green boll damage due to ABW/SBW and TC was found to be highest at** Sirsa (0.00-29.11 percent) **during 41st SMW. Rosette flowers due to pink bollworm were found maximum at Sriganganagar** (0.00-11.00 percent) **during 28th SMW. Larval recovery of PBW & green boll damage due to PBW at all locations of North Zone ranged from** 0.00-20.00/50 green bolls**&**0.00-27.00 percent **through destructive sampling and highest larval recovery and green boll damage due to PBW was recorded at** Sirsa**. Open boll damage and locule damage ranged between** 0.00-27.74 **and** 0.00-18.24 percent **respectively.**

BOLLWORMS (Bt): In North Zone, **population of *H. armigera* and *Spodoptera litura* found to be zero at all the centers of north zone. Population of *Earias spp*. ranged from 0.00-1.32/ 5 plants and maximum at** Sriganganagar **during 31st SMW. Fruiting body damage was found maximum at** Hisar(0.00-20.00 percent) **during 43rd SMW. Green boll damage due to ABW/SBW and TC was recorded maximum at** Sriganganagar(0.00-1.73 percent) **during 43rd SMW. Rosette flowers due to pink bollworm were found maximum at Sriganganagar** (0.00-9.00 percent) **during 38th SMW. Larval recovery of PBW & green boll damage due to PBW at various locations ranged between** 0.00-12.50/50 green bolls **&** 0.00-21.00 **through destructive sampling and maximum larval recovery and green boll damage due to PBW was recorded at** Sirsa**. Open boll damage and locule damage ranged between** 0.00-30.00 percent **and** 0.00-6.06 percent**, respectively at all locations.**

Central and South Zone

S.N.	States	Genotypes (Sucking Pests)	Genotypes (Bollworm)		Center Name
			Non-Bt	BG-II Hybrids	
1.	Rajasthan South	Suvin/DCH-32	Suraj	RCH-2BG-II	Banswara
2.	Gujarat	Suvin/DCH-32	Suraj	RCH-2BG-II	Surat, Junagadh, Bharuch
3.	MP	Suvin/DCH-32	Suraj	RCH-2BG-II	Khandwa
4.	Maharashtra	Suvin/DCH-32	Suraj	Ajeet155 BG II	Nanded, Akola, Rahuri
5.	Odisha	Suvin/DCH-32	Suraj	----------	Bhawanipatna
6.	Karnataka	Suvin/DCH-32	Suraj	Bahubali BG-II/ Jadoo BG-II	Dharwad, Raichur, Chamarajanagar
7.	AP	Suvin/DCH-32	Suraj	Jadoo BG II	Guntur, Nandyal
8.	Tamilnadu	Suvin/DCH-32	Suraj	Jadoo BG II	Coimbatore, Srivilliputhur

Central Zone

Population range and peak activity of sucking pests

Centre Name	Population Range and Peak Activity Period (SMW) of sucking pests /3leaves				Natural Enemies / plant (Range)
	Leafhopper	Thrips	Whitefly	Aphid	
Banswara	0.67-19.00 (36)	-	0.67-17.67 (50)	-	0.20-0.40 (39)
Junagadh	0.20-33.30 (44)	0.00-14.80 (41)	0.20-31.20 (43)	0.60-56.75 (52)	0.00-3.60 (49)
Surat	0.00-19.60 (46)	0.00-41.40 (38)	0.00-6.80 (46)	0.00-57.70 (51)	0.10-3.60 (52)
Bharuch	0.80-11.70 (42)	0.70-21.20 (40)	0.00-2.10 (47)	0.00-30.20 (52)	0.00-2.40 (52)
Akola	0.83-18.70 (46)	0.00-12.40 (35)	1.40-11.47 (39)	0.00-28.50 (52)	0.43-2.93 (50)
Nanded	0.40-11.58 (36)	0.00-49.60 (39)	0.00-8.47 (37)	0.00-77.20 (52)	0.40-7.80 (52)
Rahuri	1.45-10.50 (38)	0.40-47.20 (30)	0.00-14.95 (52)	5.20-117.65 (52)	0.24-5.62 (52)
Khandwa	0.30-6.50 (44)	-	0.00-36.30 (40)	9.60-36.90 (47)	0.00-6.60 (38)
Bhawanipatna	4.20-19.20 (39)	0.10-0.30 (43)	0.00-0.55 (52)	0.00-28.60 (30)	0.10-2.00 (39)

In central zone, leafhopper peaked between 36-46, Thrips 30-43, Whitefly between 37-52 and Aphids between 30-52 SMW.

Population range and peak activity of Bollworms (Larvae).

Centre Name	Population Range and Peak Activity of Bollworm (Larvae)					
	Non- Bt Cotton (No. of larvae/5 plants)			Bt Cotton (No. of larvae/5 plants)		
	Helicoverpa Spp. (Larvae)	*Earias* spp. (Larvae)	*Spodoptera Spp.* (Larvae)	*Helicoverpa Spp.* (Larvae)	*Earias* spp. (Larvae)	*Spodoptera Spp.* (Larvae)
Banswara	-	-	-	-	-	-
Junagadh	0.00-2.20 (41)	0.00	0.00-2.00 (43)	0.00	0.00	0.00
Surat	0.00-1.60 (46)	0.00	0.00-1.60 (43)	0.00	0.00	0.00
Bharuch	0.00-0.50 (41)	0.00-0.42 (42)	0.00-0.90 (40)	0.00	0.00	0.00

Akola	0.00-0.53 (35)	0.00-0.33 (50)	-	0.00-0.20 (37)	0.00-0.20 (48)	0.00
Nanded	0.00-1.40 (41)	0.00-0.20 (34)	0.00-1.87 (41)	0.00-0.40 (41)	0.00	0.00-1.20 (41)
Rahuri	0.00-0.60 (41)	0.00-0.10 (39)	0.00-0.20 (40)	0.00-0.10 (39)	0.00	0.00-0.20 (41)
Khandwa	0.00-0.60 (37)	0.00-0.80 (38)	-	0.00-0.60 (32)	0.00-0.90 (45)	-
Bhawanipatna	0.00-0.80 (39)	0.00-3.25 (42)	0.00-1.40 (37)	-	-	-

Population range and peak activity of Bollworms.

Centre Name	Population Range and Peak Activity of Bollworm			
	Non- Bt Cotton		Bt Cotton	
	Fruiting Body Damage (%)	GBD (%) ABW/SBW/TC	Fruiting Body Damage (%)	GBD (%) ABW/SBW/TC
Banswara	-	-	-	-
Junagadh	-	-	-	-
Surat	0.00-13.26 (45)	0.00-15.00 (46)	0.00-6.99 (45)	0.00
Bharuch	0.00-6.45 (43)	0.00-9.25 (45)	0.00-4.41 (46)	0.00
Akola	-	0.00-4.77 (36)	-	0.00-3.47 (37)
Nanded	0.00-28.85 (41)	-	0.00-21.75 (33)	-
Rahuri	-	-	-	-
Khandwa	-	-	-	-
Bhawanipatna	0.00-9.36 (47)	-	-	-

Fruiting body damage (%) peaked between 43-47 SMW, GBD (%) due to ABW/SBW 36-46 SMW in Non-Bt & Fruiting body damage (%) peaked between 33-46 SMW and GBD (%) due to ABW/SBW peaked during 37 SMW in Bt-cotton.

Population Range and Peak Activity of Pink Bollworm

Centre Name	Population Range and Peak Activity of Pink Bollworm					
	Non- Bt Cotton			Bt Cotton		
	Rosette Flower (%)	Larvae of *P. gossypiella* (No./50 green bolls)	GBD (%) Due to PBW	Rosette Flower (%)	Larvae of *P. gossypiella* (No./50 green bolls)	GBD (%) Due to PBW
Banswara	-	-	-	-	-	-
Junagadh	-	-	12.67	-	-	3.00
Surat	0.00-6.30 (43)	12.00	26.00	0.00-5.55 (43)	7.25	16.00
Bharuch	0.00-5.26 (42)	10.00	10.67	0.00-4.69 (45)	7.75	9.33
Akola	-	17.64	27.78	-	15.42	25.00
Nanded	0.00-23.83 (49)	12.33	15.44	0.00-20.00 (49)	10.89	12.78
Rahuri	-	14.00	28.33	-	8.84	20.00
Khandwa	-	1.63	41.55	-	2.00	37.50
Bhawanipatna	0.00	-	-	-	-	-

Larvae recorded from bolls collected during 90,105,120 and 135 DAS through destructive sampling.

Open boll damage and locule damage (%)

Centre Name	Open Boll and Locule Damage (%)			
	Non- Bt Cotton		Bt Cotton	
	Open Boll Damage (%)	Locule Damage (%)	Open Boll Damage (%)	Locule Damage (%)
Banswara	-	-	-	-
Junagadh	11.90	12.40	5.00	3.10

Surat	25.75	14.36	13.90	6.32
Bharuch	11.33	6.89	7.33	4.50
Akola	-	-	-	-
Nanded	39.79	26.98	35.04	21.43
Rahuri	66.15	26.73	63.85	27.88
Khandwa	-	-	-	-
Bhawanipatna	-	-	-	-

LEAFHOPPER: In Central Zone the peak activity of leafhopper/3 leaves was recorded from 36th to 46th SMW. **At** Banswara **(Rajasthan) the maximum infestation of leafhoppers was observed during 36th SMW (0.67-19.00). In** Gujrat **at** Junagadh **maximum population of leafhoppers was observed during 44th SMW (0.20-33.30) and at** Surat **peak of leafhoppers, was observed during 46th SMW (0.00-19.60). At** Bharuch **peak of leafhoppers was observed during 43rd SMW (0.80-21.80). In Maharashtra at** Akola **maximum population of leafhoppers was seen during 42nd SMW (0.80-11.70), in** Nanded **peak leafhopper infestation was reported during 36th SMW (0.40-11.58) and at** Rahuri **peak infestation of leafhoppers, was recorded during 38th SMW (1.45-10.50). At** Khandwa, **peak infestation of leafhoppers, was recorded during 44th SMW (0.30-6.50). In** Bhawanipatna **(Odisha) peak leafhopper population was observed during 39th SMW (4.20-19.20).**

WHITEFLY: **In Central Zone the peak activity of Whitefly/3 leaves was recorded from 37th to 52nd SMW.** At **Banswara** (Rajasthan) the maximum infestation of whitefly was observed during 50th SMW (0.67-17.67). In **Gujrat** at **Junagadh** maximum population of whitefly was observed during 43rd SMW (0.20-31.20) and in **Surat** peak of whitefly was observed during 46th SMW (0.00-6.80). At **Bharuch** peak of whitefly was observed during 47th SMW (0.00-2.10). In Maharashtra at **Akola** maximum population of whitefly was seen during 39th SMW (1.40-11.47), in **Nanded** peak whitefly infestation was reported during 37th SMW (0.00-8.47), at **Rahuri** peak infestation of whitefly, was recorded during 52nd SMW (0.00-14.95). At **Khandwa,** peak infestation of whitefly, was recorded during 40th SMW (0.00-36.30). At **Bhawanipatna** (Odisha) peak infestation of whitefly, was recorded during 52nd SMW (0.00-0.55).

THRIPS: In Central Zone the peak activity of thrips/3 leaves was recorded from 30th to 43rd SMW. In **Gujrat** at **Junagadh** maximum population of thrips was observed during 41st SMW (0.00-14.80) and in **Surat** peak of thrips, was observed during 38th SMW (0.00-41.40). At **Bharuch** peak of thrips was observed during 40th SMW (0.70-21.20). In Maharashtra at **Akola** maximum population of thrips was seen during 35th SMW (0.00-12.40) and in **Nanded** peak thrips infestation was reported during 39th SMW (0.00-49.60). At **Rahuri** peak infestation of thrips, was recorded during 30th SMW (0.40-47.20). At **Bhawanipatna** (Odisha) peak infestation of thrips, was recorded during 43rd SMW (0.10-0.30).

APHID: In Central Zone the peak activity of Aphids/3 leaves was recorded from 30th to 52nd SMW. In **Gujrat** at **Junagadh** maximum population of aphids were observed during 52nd SMW (0.60-56.75) and in **Surat** peak of aphids, was observed during 51st SMW (0.00-57.70). At **Bharuch** peak of aphids was observed during 52nd SMW (0.00-30.20). In Maharashtra, at **Akola** maximum population of aphids was seen during 52nd SMW (0.00-28.50), in **Nanded** peak aphid infestation was reported during 52nd SMW (0.00-77.20) and at **Rahuri** peak infestation of aphids, was recorded during 52nd SMW (5.20-117.65). At **Khandwa,** peak infestation of aphids, was recorded during 47th SMW (9.60-36.90). At **Bhawanipatna** (Odisha) aphid infestation was found maximum during 30th SMW (0.00-28.60).

NATURAL ENEMIES (NE): In Central Zone, in general activity period of generalist predators/plant was recorded between 39th to 52nd SMW.**At** Banswara **(Rajasthan) the maximum population of predators and peak activity was during 39th SMW (0.20-0.40/plant). In Gujarat, at** Junagadh **peak activity of NE was recorded during 49th SMW (0.00-3.60/plant). Population range of predators and peak activity at** Surat **was during 52nd SMW (0.10-**

3.60/plant)andat Bharuch **during 52nd SMW (0.00-2.40/plant). In Maharashtra predator's population per plant ranged between 0.43-2.93 at** Akola**, 0.40-7.80/plant at** Nanded, **0.24-5.26/plant at Rahuri. The peak activity was recorded during 50th, 52nd, and 52nd SMW, respectively at Akola, Nanded and Rahuri. At** Khandwa**, population range of predators and peak activity was during 38th SMW (0.00-6.60/plant) At** Bhawanipatna **(Odisha) predators population ranged between 0.10-2.00/plant with a peak during 39th SMW.**

BOLLWORMS (Non-Bt): **In Central Zone population of *H. armigera, Earias spp.* and*S. litura*was 0.00-2.20/ 5 plants, 0.00-3.25/ 5 plants and 0.00-2.00/ 5 plants and was maximum at** Junagadh **and** Bhawanipatna **during 41st, 42nd and 43rd SMW respectively. Fruiting body damage ranged between 0.00-28.85 percent and was recorded maximum at** Nanded **during 41st SMW. Green boll damage (%) due to ABW/TC and SBW ranged between 0.00-15.00 percent and was maximum at** Surat **during 46th SMW. Rosette flower (%) ranged between 0.00-23.83 percent and was maximum at** Nanded **during 49th SMW. *P. gossypiella* population ranged between 1.63-17.64/50 green bolls and maximum at** Akola**, whereas green boll damage due to pink bollworm was ranged between 10.67-41.55 percent and found maximum at** Khandwa**. Open boll damage (%) ranged between 11.33-66.15 percent and was maximum at** Rahuri**& locule damage (%) ranged between 6.89-26.98 percent and was recorded highest at** Nanded.

BOLLWORMS (Bt): **In Central Zone population of *H. armigera, Earias spp.* and *S. litura* was 0.00-0.60/ 5 plants, 0.00-0.90/ 5 plants and 0.00-1.20/ 5 plants and was maximum at** Khandwa **and** Nanded **during 32nd, 45th& 41st SMW respectively. Fruiting body damage ranged between 0.00-21.75 percent and was recorded maximum at** Nanded **during 33rd SMW. Green boll damage (%) due to ABW/TC and SBW ranged between 0.00-3.47 percent and was maximum at** Akola **during 37th SMW. Rosette flower (%) ranged between 0.00-20.00 percent and was maximum at** Nanded **during 49th SMW. *P. gossypiella* population ranged between 2.00-15.42/50 green bolls and green boll damage due to pink bollworm was maximum (3.00-37.50 percent) at** Akola **&** Khandwa, **respectively. Open boll damage (%) & locule damage (%) ranged between 5.00-63.85 & 3.10-27.88 percent and was maximum at** Rahuri**.**

South Zone

Population Range and Peak Activity Period (SMW) of sucking pests

Centre Name	Population Range and Peak Activity Period (SMW) of sucking pests /3leaves				Natural Enemies / plant (Range & SMW)
	Leafhopper	Thrips	Whitefly	Aphid	
Lam Guntur	0.00-14.07 (47)	0.00-11.20 (38)	0.36-4.32 (44)	1.20-4.40 (42)	0.12-0.36 (38)
Nandyal	9.25-31.30 (49)	11.50-42.80 (47)	5.20-48.87 (51)	0.00-85.00 (51)	-
Dharwad	0.00-16.90 (46)	0.00-88.40 (40)	0.00-5.93 (44)	0.00-44.73 (48)	0.00-2.73 (35)
Raichur	0.00-16.44 (38)	5.17-30.23 (40)	0.00-12.11 (45)	1.83-12.34 (34)	0.00-5.56 (45)
Chamrajnagar	2.35-11.36 (38)	0.00-13.65 (38)	0.00-3.71 (37)	2.50-46.59 (38)	0.00-4.26 (37)
Coimbatore	0.00-7.45 (40)	0.00-2.32 (48)	0.00-4.25 (40)	-	-
Srivilliputhur	0.00-5.70 (47)	0.00-2.80 (41)	0.00-1.80 (41)	-	0.00-0.80 (46)

In south zone, leafhopper peaked between 38-49, Thrips 38-48, Whitefly between 37-51 and Aphids between 34-51 SMW.

Population Range and Peak Activity of Bollworms

Centre Name	Population Range and Peak Activity of Bollworm (Larvae/plant)					
	Non- Bt Cotton (No. of larvae/plant)			Bt Cotton (No. of larvae/plant)		
	Helicoverpa Spp. (Larvae)	*Earias* spp. (Larvae)	*Spodoptera Spp.* (Larvae)	*Helicoverpa Spp.* (Larvae)	*Earias* spp. (Larvae)	*Spodoptera Spp.* (Larvae)
Lam Guntur	-	-	0.16-0.36 (43)	-	-	0.16-0.36 (49)
Nandyal	-	-	-	-	-	0.00
Dharwad	0.00-5.20 (42)	0.00-1.33 (42)	0.00	0.00-0.10 (34)	0.00-0.10 (35)	0.00
Raichur	0.00-0.91 (39)	0.00	0.00-1.00 (45)	0.00-1.44 (42)	0.00	0.00-1.11 (44)
Chamrajnagar	0.00	0.00	0.00	0.00	0.00	0.00
Coimbatore	-	-	-	-	-	-
Srivilliputhur	-	-	-	-	-	-

Population Range and Peak Activity of Bollworms

Centre Name	Population Range and Peak Activity of Bollworm			
	Non- Bt Cotton		Bt Cotton	
	Fruiting Body Damage (%)	GBD (%) ABW/SBW/TC	Fruiting Body Damage (%)	GBD (%) ABW/SBW/TC
Lam Guntur	-	-	-	-
Nandyal	-	-	-	-
Dharwad	0.00-40.58 (42)	-	0.00	-
Raichur	15.33-60.65 (43)	-	0.00-42.41 (43)	-
Chamrajnagar	0.00	0.00	0.00	0.00
Coimbatore	-	-	-	-
Srivilliputhur	-	0.00	-	0.00

Fruiting body damage (%) peaked between 42-43 SMW in Non-Bt & Fruiting body damage (%) peaked between 43 SMW in Bt-cotton.

Population Range and Peak Activity of Pink Bollworm

Centre Name	Population Range and Peak Activity of Pink Bollworm					
	Non- Bt Cotton			Bt Cotton		
	Rosette Flower (%)	Larvae of *P. gossypiella* (No./50 green bolls)	GBD (%) Due to PBW	Rosette Flower (%)	Larvae of *P. gossypiella* (No./50 green bolls)	GBD (%) Due to PBW
Lam Guntur	5.00-35.00 (51)	14.84	26.33	0.00-10.00 (49)	14.50	19.83
Nandyal	-	20.00	28.75	-	17.50	27.50
Dharwad	-	20.54	36.20	-	13.73	26.00
Raichur	0.00-39.30 (48)	30.80	66.88	0.00-34.71 (48)	23.22	43.49
Chamrajnagar	0.00	11.16	18.58	-	5.25	8.22
Coimbatore	0.00-3.67 (48)	8.01	7.41	0.00-2.89 (49)	3.85	2.90
Srivilliputhur	-	-	-	-	-	-

Larvae recorded from bolls collected during 90,105,120 and 135 DAS through destructive sampling.

Open Boll and Locule Damage (%)

Centre Name	Population Range and Peak Activity of Bollworm			
	Non- Bt Cotton		Bt Cotton	
	Open Boll Damage (%)	Locule Damage (%)	Open Boll Damage (%)	Locule Damage (%)
Lam Guntur	24.17	17.85	19.00	16.57
Nandyal	-	-	-	-
Dharwad	64.22	45.00	38.89	27.84
Raichur	84.33	78.37	75.81	70.01
Chamrajnagar	23.50	25.80	7.25	11.23
Coimbatore	10.89	8.59	4.28	3.25
Srivilliputhur	-	-	-	-

Leafhopper: In South Zone the peak activity of leafhopper was recorded from 38th to 47th SMW. In **Lam Guntur,** leafhopper attained its peak during 47th SMW and population ranged between 0.00-14.07/3 leaves. In **Nandyal,** peak of leafhoppers was seen during 49th SMW and ranged between 9.25-31.30/3 leaves. In **Dharwad,** the peak of leafhoppers was observed during 46th SMW with a range of 0.00-16.90/3 leaves. In **Raichur,** leafhopper infestation was found maximum during 38th SMW with a range of 0.00-16.44/ 3 leaves. In **Chamarajnagar,** peak of leafhopper was observed during 38th SMW and population ranged between 2.35-11.36/3 leaves. In **Coimbatore,** the leafhoppers were observed maximum (0.00-7.45/3 leaves) during 40th SMW and in **Srivilliputhur,** leafhopper attained its peak during 47th SMW and ranged between 0.00-5.70/3 leaves.

Whitefly: In South Zone the peak activity of whiteflies was recorded from 37th to 45th SMW. In **Lam Guntur,** whiteflyattained itspeak during 44th SMW and ranged between 0.36-4.32/3 leaves. In **Nandyal,** peak of whitefly was seen during 51st SMW and ranged between 5.20-48.87/3 leaves. In **Dharwad,** the peak of whitefly was observed during 44th SMW and ranged between 0.00-5.93/3 leaves. In **Raichur,** whitefly infestation was found maximum during 45th SMW with a range of 0.00-12.11/ 3 leaves. In **Chamarajnagar,** peak of whitefly was observed during 37th SMW and ranged between 0.00-3.71/3 leaves. In **Coimbatore,** whiteflies were observed maximum (0.00-4.25/3 leaves) during 40th SMW and in **Srivilliputhur,** whitefly attained its peak during 41st SMW with a range of 0.00-1.80/3 leaves.

Thrips: In South Zone the peak activity of thrips was recorded from 38th to 48th SMW. In **Lam Guntur,** thrips attained itspeak during 38th SMW and ranged between 0.00-11.20/3 leaves. In **Nandyal,** peak of thrips was seen during 47th SMW and ranged between 11.50-42.80/3 leaves. In **Dharwad,** the peak of thrips was observed during 40th SMW and ranged between 0.00-88.40/3 leaves. In **Raichur,** thrips infestation was found maximum during 40th SMW with a range of 5.17-30.23/ 3 leaves. In **Chamarajnagar,** peak of thrips was observed during 38th SMW and ranged between 0.00-13.65/3 leaves. In **Coimbatore,** thrips was observed maximum (0.00-2.32/3 leaves) during 48th SMW and in **Srivilliputhur,** thrips attained its peak during 41st SMW with a range of 0.00-2.80/3 leaves.

Aphid: In South Zone the peak activity of aphids was recorded from 34th to 48th SMW. In **Lam Guntur,** aphids attained itspeak during 42nd SMW and ranged between 1.20-4.40/3 leaves. In **Nandyal,** peak of aphids was seen during 51st SMW and ranged between 0.00-85.00/3 leaves. In **Dharwad,** the peak of aphids was observed during 48th SMW and ranged between 0.00-44.70/3 leaves. In **Raichur,** aphid infestation was found maximum during 34th SMW with a range of 1.83-12.34/ 3 leaves and in **Chamarajnagar,** peak of aphids was observed during 38th SMW and ranged between 2.50-46.59/3 leaves.

Natural Enemies: In South Zone, in general activity period of generalist predators was recorded between 35th to 46th SMW. In **Lam Guntur**, predator's population/plant ranged between 0.12-0.36/plant during 38th SMW. In **Dharwad**, predator's population ranged between 0.00-2.73/plant and peak activity was recorded during 35th SMW. The predator's population ranged between 0.00-5.56/ plant in **Raichur** and peak was during 45th SMW. In **Chamarajnagar**, predator's population ranged between 0.00-4.26/plant and peak activity was recorded during 37th SMW and in **Srivilliputhur,**predator's population ranged between 0.00-0.80/plant and peak activity was recorded during 46th SMW.

BOLLWORMS (Non-Bt): **In** South Zone **peak activity of *H. armigera* (0.00-5.20/5 plants), and *Earias spp* (0.00-1.33/5 plant) was maximum at** Dharwad **during 42nd SMW. Population of *S. litura* (0.00-1.00/5 plant) was maximum at** Raichur **during 45th SMW. Fruiting body damage (%) ranged between 0.00-60.65 and was maximum at** Raichur **during 43rd SMW. Green boll damage due to ABW/TC/SBW was nil at all the centers. Rosette flowers (%) ranged between 0.00-39.30 and were maximum at** Raichur **during 48th SMW. Pink bollwormlarval recovery & green boll damage ranged between 8.01-30.80 & 7.41-66.88 percent respectively, and was found maximum at** Raichur. **Open boll damage and locule damage ranged from** 10.89-84.33 **and** 8.59-78.37 percent**, respectively at all locations and were found maximum at** Raichur**.**

BOLLWORMS (Bt): In **South Zone** peak activity of *H. armigera* (0.00-1.44/5 plants), and *Earias spp* (0.00-0.10/5 plant) was maximum at **Raichur** and **Dharwad** during 42nd and 35th SMW, respectively. Population of *S. litura* (0.00-1.11/5 plant) was maximum at **Raichur** during 44th SMW. Fruiting body damage (%) ranged between 0.00-42.41 percent and was maximum at **Raichur** during 43rd SMW. Green boll damage due to ABW/TC/SBW was recorded nil at all the locations. Rosette flowers (%) ranged between 0.00-34.71 percent and were maximum at **Raichur** during 48th SMW. Pink bollwormlarval recovery & green boll damage ranged between 3.85-23.22 & 2.90-43.49 percent, respectively and was found maximum at **Raichur.** Open boll damage and locule damage ranged from **4.28-75.81 percent** and **3.25-70.01 percent**, respectively at all locations and were found maximum at **Raichur**.

Ent 3: Survey for key and emerging pests in cotton in Farmers Field for weekly advisory in North Zone, Central Zone and South Zone during 2024-25 (Table No 189).

NORTH ZONE

In Bathinda, a total of **360** locations were surveyed for surveillance of insect pests of cotton starting from June to October during kharif, in which whitefly, leafhopper, thrips and pink bollworm crossed ETL in 87, 17, 36 & 32 locations, respectively. **In Faridkot,** a total of **836** locations were surveyed from June to October, where whitefly crossed ETL at 508 locations, leafhopper crossed ETL at 13 locations and thrips were above ETL at 179 locations and pink bollworm was recorded above ETL at 33 locations. **In Hisar**, a

total of **333** locations were surveyed from June to October. Out of all surveyed locations of Hisar 34, 18, 04 & 206 locations were found to cross ETL for whiteflies, leafhoppers, thrips and pink bollworm, respectively. **In Sirsa**, a total of **227** locations were surveyed wherein 127, 34, 41 & 107 locations were found to cross ETL for whiteflies, leafhoppers, thrips and pink bollworm, respectively. **In Sriganganagar,** a total of **478** locations were surveyed during Kharif **2024 season** for infestation of insect pests, where in whitefly, leafhopper, thrips and pink bollworm crossed ETL at 105, 19, 18 & 78 locations. Overall, a total of **2234** locations were surveyed during 2024-25 in entire North zone where whitefly and pink bollworm were major pest. The maximum number of locations (%) above ETL recorded was for whitefly (34.51 percent) followed by pink bollworm (20.41 percent), thrips (12.44 percent) and leafhopper (4.52 percent).

CENTRAL ZONE

In **Banswara**, a total of **241** locations were surveyed during July to November, out of all locations surveyed leafhopper crossed ETL at 83 locations. In **Junagadh**, **175** locations surveyed from June to December in which whitefly, thrips, aphids and pink bollworm crossed ETL at 04, 17, 66 and 60 locations, respectively. In **Surat & Bharuch, 827** locations were surveyed during June to December in which leafhopper, thrips, aphids and pink bollworm crossed ETL at 34, 28, 57 and 67 locations respectively. In **Akola,** out of **183** locations were surveyed from August to January, whitefly, leafhopper, thrips, aphid, pink bollworm and *Spodoptera litura* crossed ETL at 20, 36, 24, 18, 16 and 12 locations, respectively. In **Nanded**, **675** locations were surveyed during June to December, out of these 124, 276, 288, 358 and 540 locations were found to be above ETL for whitefly, leafhopper, thrips, aphids and pink bollworm respectively. In **Rahuri**, **554** locations surveyed during June to December out of which 98 locations crossed ETL for aphids, 09 locations for leafhopper, 81 for thrips crossed ETL and 142 locations crossed ETL for pink bollworm. In **Bhawanipatna,** out of **1044** locations surveyed during June to December, leafhopper crossed ETL at 40 locations, thrips at 10 locations, mirid bug was found above ETL at 08 locations, pink bollworm was recorded above ETL at 55 locations and 39 locations crossed ETL for shoot weevil respectively. Overall, a total of **3699** locations were surveyed in central zone and pink bollworm and aphid were major pest at all location. The maximum number of locations (%) above ETL recorded was for pink bollworm (23.79 percent) followed by aphids (16.14 percent), leafhopper (12.92 percent), thrips (12.11 percent), whitefly (4.00 percent), shoot weevil (1.05 percent), *Spodoptera litura* (0.32 percent) and mirid bugs (0.22 percent).

SOUTH ZONE

In Lam Guntur, whitefly, leafhopper, thrips, aphids, pink bollworm and *Spodoptera litura* crossed ETL at 03, 87, 38, 22, 67 and 03 locations, respectively out of **433** locations were surveyed during the season. **In Dharwad,** out of **259** locationssurveyed, leafhopper crossed ETL at 85 locations, thrips at 71 locations, aphids at 55 locations, mirid bug at 68 locations, pink bollworm at 72 locations and shoot weevil 12 locations. **In Raichur**, **1423** locations were surveyed for pest infestation out of which 7, 166, 154, 08, 299 and 19 locations were found to be above ETL for whitefly, leafhopper, thrips, aphids, pink bollworm and *Spodoptera litura*, respectively. **In Chamarajanagar, 1292** locations were surveyed and leafhopper was found to be above ETL at 20 locations. **In Coimbatore,** out of **165** locations surveyed leafhopper, thrips and pink bollworm crossed ETL at 33, 03 and 35 locations, respectively. In **Srivilliputhur**, out of **132** locations surveyed leafhopper was found to be above ETL at 44 locations and Shoot weevil crossed ETL at 07 Locations. In South Zone, pink bollworm and leafhopper were major pest and out of total 3704 surveyed locations. The maximum number of locations (%) above ETL recorded was for pink bollworm

(13.24 percent) followed by leafhopper (11.75 percent), thrips (7.45 percent), aphids (2.38 percent), mirid bug (1.90 percent), *Spodoptera litura* (0.62 percent), shoot weevil (0.52 percent) and whitefly (0.03 percent).

Ent.4a.Evaluation of persistence of insecticides against PBW (Table No.190-221)

In North zone:

Evaluation of persistence toxicity of insecticides at field dose:

The studies conducted both in field cum laboratory condition in North zone at **Sirsa** location reported **Profenophos** relatively most persistent among 9 insecticides evaluated, followed by **Emamectin benzoate**, with persistence toxicities of 841.40 and 727.58, respectively. The least persistent insecticide was **Chlorpyrifos**, with persistent toxicity of 335.67 (**Table 191**). At **Hisar location,** in field cum laboratory studies, **Spinetoram** was the most persistent insecticide, followed by **Profenophos**, with persistence toxicities of 825.18 and 772.92, respectively. The least persistent insecticide was **Cypermethrin**, with a toxicity of 398.72 (**Table 191**). At the **Faridkot location,** in field-cum-laboratory studies, **Spinetoram** was found to be the most persistent insecticide, followed by **Cypermethrin**, with persistence toxicities of 358.15 and 723.15, respectively. The least persistent insecticide was **Quinalphos**, with a toxicity of 358.15 (**Table 190**). At the **Bathinda location,** in field-cum laboratory studies, out of four insecticides, **Emamectin benzoate** recorded the highest persistence, followed by **Fenpropathrin**, with persistence toxicities of 803.06 and 719.77, respectively. The least persistent insecticide was **Spinetoram**, with a toxicity of 543.09 (**Table 190**). In Sirsa similar trend was observed in the persistence toxicity of insecticides under pot cum laboratory studies (**Table 192**).

Effect of insecticides on green boll damage (GBD), Open boll damage (OBD) and Yield of cotton in field condition under evaluation of persistence toxicity of insecticides:

At Sirsa location, the lowest **green boll damage** (%) was observed in **Profenophos** (6.67%), which was statistically similar to **Emamectin benzoate** (8.33%) and **Cypermethrin** (11.67%) treated plot. The highest damage was seen in the untreated control plot, followed by **Chlorpyriphos** treated plot, with 38.18% and 29.91%, respectively (**Table 192**). The same trend was observed for **open boll damage** (**Table 192**). The highest yield was recorded in the **Profenophos** treated plot, followed by the **Emamectin benzoate**-treated plot, with yields of 22.68 and 21.92 quintals per hectare, respectively (**Table 192**).

<u>In Central Zone</u>

Evaluation of persistence toxicity of insecticides:

In Central zone, at Akola **location**, in field-cum-laboratory conditions at **field dose**, out of eight insecticides, **Chlorantraniliprole** was found to be relatively most persistent, followed by **Bifenthrin**, with persistence toxicities of 481.55 and 472.58, respectively. The least persistent insecticide was **Chlorpyrifos**, with a toxicity of 273.15 (**Table 193**). At the **Junagadh location,** in field-cum-laboratory conditions studies at **field dose**, out of nine insecticides, **Spinetoram** was found to be the most persistent insecticide, followed by **Emamectin benzoate**, with persistence toxicities of 894.30 and 466.66, respectively. The least persistent insecticide was Profenofos, with a toxicity of 283.81 (**Table 193**). A similar trend was observed in the persistence toxicity of insecticides at dosages applied at 10 % & 25 % more than field dose and same trend was found under pot-cum-laboratory conditions at all three doses (field dose, more than 10 % & 25

% of field dose) (**Table 195, 196, 203, 204 & 205**). At the **Nanded locations,** in field-cum-laboratory conditions, out of nine insecticides at field dose, **Emamectin benzoate** showed the highest persistence, followed by **Spinetoram**, with persistence toxicities of 751.92 and 728.22, respectively. The least persistent insecticide was **Cypermethrin**, with a toxicity of 471.66 (**Table 194**). At the **Surat location,** in field-cum-laboratory conditions, out of nine insecticides at field dose, **Profenofos** was the most persistent insecticide, followed by **Cypermethrin**, with persistence toxicities of 634.31 and 457.77, respectively. The least persistent insecticide was **Bifenthrin**, with a toxicity of 220.03(**Table 194**). At doses applied at more than 10 % of field dose, **Profenofos** was the most persistent insecticide, followed by **Chlorantraniliprole**, with persistence toxicities of 797.14 and 720.00, respectively. The least persistent insecticide was **Bifenthrin**, with a toxicity of 353.32(**Table 195**). A similar trend was observed in the persistence toxicity of insecticides used at more than 25 % of field dose and same trend was found under pot-cum-laboratory conditions at all three doses (field dose, more than 10 % & 25 % of field dose) (**Table 196, 203, 204 & 205**).

Effect of insecticides on Green Boll Damage (GBD), Open Boll damage (OBD) and Yield of cotton in field condition under evaluation of persistence toxicity of insecticides:

In **Surat location**, the lowest **green boll and open boll damage** (%) was observed in **Profenofos,** which was statistically similar to **Emamectin benzoate** and **Cypermethrin** treated plot at **field dose**. The highest damage was seen in the untreated control plot**.** The same trend was observed in plots applied at more **than 10 % of field dose (Table 198 & 200)**. At more than 25 % of field dose, lowest **green boll, and open boll damage** (%) was observed in **Cypermethrin,** which was statistically similar to **Emamectin benzoate** and **Profenofos (Table 202).** The highest yield was recorded in the **Profenofos** treated plot, followed by the **Emamectin benzoate**-treated plot (**Table 198**). The similar trend of yield was found in plots treated with more **than 10 % & 25 % of field dose** (**Table 200 & 202).**

In **Junagadh location**, the lowest **green boll and open boll damage** (%) was observed in **Spinetoram,** which was statistically similar to **Emamectin benzoate** and **Cypermethrin** treated plot at **field dose**. The highest damage was seen in the untreated control plot, followed by **Profenofos** treated plot at **field dose.** The same trend was observed in plots applied at more **than 10 & 25 % of field dose**. The highest yield was recorded in the **Spinetoram** treated plot, followed by the **Emamectin benzoate**-treated plot. The similar trend of yield was found in plots treated with more **than 10 % & 25 % of field dose** (**Table 197, 199 & 201).** In **Nanded**, the lowest **green boll and open boll damage** (%) was observed in **Spinetoram,** which was statistically similar to **Emamectin benzoate** and **Cypermethrin** treated plot at **field dose**. The highest damage was seen in the untreated control plot at **field dose.** The highest yield was recorded in the **Spinetoram** treated plot, followed by the **Emamectin benzoate** treated plot. The similar trend showed as a **Nanded** in **Surat** center at all dosages of insecticides (**Table 197**).

Evaluation the persistence toxicity of insecticides applied through Conventional method:
In Nagpur location,in **field-cum-laboratory** conditions at **field dose**, out of nine insecticides, **Chlorpyriphos** was found to be relatively most persistent, followed by **Spinetoram**, with persistence toxicities of 1030.82 and 982.69, respectively. The least persistent insecticide was **Bifenthrin**, with a toxicity of 727.05 (**Table 206**). At **1.5 times field dose, Profenofos** and **Spinetoram** was found to be relatively most persistent, with persistence toxicities of 1075.42 and 1072.43, respectively. The least

persistent insecticide was **Chlorantraniliprole**, with a toxicity of 826.14 (**Table 206**). In **pot cum-laboratory** conditions at **field dose, Chlorpyriphos** was found to be relatively most persistent, followed by **Profenofos,** with persistence toxicities of 1031.10 and 955.08, respectively. The least persistent insecticide was **Chlorantraniliprole**, with a toxicity of 755.44 (**Table 207**).In **pot cum-laboratory conditions at 1.5 timesfield dose, Profenofos** was found to be relatively most persistent, followed by **Chlorpyriphos,** with persistence toxicities of 1175.02 and 1086.12, respectively. The least persistent insecticide was **Chlorantraniliprole**, with a toxicity of 863.24 (**Table 207**).

Evaluation the persistence toxicity of insecticides applied through Drone:

In **field-cum-laboratory** conditions at **field dose**, out of eleven insecticides, **Cypermethrin** was found to be relatively most persistent, followed by **Emamectin benzoate**, with persistence toxicities of 1157.63 and 1153.78, respectively. The least persistent insecticide was **Spinetoram**, with a toxicity of 951.86 (**Table 208**).At **1.5 times field dose,Bifenthrin** was found to be relatively most persistent, followed by **Cypermethrin** and **Chlorantraniliprole** with persistence toxicities of 1178.45, 1167.78 and 1165.68, respectively. The least persistent insecticide was **Spinetoram**, with a toxicity of 921.31 (**Table 208**).

Effect of different insecticides on green boll damage (GBD) in experiment on evaluation of persistence of insecticides applied through drone:

In **Field dose**, no infestation of **green boll damage** was found in **Emamectin benzoate, Cypermethrin, Spinetoram** and **Fenpropathrin** treated plot. Highest infestation of green boll damage was found in **Quinalphos(22.22%)** and **Diafenthiuron (22.22%)** treated plot(**Table 209**).

In **1.5 times Field dose**, no infestation of **green boll damage** was found in **Profenofos, Cypermethrin, Quinalphos** and **Fenpropathrin** treated plot. Highest infestation of green boll damage was found in **Flonicamid (22.22%)** and Bifenthrin **(22.22%)** treated plot (**Table 209**).

In South Zone,
Evaluation of persistence toxicity of insecticides:

In South Zone at **Dharwad location,** in field-cum-laboratory studies, out of nine insecticides applied at field dose, **Cypermethrin and Bifenthrin** was found to be the most persistent with persistence toxicities of 966.65. The least persistent insecticide was **Quinalphos**, with a toxicity of 210.00 (**Table 210**). A similar trend was observed in the persistence toxicity of insecticides at more than 10% & 25 % of field dose (**Table 211 & 212**) and same trend was found under pot-cum-laboratory studies at all three doses (field dose, more than 10 % & 25 % of field dose) (**Table 219, 220 & 221**). At **Coimbatore location**, in **pot-cum-laboratory** studies at **field dose**, out of nine insecticides tested, **Chlorantraniliprole** was found to be the most persistent insecticide, followed by **Spinetoram**, with persistence toxicities of 1046.00 and 928.75, respectively. The least persistent insecticide was **Quinalphos**, with a toxicity of 552.00 (**Table 219**). At **LamGuntur location**, in field-cum-laboratory conditions, out of nine insecticides at field dose, **Spinetoram** showed the highest persistence, followed by **Chlorantraniliprole**, with persistence toxicities of 699.95 and 649.93, respectively. The least persistent insecticide was **Chlorpyriphos**, with a toxicity of 74.62 (**Table 210**). A similar trend was observed in the persistence toxicity of insecticides at more than 10

& 25 % of field dose (**Table 211 & 212**). At **Raichur location**, in field-cum-laboratory conditions, out of eight insecticides applied at field dose, **Fenpropathrin** was the most persistent insecticide, followed by **Cypermethrin**, with persistence toxicities of 243.99 and 241.99, respectively. The least persistent insecticide was **Chlorantraniliprole**, with a toxicity of 77.15 (**Table 210**). At more than 10 & 25 % of field dose, **Fenpropathrin** was found to be most and **Chlorantraniliprole as least persistent insecticide (Table 211 & 212)**. In pot-cum-laboratory studies, out of eight insecticides applied at field dose, Cypermethrin and Profenofos was most persistent insecticide with persistence toxicity of 280.00. The least persistent insecticide was **Emamectin benzoate, Chlorantraniliprole, Bifenthrin and Chlorpyriphos** with a toxicity of 196.00 (**Table 219)**. At dosages applied at more than 10 and 25 % of field dose, **Emamectin benzoate** and **Fenpropathrin** was most and **Chlorantraniliprole** and **Chlorpyriphos** was least persistent insecticide (**Table 220 & 221**).

Effect of insecticides on GBD, OBD and Yield of cotton in field condition under evaluation of persistence toxicity of insecticides:

At**Dharwad location**, the lowest **green boll and open boll damage** (%) was observed in **Cypermethrin,** which was statistically similar to **Spinetoram** treated plot at **field dose**. The highest damage was seen in the untreated control plot at **field dose.** The same trend was observed in plots applied with more **than 10 & 25 % of field dose**. The highest yield was recorded in the **Cypermethrin** treated plot, followed by the **Bifenthrin**. The similar trend of yield was found in plots applied at **more than 10 - & 25 % of field dose** (**Table 213, 215 & 217).** In **Lam Guntur**, the lowest **green boll and open boll damage** (%) was observed in **Spinetoram** and highest damage was seen in the untreated control plot at **all three doses.** The highest yield was recorded in the **Spinetoram** treated plot at all three doses applied (**Table 213, 215 & 217).** In **Raichur**, the lowest **green boll and open boll damage** (%) was observed in **Fenpropathrin**, **Cypermethrin**and **Profenofos** and highest damage was recorded in the untreated control plot at **all three doses.** The highest yield was recorded in the **Profenofos** and **Spinetoram** treated plot at all three doses (**Table 214, 216 & 218).**

Ent4b.Evaluation of persistence of insecticides against insect- pests of cotton (through conventional &drone application) (Table No 222-256)

Central zone

Leafhopper

At Surat location using field dose, among all insecticides applied through drone, **Flonicamid** was found to be most effective against **leafhopper** followed by **Diafenthiuron** with highest **reduction over control (87.07 & 71.45 %)** and similar trend was found when insecticide applied through conventional spraying method at all three dosages. The methods of application of insecticides either through drone or through conventional method were statistically non-significant to each other **(Table 225, 227 & 228).**At **Junagadh location using field dose**, among all insecticides applied through drone, **Profenofos** was found to be most effective against **leafhopper** followed by **Flonicamid** with highest reduction (62.71 & 47.24 %) and in conventional spraying method, **Flonicamid** was found to be most effective against leafhopper followed by **Diafenthiuron** with highest **reduction over control** (53.57 & 36.98 %). The methods of application of different insecticides either through drone or conventional method were statistically significant to each other. Where the insecticides applied through drone record better reduction over conventional method of application**(Table 225)**. At **Rahuri**, among all insecticides applied through drone,

Flonicamid was found to be most effective against **leafhopper** followed by **Chlorantraniliprole** with highest reduction (53.21 & 51.07 %) and similar trend was recorded when insecticides applied through conventional spraying method. The methods of application of insecticides either through drone or through conventional method were statistically non-significant to each other **(Table 226)**. At **Nagpur**, among all insecticides applied through drone, **Diafenthiuron** was found to be most effective against **leafhopper** followed by **Chlorantraniliprole** with highest reduction (23.34 & 23.08) and in conventional no reduction in population of leafhopper over control in all dosages was recorded **except Flonicamid at field dose (Table 229)**.

White Fly

At **Junagadh location using field dose**, among all insecticides applied through drone, **Flonicamid** was found to be most effective against **white Fly** followed by **Diafenthiuron** with highest reduction (71.47 & 59.19 %) and similar trend was found when insecticides applied through conventional spraying method. The methods of application of insecticides either through drone or through conventional method were statistically non-significant to each other **(Table 230)**. At **Rahuri**, among all insecticides applied through drone, **Profenofos** was found to be most effective against **white Fly** followed by **Diafenthiuron** with highest reduction (69.92 & 39.85 %) and similar trend recorded when insecticides were applied through conventional spraying method. The methods of application of insecticides either through drone or through conventional method were statistically non-significant to each other **(Table 230)**.At**Nagpur**, among all insecticides applied through drone, **Chlorantraniliprole** observed most effective against **white Fly** followed by **Spinetoram** with highest reduction (33.33 & 12.90 %) and in conventional spraying method, **Profenofos** was found to be most effective against **white Fly** followed by **Diafenthiuron** with highest **reduction over control** (2.50 &1.25 %). The methods of application of insecticides either through drone or through conventional method were statistically non-significant to each other. **At 1.5 times field dose applied through drone**, **Flonicamid** was found to be most effective against **white Fly** followed by **Fenpropathrin** with highest reduction (25.81 & 16.13 %) and in insecticides applied through conventional spraying method, **Diafenthiuron** was found to be most effective against **white Fly** followed by **Quinalphos** with highest **reduction over control** (13.75 & 6.25 %). The methods of application of different insecticides either through drone or conventional method were statistically different to each other wherein insecticide applied through drone record better reduction over conventional method of application**(Table 231)**.

Thrips

At **Junagadh location using field dose**, among all insecticides applied through drone, **Flonicamid** was found to be most effective against **thrips** followed by **Profenofos** with highest reduction (66.63 & 56.79 %) and similar trend was observed when insecticides applied through conventional spraying method. The methods of application either drone or conventional method was statistically **non-significant** to each other in reduction of thrips population after application **(Table 237)**.At **Rahuri using field dose**, among all insecticides applied through drone, **Flonicamid** was found to be most effective against **thrips** followed by **Diafenthiuron** with highest reduction (20.72 & 15.60 %) and similar trend was recorded when insecticides applied through conventional spraying method. There was no significant difference in the efficacy of insecticides applied either through drone or conventional method **(Table 237)**.At **Nagpur using field dose**, among all insecticides applied through drone, **Fenpropathrin** was found to be most effective against **thrips** followed by **Quinalphos** with highest reduction (11.76 & 10.46 %) and in insecticides applied through conventional spraying method, **Chlorpyriphos** & **Fenpropathrin** was found to be most effective

against **thrips** followed by **Quinalphos** with highest **reduction over control** (41.89 & 21.62 %). The different insecticides applied either through drone or conventional methods were statistically **non-significant** to each other **(Table 238)**. **At 1.5 times field dose, Fenpropathrin** was found to be most effective against thrips followed by **Bifenthrin** with highest value of **reduction over control** (41.83 & 33.33 %) and insecticide applied through conventional spraying method, **Diafenthiuron** was found to be most effective against **Thrips** followed by **Quinalphos** with highest **reduction over control** (21.62 & 13.51 %). The methods of application of different insecticides either through drone or conventional method were statistically significant to each other and insecticides applied through drone record better reduction over conventional method of application**(Table 238)**.

Aphid

At **Surat location using field dose,** among all insecticides applied through drone, **Flonicamid** was found to be most effective against **aphid** followed by **Diafenthiuron** with highest **reduction over control (93.58 & 85.77 %)** and similar trend was recorded when insecticides applied through conventional spraying method at all three dosages. But the methods of application of insecticides either through drone or conventional method were statistically **non-significant** to each other as far as efficacy of insecticide is considered **(Table 232, 234 & 235)**.At **Junagadh location using field dose**, among all insecticides applied through drone, **Flonicamid** was found to be most effective against **aphid** followed by **Diafenthiuron** with highest reduction (81.26 & 71.92 %) and similar trend was recorded when insecticides applied through conventional spraying method. Butthe methods of application of insecticides either using drone or conventional method were statistically **non-significant** to each other in reducing aphid population **(Table 232)**.At **Rahuri using field dose**, among all insecticides applied through drone, **Flonicamid** was found to be most effective against **aphid** followed by **Profenofos** with highest reduction (82.61 & 58.73 %) whereas in case insecticide applied through conventional spraying method, **Flonicamid** was observed most effective against **aphid** followed by **Cypermethrin** with highest **reduction over control** (76.55 & 60.81 %). But the methods of application either using drone or conventional method were statistically **non-significant** to each other in reducing pest population after spraying **(Table 233)**.At **Nagpur using field dose**, among all insecticides applied through drone, **Flonicamid** was found to be most effective against **aphid** followed by **Profenofos** with highest reduction (95.57 & 95.52 %) whereas when insecticides were applied through conventional spraying method, **Diafenthiuron** was observed effective against **aphid** followed by **Flonicamid** with highest **reduction over control** (73.12 & 70.70%).The methods of application of different insecticides either through drone or conventional method were statistically significant to each other and insecticide applied through drone record higher reduction over conventional method of application (**Table 236**). **At 1.5 times field dose, Diafenthiuron** was found to be most effective against thrips followed by **Flonicamid** with highest value of **reduction over control** (96.33 & 95.57 %) and similar trend observed when insecticide applied through conventional spraying method. Butthe methods of application either drone or conventional method was statistically **non-significant** to each other in reducing pest population after spraying **(Table 236)**.

Green boll damage (PBW)

At Surat location using field dose, among all insecticides applied through drone, **Chlorantraniliprole** was found to be most effective in reducing PBW g**reen boll damage** followed by **Emamectin benzoate** with highest **reduction over control (60.00 & 54.29 %) and** similar trend was found at all three dosages when insecticides were applied through conventional spraying method. The methods of application of different insecticides either through drone or conventional method were statistically

non-significant with each other in reducing PBW incidence **(Table 239, 241 & 242)**.At **Junagadh location using field dose**, among all insecticides applied through drone, **Spinetoram** was found to be most effective in reducing green **boll damage (PBW)** followed by **Emamectin benzoate** with highest reduction (84.08 & 78.82 %) and similar trend was found when insecticides applied through conventional spraying method. The methods of application of different insecticides either through drone or conventional method were statistically **non-significant** with each other(**Table 239)**.At **Rahuri**, among all insecticides applied through drone, **Spinetoram** was found to be most effective in reducing green **boll damage (PBW)** followed by **Emamectin benzoate** with highest reduction (33.35 & 33.35 %) and similar trend was found when insecticides applied through conventional spraying method. The methods of application of different insecticides either using drone or conventional method were statistically **non-significant** with each other**(Table 240)**.

Larval recovery (PBW)

At **Junagadh location using field dose**, among all insecticides applied through drone, **Spinetoram** was found to be most effective in reducing PBW larval **recovery** followed by **Emamectin benzoate** with highest reduction (80.75 & 77.62 %) and similar trend was found when insecticides applied through conventional spraying method. The methods of application of different insecticides either through drone or conventional method was statistically **non-significant** with each other**(Table 243)**.In **Rahuri**, among all insecticides applied through drone, **Emamectin benzoate** was found to be most effective in reducing PBW larval **recovery** followed by **Chlorantraniliprole**, **Flonicamid, Profenofos and Spinetoram** with highest reduction (20.04 & 10.02 %) and similar trend was found in case insecticide applied through conventional spraying method. The methods of application of different insecticides either through drone or conventional method were statistically significant to each other and insecticides applied through drone perform better over conventional method of application **(Table 243)**.

Yield

At **Surat location using field dose,** among all insecticides applied through drone**, Flonicamid** was observed most effective followed by **Diafenthiuron** with highest yield (28.07 & 26.96 Q/ha) record. A similar trend was observed when insecticide applied through conventional method using more than **10 % of** recommended dosages**.** When the insecticide dose increased to **25 %** more than the recommended dose and applied through drone**, Flonicamid** was observed most effective followed by **Cypermethrin** with highest yield **(29.85 & 27.79 Q/ha)** record **(Table 244).**In **Junagadh location applying field dose**, similar trend was observed s a **Surat location(Table 245)**.At **Nagpur location** using **field dose**, among all insecticides applied through drone, **Diafenthiuron** was observed most effective followed by **Cypermethrin** with highest **yield (17.88 & 16.44 Q/ha**) record. **Fenpropathrin** followed by **Bifenthrin** was most effective with highest **yield (13.31 & 12.63 Q/ha**) record when insecticides were applied through conventional method. At **Nagpur location** using **1.5 times field dose**, among all insecticides applied through drone, **Bifenthrin** was observed most effective followed by **Quinalphos** with highest **yield (16.29 & 15.72 Q/ha**) record. **Emamectin benzoate** followed by **Chlorpyrifos** was most effective with highest **yield (11.21 & 11.20 Q/ha**) record when insecticides were applied through conventional method **(Table 245)**.

Phytotoxicity

No phytotoxicity symptoms or any injuries was observed in **Surat, Junagadh and Rahuri location (Table 246, 247 & 248)** when insecticides were applied either through drone or conventional spraying methods**.But in Nagpur location,** when insecticides applied through drone, Profenophos 50EC and Quinolphos 20% AF sprayed at 2000 ml/ha (800 ml/acre) and 2500 ml/ha (1000 ml/acre), respectively, exerted phytotoxicity to the leaves. Similar results were recorded at 1.5 times the recommended dose of these chemicals. No phytotoxicity was observed for other insecticides at both doses using both methods **(Table 249)**.

South zone (Coimbatore)

At field dose, among all insecticides applied through drone, **Spinetoram** was found to be most effective against **leafhopper** followed by **Flonicamid** with highest **reduction over control (91.25 & 87.47 %)** and in conventional spraying, **Flonicamid** found to be most effective followed by **Diafenthiuron** with highest **reduction over control** (75.86 & 74.44 %). The methods of application of different insecticides either through drone or conventional method were statistically significant to each other and insecticides applied through drone perform better in reduction of population over conventional method of application**(Table 251)**.

At more than 25 % of field dose, among all insecticides applied through drone, **Diafenthiuron** was found to be most effective against **leafhopper** followed by **Flonicamid** with highest **reduction over control (100.00 & 86.24 %)** and in conventional spraying, **Flonicamid** found to be most effective followed by **Diafenthiuron** with highest **reduction over control** (92.57 & 90.16 %). The methods of application of insecticides either through drone or through conventional method were statistically non-significant to each other **(Table 251)**.

At field dose, among all insecticides applied through drone, **Spinetoram**, **Chlorantraniliprole, Diafenthiuron, Chlorpyriphos and Quinalphos** was found to be most effective against **white fly** and similar trend was observed in conventional spraying method. The methods of application of insecticides either through drone or through conventional method were statistically non-significant to each other **(Table 252)**.

At more than 25 % of field dose, among all insecticides applied through drone, **Chlorantraniliprole, Diafenthiuron, and Profenofos** was found to be most effective against **white fly** and similar trend was observed in conventional spraying method. The methods of application of insecticides either through drone or through conventional method were statistically non-significant to each other **(Table 252)**.

At field dose, among all insecticides applied through drone, **Flonicamid** was found to be most effective against **aphid** followed by **Cypermethrin** with highest **reduction over control (90.26 & 89.42 %)** and in conventional spraying, **Flonicamid** was found to be most effective followed by **Spinetoram** with highest **reduction over control** (93.43 & 78.42 %). The methods of application of insecticides either through drone or through conventional method were statistically non-significant to each other **(Table 253)**.

At more than 25 % of field dose, among all insecticides applied through drone, **Diafenthiuron** was found to be most effective against **aphid** followed by **Profenofos** with highest **reduction over control**

(86.63 & 78.95 %) and similar trend was recorded in insecticides applied through conventional spraying. The methods of application of different insecticides either through drone or conventional method were statistically significant to each other and insecticides applied through conventional method perform better in reduction of aphids population over drone application **(Table 253)**.

At field dose, among all insecticides applied through drone, **Spinetoram** was found to be most effective against **thrips** followed by **Emamectin benzoate** with highest **reduction over control (88.69 & 83.57 %)** and in conventional spraying, **Emamectin benzoate** was found to be most effective followed by **Flonicamid** with highest **reduction over control** (89.21 & 78.35 %). The methods of application of insecticides either through drone or through conventional method were statistically non-significant to each other **(Table 254)**.

At more than 25 % of field dose, among all insecticides applied through drone, **Flonicamid** was found to be most effective against **thrips** followed by **Spinetoram** with highest **reduction over control (86.04 & 83.74 %)** and in conventional spraying, **Flonicamid** was found to be most effective followed by **Emamectin benzoate** with highest **reduction over control** (89.50 & 86.82 %). The methods of application of insecticides either through drone or through conventional method were statistically non-significant to each other **(Table 254)**.

At field dose, among all insecticides applied through drone, **Spinetoram** was observed most effective in reducing PBW **green boll damage** followed by **Chlorpyriphos** with highest **reduction over control (62.74 & 55.92 %)** and in conventional spraying, **Emamectin benzoate** observed most effective followed by **Profenofos** with highest **reduction over control** (79.87 & 79.70 %). The methods of application of insecticides either through drone or through conventional method were statistically non-significant to each other**(Table 255)**.

At more than 25 % of field dose, among all insecticides applied through drone, **Emamectin benzoate** was observed effective in reducing PBW **green boll damage** followed by **Cypermethrin** with highest **reduction over control (83.06 & 78.45 %)** whereas insecticide applied through conventional spraying, **Emamectin benzoate** found to be most effective followed by **Profenofos** with highest **reduction over control** (73.42 & 70.32 %). The methods of application of insecticides either through drone or through conventional method were statistically non-significant to each other **(Table 255)**.

No phytotoxicity symptoms or any injuries to any plant part wasreported at **Coimbatore location (Table 256).**

Ent 5a: To Evaluate and identify suitable seed treatment interventions for pest management in organic cotton production 2024-25 (Table No 257-268)

S.N.	Treatments	Dose	
1	**Soil application of neem cake**	@ 200 kg per acre	Artificial release of fixed number (ETL equivalent) nymph of leafhopper /whitefly adults/ thrips nymph, separately for each insects species)
2	***Pseudomonas fluorescens***	10g/ kg of seed	
3	***Beauveria bassiana***	10g/ kg of seed	
4	***Metarhizium anisiopliae***	Seed treatment 10g/ kg of seed and 5g/ lt. of water	
5	***Lecanicillium lecanii***	Seed treatment 10g/ kg of seed and 5g/ lt. of water	
6	***Lecanicilliumlecanii+ Pseudomonas fluorescens***	Combined Seed treatment and foliar spray	▪ Pot study ▪ Three replications/ observations on sucking pest at weekly interval up to 30 days. ▪ Jassid injury grade/ jassids counts/whitefly counts/thrips counts.
7	***Beauveriabassiana+ Pseudomonas fluorescens***	Combined Seed treatment and foliar spray	
8	**Beejamritham**	200 ml/kg	
9	**Control with water only**	-	
10	**Seed treatment with insecticide**	Thiamethoxam 30 FS (Cruiser) @ 7g or Imidacloprid 70 WS (Gaucho) @ 5g/kg of seed	

NORTH ZONE

In Bathinda field conditions, among the different treatments applied as seed treatments in production of organic cotton, the T-10 **(Seed treatments with insecticides)** was found to be more effective against leafhopper, with lowest population of **leafhopper2.57/3 leaves** was recorded however it was statistically at par with T7**(*Beauveria bassiana + Psedomonas fluorescens*)** and T-8**(Beejamritham)**. Similarly, in case of thrips, lowest population **8.58/3 leaves** were found in T-10 **(Seed treatments with insecticides)** treatment and it was statistically at par with T-7 **(*Beauveria bassiana*)**treatment. Lowest population of **whitefly 6.35/3 leaves** was found in T-10 **(Seed treatments with insecticides)** treatment and it was statistically at par with T-7 **(*Beauveria bassiana*)**treatments. **Similarly in pot conditions,** T-10 **(Seed treatments with insecticides)** was found to be more effective against leafhopper (**1.64/3leaves),thrips (9.07/3 leaves)** and **whitefly (6.43/3leaves)** followed by T-7**(*Beauveria bassiana+Pseudomonas fluorescens*)** treatment T-6 **(*Lecanicillium lecanii+Psedomonas fluorescens*)** and T-8**(Beejamritham)** treatment. However, among the non-chemical treatments, T-7**(*Beauveria bassiana+Pseudomonas fluorescens*)** was found superior over other similar non-chemical interventions (Table 257).

At Hisar in field conditions, T-10 **(Seed treatments with insecticides)** treatment was recorded with the lowest population of **leafhopper1.19/3 leaves;** however it was statistically at par with T-1 **(Soil application of neem cake)** and T-8 **(Beejamritham)** treatment. Lowest population of thrips (**2.46/3 leaves)** and **whitefly** (**4.16/3 leaves)** was found in T-10 **(Seed treatments with insecticides)** treatment. **Under pot conditions,** T-10 **(Seed treatments with insecticides)** treatment was found to be more effective against **leafhopper (2.20/3 leaves)** and statistically at par with T-1**(Soil application of neem cake**) treatment and T-8 **(Beejamritham)** treatments. Lowest population of **thrips (8.01/3 leaves)** and **whitefly (6.31/3 leaves)** was found in T-10 **(Seed treatments with insecticides)** treatment. However, among the non-chemical treatments, T-1 (**Soil application of neem cake**) T-8 (**Beejamritham**), T-6 (***Lecanicillium lecanii+ Pseudomonas fluorescens***), and T-7 (***Beauveria bassiana + Pseudomonas fluorescens***) was superior over other similar interventions (Table 258).

In Sirsa Under pot conditions, T-5**(*Lecanicillium lecanii)*** treatment was found to be more effective against **leafhopper (0.25/3 leaves).** It was statistically at par with T-1**(Soil application of neem cake)** treatment T-3 **(*Beauveria bassiana*)**treatment T-4 **(*Metarhizium anisiopliae*)** treatment and T-10 **(Seed treatments with insecticides)** treatment. Lowest population of **whitefly** (**6.50/3 leaves**) found in T-10 **(Seed treatment with insecticide)** treatment and it was statistically at par with T-4 **(*Metarhizium anisiopliae*)** treatment T-7 **(*Beauveria bassiana+Pseudomonas fluorescens*)** treatment, T-2**(*Psedomonas fluorescensm*)** treatment and T-6 ((***Lecanicillium lecanii+ Pseudomonas fluorescens*)** treatment (Table 259).

CENTRAL ZONE

In Akola field conditions, In field Condition, trial was vitiated because of poor plant population due to continuous rains after sowing. **Under pot conditions,** T-10 (**Seed treatment with insecticide**) treatment was found to be more effective against leafhopper (**3.58/ 3 leaves)** followed by T-7(***Beauveria bassiana+ Pseudomonas fluorescens***) treatment T-8 (***Beejamritham***) treatment and T-6 **(*Lecanicillium lecanii + Psedomonas fluorescens*)** treatments. Similarly, in case of thrips and whitefly, lowest population was found in T-10 (**Seed treatment with insecticide**) treatment. Among non-chemical method of seed treatment, treatments T-7 (***Beauveria bassiana+ Pseudomonas fluorescens***) and T-8 (***Beejamritham***) were found superior among the similar non-chemical interventions (Table 260).

In Junagadh field conditions, T-3 (***Beauveria bassiana***) treatment was found to be more effective against **leafhopper** (**3.18/ 3 leaves)** and at par with T-10 (**Seed treatment with insecticide**) treatment. Lowest population of thrips (**5.70/3 leaves)** was also found in T-3 **(*Beauveria bassiana*)**treatment. In case of whitefly, lowest population of **whitefly** was found in T-10 (**Seed treatment with insecticide**) treatment **(5.82/3 leaves),** statistically at par with T-3**(*Beauveria bassiana*)**treatment T-1**(Soil application of neem cake)** and T-2 **(*Psedomonas fluorescens*)**treatment. **Under pot conditions,** T-3 (***Beauveria bassiana***) treatment was found to be more effective against **leafhopper (3.76/ 3 leaves),** statistically at par with T-10 (**Seed treatment with insecticide**) treatment. Similarly, lowest population of **thrips (5.74/3 leaves)** was found in T-3 (***Beauveria bassiana***) treatment. Lowest population of **whitefly** was found in T-3 (***Beauveria bassiana***) treatment **(6.88/3 leaves**) treatment and it was statistically at par with T-10 (**Seed treatment with insecticide**) treatment T-2 **(*Psedomonas fluorescens*)**and T-1**(Soil application of neem cake)** treatment. Among the non-chemical treatments T-1 (**Soil application of neem cake**) treatment T-2 (***Pseudomonas fluorescens***) and T-3 (***Beauveria bassiana***) were found superior among similar non-chemical treatments(Table 261).

In Bhawanipatna field conditions, T-10 (**Seed treatment with insecticide**) treatment was found to be more effective against **leafhopper** (**2.27/3 leaves)**. Similarly, in case of thrips, lowest population of thrips (**0.13/3leaves)** was found in T-10 (**Seed treatment with insecticide**) treatment and it was statistically at par with T-1 (**Soil application of neem cake**) treatment T3 (***Beauveria bassiana***) treatment and T-4 **(*Metarhizium anisiopliae*)** treatment. In case of whitefly, lowest population of **whitefly** was found in T-5 **(*Lecanicillium lecanii*)(0.20whitefly/3 leaves)** treatment and it was statistically at par with T-2 **(*Psedomonas fluorescens*)**treatment and T-3(***Beauveria bassiana***) treatment. **Under pot conditions,** T-9 **(Control)** treatment was found lowest population of **leafhopper (3.13/3 leaves)** and it was statistically at

par with all treatments except T-10 (**Seed treatment with insecticide**) and T-8 **(Beejamritham)** treatments. Thrips & whitefly counts were very less in T-9 **(Control)** treatment and T-8 **(Beejamritham)** treatments (Table 262).

In Nagpur field conditions, InT-5 **(*Lecanicillium lecanii*)** treatment, the lowest population of **leafhopper** (**1.41/3 leaves)** was recorded followed by T-4 **(*Metarhizium anisiopliae*)**treatment. Lowest population of **whitefly (0.60/3 leaves)** was found in T-2 **(*Psedomonas fluorescensm*)** treatment followed by T-1 **(Soil application of neem cake)** treatment and T-3 **(*Beauveria bassiana*)**treatment.**In Nagpur pot conditions,**Jassid counts were very less in the entire expectations (Table 263).

In Rahuri field conditions, inT-10 (**Seed treatment with insecticide**) treatment, the lowest population of **leafhopper** (**3.40/3 leaves)** was recorded, which was statistically at par with T-2 **(*Psedomonas fluorescens*)**treatment T-7 (***Beauveria bassiana*+ *Pseudomonas fluorescens***) and T-6 **(*Lecanicillium lecanii + Psedomonas fluorescens*)** treatment. Lowest population (**8.50/3leaves)** of thrips was found in T-3**(*Beauveria bassiana*)** and statistically at par with T-10 (**Seed treatment with insecticide**) treatment and T-1**(Soil application of neem cake)** treatment. Lowest population of **whitefly (1.34/3 leaves)** was found in T-10 (**Seed treatment with insecticide**) treatment and statistically at par with T-3**(*B. bassiana*).In Rahuri pot conditions,** T-3**(*Beauveria bassiana*)** was found to be more effective against **leafhopper (9.72/3 leaves)** and it was statistically at par with all treatments except T-9 **(control).** Lowest population of **thrips** (**9.72/3 leaves**) was found in T-3 **(*Beauveria bassiana*)** and statistically at par with T-10**(Seed treatments with insecticides)** and T-1 **(Soil application of neem cake)** treatment (Table 264).

SOUTH ZONE

In Chamarajnagar field conditions, T-10 **(Seed treatments with insecticides)** was recorded with lowest population of **leafhopper** (**3.55/3 leaves)** and statistically at par with all treatment except T-9 **(control)** treatment. Similarly, in case of thrips, lowest population of **thrips (2.01/3leaves) &whitefly (1.70/3 leaves)** was found in T-10 **(Seed treatments with insecticides)** and it was statistically at par with all treatment except the non-chemical treatments T-9 **(control)** treatment T-8 **(Beejamritham)** treatment and T-2**(*Psedomonas fluorescens*)** treatment. **In Chamarajnagar pot conditions,** T-10 **(Seed treatments with insecticides)** was found to be more effective against **leafhopper (2.36/3 leaves)** and statistically at par with all treatments except T-9. Similarly, in case of thrips, lowest population of **thrips** (**0.93/3 leaves**)**&whitefly (0.35/3 leaves)** was found in T-7 (***Beauveria bassiana*+ *Pseudomonas fluorescens***) and T-10 **(Seed treatments with insecticides**) and it was statistically at par with all treatment except the non-chemical T-9 **(control)** treatment and T-8 (***Beejamritham***) treatment (Table 266).

In Nandyal field conditions, T-10 **(Seed treatments with insecticides)** treatment recorded lowest population of **leafhopper** (**3.07/3 leaves)** and statistically at par with T-2 **(*Psedomonas fluorescensm*)** treatment and T-6 **(*Lecanicillium lecanii + Psedomonas fluorescens*)**treatment. Similarly, in case of thrips (**10.13/3leaves)** lowest population of thrips was found in T-6 **(*Lecanicillium lecanii + Psedomonas fluorescens*)** treatment and it was statistically at par with T-2**(*Psedomonas fluorescensm*)** and T-10 **(Seed treatments with insecticides)** treatment and **whitefly (9.93/3 leaves)** was found in T-10 **(Seed treatments with insecticides)** it was statistically at par with T-6 **(*Lecanicillium lecanii + Psedomonas fluorescens*)** and T-2 **(*Psedomonas fluorescensm*** treatment. **In Nandyal pot conditions,** T-2 **(*Psedomonas fluorescensm*** treatment recorded lowest population of **leafhopper (4.07/3 leaves),** statistically at par with T-6 **(*Lecanicillium lecanii + Psedomonas fluorescens*)** and T-9 **(control)** treatments. Lowest population of

thrips (10.40/3 leaves) was found in T-10 **(Seed treatments with insecticides)** and it was statistically at par with T-2 **(*Psedomonas fluorescensm*)** treatment. Lowest population of **whitefly (9.43/3 leaves)** was found in T-2 (***Pseudomonas fluorescens***) and statistically at with T-10 **(Seed treatments with insecticides)** and T-6 **(*Lecanicillium lecanii + Psedomonas fluorescens*)** treatment (Table 267).

In Dharwad field conditions, T-10 **(Seed treatments with insecticides)** was recorded with lowest population of **leafhopper** (**0.76/3leaves),** thrips (**7.06/3leaves)** and whitefly **(3.39 whitefly/3 leaves)**. **In Dharwad pot conditions,** T-10 **(Seed treatments with insecticides)** recorded with lowest population of **thrips (23.40/3 leaves)** and it was statistically at par with T-1 **(Soil application of neem cake)** treatment T-6 **(*Lecanicillium lecanii + Psedomonas fluorescens*)** treatment, T-5 **(*Lecanicillium lecanii*)** treatment and T-4 **(*Metarhizium anisiopliae*)**treatment. In case of leafhopper and whitefly, population in general was very less and no data was recorded (Table 265).

In Raichur field conditions, T-7 (***Beauveria bassiana* + *Pseudomonas fluorescens***) treatment recorded lowest population of **leafhopper** (**0.46/3leaves)** and statistically at par with T-10 **(Seed treatments with insecticides**) treatment T-3 **(*Beauveria bassiana*)**treatmentand T-8 **(Beejamritham)** treatment. Lowest population of thrips (**5.39/3leaves)** was found in T-10 **(Seed treatments with insecticides)** and statistically at par with T-7 (***Beauveria bassiana* + *Pseudomonas fluorescens***) and T-8 **(Beejamritham)** treatment. Lowest population of **whitefly (0.08/3 leaves)** in T-3 **(*Beauveria bassiana*)**treatment& T-7 (***Beauveria bassiana* + *Pseudomonas fluorescens***) treatment and statistically at par with all treatment except T-9 **(control)** treatment. **In Raichur pot conditions,** T-10 **(Seed treatments with insecticides)** recorded with lowest population of **leafhopper (3.59/3 leaves)**. Lowest population of **thrips** (**1.41/3 leaves**) was recorded in T-7 (***Beauveria bassiana* + *Pseudomonas fluorescens***) treatment and it was statistically at par with T-10 **(Seed treatments with insecticides)** treatment and T-3 **(*Beauveria bassiana*)**treatment. In case of whitefly, counts were very less in the entire expectations (Table 268).

Ent. 5 (b)-To validate IPM module based on existing interventions for organic cotton production (Table No. 269-294).

DAS	Module-1 (Completely on-farm resources)		Module-2 (LEISA module -low external 30% input sustainable model)		Module-3 {Intensive Module, 30% on-farm, 70% off-farm external inputs (cost basis)}		Module 4: IPM (location specific)	Module 5: Farmers practice
	Sucking pests	Bollworms	Sucking pests	Bollworms	Sucking pests	Bollworms	SP /Bollworms	SP/ Bollworms
0-60	Resistant genotype, monitoring, trap crop etc Green Manures, FYM, Cow Urine		Resistant genotype, monitoring, trap crop etc Green Manures, FYM, Cow Urine		Resistant genotype, monitoring, trap crop etc Green Manures, FYM, Cow Urine		Resistant genotype	Resistant genotype
61-90	NSKE Neem (5%) /Aak / Dhatura Leaf extract$ / Cow urine sprays Neemastra	NSKE Neem (5%) /Aak / Dhatura Leaf extract (5%)/ Cow urine sprays Bramhastra, Agniastra	NSKE Neem (5%) /Aak / Dhatura Leaf extract / Cow urine sprays (50ml/ litre of water) Entomopathogens YST s	NSKE Neem (5%) /Aak / Dhatura Leaf extract / Cow urine sprays Entomopathogens Pheromone traps	Neem based formulation, Entomopathogens- Beauveria and Lecanicillium leacani and YST, Release of generalist predators if available	Mechanical destruction of rossete flowers, NSKE, Neem based, NPV, EPN etc,*Trichogramma bactrae* & *T. chilonis. Handpicking of larvae of bollworms.*		
91-120	NSKE,Neem /Aak / Dhatura Leaf extract / Cow urine sprays Neemastra	Bramhastra Agniastra			Neem based formulation, Entomopathogens- Beauveria and Lecanicillium leacani and YST			
120 >								

Details of the Module Followed

- **Module 1 (M1):** Completely on-farm resources (manures, plant extract/preparations).
- **Module 2 (M2):** LEISA module (Low external input sustainable model) having a mix of more On-farm inputs (70%) and less Off-farm (less of purchased inputs, 30% only critical most effective external inputs).
- **Module 3 (M3):** Intensive organic module, 30% on farm, 70% Off-farm external inputs (cost basis).
- **Module 4 (Control 1):** IPM (Integrated Pest Management) of the location.
- **Module 5 (Control 2):** Farmer's Practices of the location.

In **North Zone** at **Sirsa**, Leafhopper population was recorded lowest in Module 4 (IPM) i.e. 2.28 leafhopper/3 leaves which was at par with Module 5 (FP)(Table 269). Lowest population of whitefly adults (10.24 adults/3 leaves) was recorded in **Module 4 (IPM)** which were at par with all other modules. Thrips population (8.03/3 leaves) was also recorded lowest in **Module 4 (IPM)** followed by **Module 5 (FP)** having 9.70 thrips/3 leaves. Predator's population/ plant was recorded highest in **Module 1** i.e. 1.84/plant (Table 270). Larval recovery of pink bollworm (0.34 larvae/ 10 bolls) and green boll damage (%) due to PBW (6.25 percent) were recorded lowest in **Module 4 (IPM)** which were at par with all other modules. Open boll damage (8.37 percent) was recorded lowest in **Module 4 (IPM)** which was significantly at par with **Module 5 (FP)** and locule damage (4.01 percent) was recorded lowest in **Module 4** which was at par with all other modules (Table 271).

At **Bathinda** leafhopper (3.22 leafhopper/3 leaves) was recorded lowest in **Module 4 (IPM)**. Population of whitefly (14.73 adults/3 leaves) and thrips population (9.58 /3 leaves) was recorded lowest in **Module 4 (IPM)** which was significantly at par with **Module 3.** Natural enemies/plant was recorded highest in **Module 1** i.e. 5.56/plant (Table 269-270).

In **Central Zone** at **Junagadh**, leafhopper population (3.00/3 leaves) was recorded lowest in **Module 4 (IPM)**(Table 274). Population of whitefly (8.40 adults/3 leaves) was recorded lowest in **Module 4 (IPM)** which was significantly at par with **Module2**(Table 275). Thrips population (7.10 /3 leaves) was also recorded lowest in **Module 4 (IPM)** which was at par with **Module 3**(Table 276)**.** Aphids were recorded lowest in **Module 4 (IPM)** with 4.20 aphids/3 leaves (Table 277). Predator's population (1.38/plant) was found highest in **Module 1**(Table 278). Green boll damage (%) due to PBW (9.36 percent) was recorded lowest in **Module 4 (IPM)**(Table 284). Open boll damage (11.61 percent) and locule damage (10.97 percent) were recorded lowest in **Module 4 (IPM)**(Table 285-86). Highest yield (31.50 q/ha) was recorded in **Module 4 (IPM) (Table 287)**.

At **Surat**, leafhopper (1.75 leafhopper/3 leaves), whitefly (1.11 whitefly/3 leaves) and aphid population (4.21 aphids/3 leaves) was recorded lowest in **Module 4 (IPM)** which were significantly at par with **Module 5 (FP)**(Table 274, 275 & 277). Population of thrips (12.46 thrips/3 leaves) was recorded lowest in **Module 4 (IPM)**(Table 276). Predator's population (1.49/plant) was found highest in **Module 1**(Table 278). Lowest population of *Helicoverpa armigera/* plant (0.40/plant) was recorded in **Module 4 (IPM)**&**Module 5 (FP)**(Table 280), *Spodoptera litura* (0.37/plant)was recorded lowest in **Module 4 (IPM)** (Table 282), Green boll damage due to ABW/SBW and TC (4.86 %) was recorded lowest in **Module 4 (IPM)** which was significantly at par with **Module 5 (FP)**(Table 283). Larval recovery of pink bollworm (1.36 larvae/10 bolls)

was recorded lowest in **Module 4 (IPM)** which was at par with **Module 5 (FP)**(Table 279). Green boll damage due to PBW (7.66%) was recorded lowest in **Module 4 (IPM)** which was significantly at par with **Module 5 (FP)**(Table 284). Open boll damage (5.58%) and Locule damage (2.51%) was found lowest in **Module 4 (IPM)** which was significantly at par with **Module 5 (FP)** (Table 285-286). Highest yield (19.38 q/ha) was recorded in **Module 4 (IPM)** (Table 287).

At **Rahuri**, leafhopper population (2.66/3 leaves) was recorded lowest in **Module 4 (IPM)** which was significantly at par with **Module 5 (FP)** (Table 274) and lowest population of aphids (19.32/3 leaves) were seen in **Module 2**(Table 277)which was at par with all other modules. Highest predator's population (2.77/plant) was recorded in **Module 1**(Table 278). Lowest population of *Helicoverpa armigera* (0.38/plant) &*Spodoptera litura* (0.24/plant) were seen in **Module 5 (FP)** which were significantly at par with **Module 4 (IPM)**(Table 280 & 282). Green boll damage due to ABW/SBW/TC (3.77 %) and green boll damage due to PBW (3.72%) were recorded lowest in **Module 4 (IPM)** which were significantly at par with **Module 5 (FP)**(Table 283 & 284)**.** Open boll damage (5.35%) & locule damage (2.88 %) was recorded lowest in **Module 5 (FP)**(Table 285-286) and highest yield (33.56 q/ha) was obtained from **Module 2**(Table 287).

At **Bhawanipatna,** population of leafhopper (0.70/3 leaves) was recorded lowest in **Module 4 (IPM)**(Table 274)**.** Aphids (2.38/3 leaves) were recorded lowest in **Module 5 (FP)**(Table 277). Lowest thrips population (0.55 thrips/3 leaves) was recorded in **Module 3**(Table 276)**.** Lowest population of *Spodoptera litura* (0.00/plant) was recorded in **Module 1** and **Module 3**(Table 282)**.** Lowest green boll damage due to ABW/SBW/TC (0.35%) was recorded in **Module 4 (IPM)**(Table 283). Lowest PBW larval recovery (1.25/10 green bolls) was in **Module 3**(Table 279) and green boll damage (%) due to PBW (6.25) was in **Module 4 (IPM)**(Table 284)**.** Lowest open boll damage (2.05%) and locule damage (0.00%) in **Module 2**(Table 285) and highest yield (15.97q/ha) was obtained from **Module 4 (IPM)**(Table 286)**.**

At **Nagpur**, population of leafhopper (1.44/3 leaves), was recorded lowest in **Module 2**(Table 274)**.** Lowest whiteflypopulation (1.20/3 leaves) was recorded in **Module 3**(Table 275)**.** Lowest thrips population (0.74 thrips/3 leaves) was recorded in **Module 2**(Table 276). Lowest population of *Helicoverpa armigera* (0.03/plant) was recorded in **Module 1**(Table 280)**.** Lowest green boll damage due to ABW/SBW/TC (6.44 %) was recorded in **Module 1**(Table 283). Pink bollworm larval recovery (0.11/10 green bolls) was recorded lowest in **Module 3**(Table 279)**.** Green boll damage due to PBW (8.33 %) was recorded in **Module 2**(Table 284)**.** Open boll damage (6.75%) was recorded lowest in **Module 3**(Table 285). Locule damage (5.00%) was recorded lowest in **Module 2**(Table 286)**.**

In **South Zone** at **Dharwad**, lowest population of leafhopper (3.65/3 leaves), aphids (8.24/3 leaves) and thrips (17.93/3 leaves) were seen in **Module 4 (IPM)** (Table 288 & 289). Lowest population of *Helicoverpa armigera* (1.64 larvae/plant) (Table 291) &lowest green boll damage due to ABW/SBW/TC (4.41 %) was recorded in **Module 4 (IPM)**(Table 293). Larval recovery of pink bollworm (5.75 larvae/10 bolls) (Table 291) and green boll damage due to PBW (18.50%) was seen lowest in **Module 4 (IPM)** which was significantly at par with **Module 5 (FP)**(Table 293).

At **Raichur**, lowest population of leafhopper (3.70/3leaves) was recorded in **Module 5 (FP)** which was significantly at par with **Module 3**&**Module 4 (IPM)**(Table 288)**.** Minimum population of whitefly (0.69/3 leaves) was recorded in **Module 5 (FP)** which wasat parwith all other modules. Lowest population of thrips (3.77/3 leaves) was recorded in **Module 5 (FP)** which was significantly at par with **Module 3**(Table 289)**.** Lowestaphidpopulation (3.19/3 leaves) was recorded in **Module-5.** Maximum predator's population

(1.47/plant) was recorded in **Module 3**(Table 290)**.** Lowest population of *Helicoverpa armigera* (0.00/plant) was recorded in **Module 4 (IPM) and Module 5 (FP)** which was at par with all other modules (Table 291). Green boll damage due to ABW/SBW/TC (0.08%), green boll damage (%) due to PBW (27.76%), were recorded in Module 5 (FP)(Table 293). Highest yield (19.52q/ha) were obtained from **Module 4 (IPM)**(Table 294)**.**

At **Srivilliputtur**, lowest population of leafhopper (3.16/3 leaves) & whitefly (2.52/3 leaves) were recorded in **Module 3**(Table 288)**.** Thrips (1.50/3 leaves) were recorded lowest in **Module 4 (IPM)**(Table 289). Highest population of natural enemies (2.30/plant) was observed in **Module 1**(Table 290). Green boll damage due to due to PBW (0.39 %) was recorded lowest in **Module 4 (IPM)**(Table 293)which was significantly at par with **Module 3** and highest yield (18.75q/ha) was obtained from **Module 3**(Table 294)**.**

Ent 6 (a): Evaluation of MakAdjuvol (Mineral Paraffin Oil) as adjuvant with insecticides—sponsored product (Table no. 295-306)

Treatment Details:

SN	Name of the insecticides
1	Flonicamid 50 WG (Systemic)
2	Flonicamid 50 WG + **MakAdjuvol @0.75% (7.5ml/L water)**
3	Flonicamid 50 WG **+ MakAdjuvol @1.5% (15 ml/L water)**
4	Spinetoram 11.7 SC (Product of fermentation of Saccharopolyspora spinosa)
5	Spinetoram 11.7 SC + **MakAdjuvol @0.75 % (7.5 ml/L water)**
6	Spinetoram 11.7 SC + **MakAdjuvol @1.5% (15 ml/L water)**
7	Emamectin benzoate 5 SG **(Translaminar)**
8	Emamectin benzoate 5 SG **+ MakAdjuvol @0.75 % (7.5 ml/L water)**
9	Emamectin benzoate 5 SG+ **MakAdjuvol @ 1.5% (15 ml/L water)**
10	Profenofos 50 EC **(Contact)**
11	Profenofos 50 EC+ **MakAdjuvol @0.75% (7.5 ml/L water)**
12	Profenofos 50 EC+ **MakAdjuvol @1.5% (15 ml/L water)**
13	Water+ MAK HMO @ 0.75 % or 7.5 ml /litre (Control)
14	Water+ MAK HMO @ 1.5 % @ 15 ml /litre (Control)
15	Control (Water spray)

The experiment was conducted to study the effect of mixing of MakAdjuvol @ 0.75 &1.5% with insecticides as adjuvants. Based on the sprays applied against sucking pest at different locations of 3 zones, the overall effect observed has been discussed as under;

NORTH ZONE

In Bathinda, among the different treatments applied as insecticides (alone) or in combination with Mak Adjuvol, Profenofos 50 EC+ **MakAdjuvol @ 1.5%** was found to be more effective against whitefly with lowest population (**16.67/3 leaves)** and reduction in population (64.03%) over control and that was significantly superior over Profenofos 50 EC **+ MakAdjuvol @ 0.75%.** Similarly, in case of thrips, highest reduction (71.17%) over control was found in Spinetoram 11.7 SC+ **MakAdjuvol @ 0.75%** and it was significantly superior over Profenofos 50 EC (alone)**.** In case of leafhopper, highest reduction in

population over control (75.51%) was recorded in Flonicamid 50 WG (alone) followed by Flonicamid 50 WG+ **MakAdjuvol @ 1.5% (Table 295).** Highest yield (29.70q/ha) was recorded in plots treated with Flonicamid 50 WG (alone) which was followed by Flonicamid 50 WG+ **MakAdjuvol @ 0.75%** and Flonicamid 50 WG+ **MakAdjuvol @ 1.50%.** The lowest yield (16.63q/ha) was recorded in control followed by water+ **MAK HMO @ 1.5%(Table 298).**

In Hisar, Flonicamid 50 WG + **MakAdjuvol @ 1.5 %** was found to be more effective against whitefly. The lowest whitefly population (8.10/3 leaves) and maximum reduction in population (59.44 %) over control was recorded in the above treatment followed by Flonicamid 50 WG **+ MakAdjuvol @ 0.75%**. Similarly in case of thrips, highest reduction (65.88 %) over control and minimum (8.37/3 leaves) thrips population were found in Spinetoram 11.7 SC+ **MakAdjuvol @ 1.5%** followed by Spinetoram 11.7 SC 5+ **Mak Adjuvol @ 0.75%.** In case of leafhopper, highest reduction over control (67.12%) and minimum population (1.93/3 leaves) was recorded in Flonicamid 50 WG+ **Mak Adjuvol @ 1.50%** followed by Flonicamid 50 WG+ **Mak Adjuvol @ 0.75%(Table 296).** Highest yield (23.32 q/ha) was recorded in plots treated with Flonicamid 50 WG+ **Mak Adjuvol @ 1.5 %** followed by Profenofos 50 EC + **Mak Adjuvol @ 1.5%.** The lowest yield (18.29 q/ha) was recorded in Control followed by Water+ **MAK HMO @ 0.75 %(Table 298)**.
In case of Sriganganagar, minimum whitefly population (5.18/3 leaves) and highest reduction in population over control (83.91%) was recorded in Flonicamid 50 WG+ **Mak Adjuvol @ 1.50%** followed by Profenofos 50 EC+ **MakAdjuvol @ 1.5%.** Similarly in case of thrips, highest (92.71%) reduction over control and minimum thrips population (1.69/3 leaves) was found in Spinetoram 11.7 SC + **MakAdjuvol @ 1.5%** followed by Spinetoram 11.7 SC + **MakAdjuvol @ 0.75 %.** In case of leafhopper, highest reduction (77.83%) over control was found in Flonicamid 50 WG **+ MakAdjuvol @ 1.5%** which was at par with Flonicamid 50 WG + **MakAdjuvol @ 0.75%(Table 297).** Highest yield (19.07 q/ha) was recorded in plots treated with Spinetoram 11.7 SC + **MakAdjuvol @ 1.5%** which was followed by Spinetoram 11.7 SC +**Mak Adjuvol @ 0.75%.** The lowest yield (13.87 q/ha) was recorded in Water+ **MAK HMO @ 1.5 %** followed by Water+ **MAK HMO @ 0.75 %(Table 298).**
In nutshell, insecticides like Flonicamid 50 WG (alone) vs Flonicamid 50 WG+ Mak Adjuvol @ 0.75% & 1.5%**, Spinetoram 11.7 SC (alone) vs Spinetoram 11.7 SC+** Mak Adjuvol @ 0.75% & 1.5% **and Profenofos 50 EC (alone) vs Profenofos 50 EC** + Mak Adjuvol @ 0.75% & 1.5% **were found significantly different as far the efficacy against sucking pest is concerned.**

CENTRAL ZONE

In Nanded, Flonicamid 50 WG **+ MakAdjuvol @ 1.5%** was found to be more effective against whitefly. Minimum whitefly population (1.00/3 leaves) and highest reduction in population (77.61%) over control was recorded in the above treatment followed by Flonicamid 50 WG + **MakAdjuvol @ 0.75%.** Similarly in case of thrips, highest reduction (79.34%) over control was found in Spinetoram 11.7 SC + **MakAdjuvol @ 1.5%** followed by Spinetoram 11.7 SC + **MakAdjuvol @ 0.75 %.** In case of leafhopper, highest reduction over control (78.88%) was recorded in Flonicamid 50 WG+ **MakAdjuvol @ 1.5%** that was followed by Flonicamid 50 WG+ **MakAdjuvol @ 0.75%(Table 299).** Highest yield (21.40 q/ha) was recorded in plots treated with Spinetoram 11.7 SC+ **MakAdjuvol @ 1.5%**which was followed by Spinetoram 11.7 SC + **MakAdjuvol @ 0.75 %.** The lowest yield (11.10 q/ha) was recorded in Water**+ MAK HMO @ 0.75 %** which was followed by Water+ **MAK HMO @ 1.5 % (Table 303)**.

In Junagadh, Flonicamid 50 WG **+ MakAdjuvol @ 1.5%** was found to be more effective against whitefly. Minimum whitefly population (4.67/3 leaves) and highest reduction in population (75.86 %) over control was recorded in the above treatment followed by Spinetoram 11.7 SC+ **MakAdjuvol @ 1.5%.** Similarly in case of thrips, highest reduction (71.30%) over control was found in Spinetoram 11.7 SC+ **MakAdjuvol @ 1.5%**followed by Flonicamid 50 WG **+ MakAdjuvol @ 1.5%**(Table 300).In case of leafhopper, highest reduction over control (75.08%) was recorded in Flonicamid 50 WG **+ MakAdjuvol @ 1.5%** and which was followed by Spinetoram 11.7 SC+ **MakAdjuvol @ 1.5%.** Flonicamid 50 WG **+ MakAdjuvol @ 1.5%** was found to be more effective against aphids with minimum aphid population (9.10/3 leaves) and highest reduction (69.14%) over control and which was followed by Spinetoram 11.7 SC+ **MakAdjuvol @ 1.5%**(Table 301)**.** Highest yield (31.16 q/ha) was recorded in plots treated with Flonicamid 50 WG **+ MakAdjuvol @1.5%** followed by Spinetoram 11.7 SC + **MakAdjuvol @1.5%.** The lowest yield (18.61 q/ha) was recorded in control followed by Water+ **MAK HMO @ 1.5 %**and Water+ **MAK HMO @ 0.75%**(Table 303)**.**

In case of Banswara, Flonicamid 50 WG **+ MakAdjuvol @ 1.5%** was found to be more effective against whitefly with minimum whitefly population (4.00/3 leaves) and maximum reduction in population (69.99%) over control followed by Profenofos 50 EC+ **MakAdjuvol @ 1.5%.** Similarly, Flonicamid 50 WG **+ MakAdjuvol @ 1.5%** was found to be most effective against leafhopper with minimum leafhopper population (4.00/3 leaves) and maximum reduction (75.51%) over control followed by Profenofos 50 EC+ **MakAdjuvol @ 1.5%**(Table 302)**.** Highest yield (31.42 q/ha) was recorded in plots treated with Flonicamid 50 WG **+ MakAdjuvol @ 1.5%** which was followed by Profenofos 50 EC+ **MakAdjuvol @ 1.5%** andEmamectin benzoate 5 SG+**MakAdjuvol @ 1.5 %.**The lowest yield (20.02 q/ha) was recorded in Control followed by Water+ **MAK HMO @ 1.5 %**and Water+ **MAK HMO @ 0.75%**(Table 303)**.**

In brief, insecticides like Flonicamid 50 WG (alone) vs Flonicamid 50 WG+ **MakAdjuvol @ 0.75%** &**1.5%,** Spinetoram 11.7 SC (alone) vs Spinetoram 11.7 SC+ **MakAdjuvol @ 0.75% & 1.5%,** Profenofos 50 EC (alone) vs Profenofos 50 EC + **MakAdjuvol @ 0.75% &1.5%, Water (alone) vs** Water+ **MAK HMO @ 0.75%**, **1.5%** and Emamectin benzoate 5 SG vs Emamectin benzoate 5 SG + **MakAdjuvol @ 0.75% & 1.5%** were found differed significantly from each other as far the efficacy against sucking pest is concerned.

SOUTH ZONE

In Lam Guntur, **Flonicamid 50 WG+** MakAdjuvol @ 1.5% **was found to be more effective against whitefly with minimum whitefly population (1.12/3 leaves) and highest reduction in population (81.64%) over control followed by Flonicamid 50 WG** + MakAdjuvol @ 0.75%. **Similarly, Spinetoram 11.7 SC+** MakAdjuvol @ 1.5 % **was found to be more effective against thrips with minimum thrips population (2.27/3 leaves) and highest reduction in population (82.70%) over control followed by Spinetoram 11.7 SC+** MakAdjuvol @ 0.75% . **In case of leafhopper, highest reduction over control (90.80%) was recorded in Flonicamid 50 WG+** MakAdjuvol @ 1.5% **followed by Flonicamid 50 WG+** MakAdjuvol @ 0.75 %**(Table 304)**. **Highest yield (25.26 q/ha) was recorded in plots treated with Spinetoram 11.7 SC**+ MakAdjuvol @ 1.5% **followed by Spinetoram 11.7 SC +** MakAdjuvol @ 0.75%. **The lowest yield (9.64 q/ha) was recorded in control followed by Water+** MAK HMO @ 0.75 %**(Table306)**.

In Raichur, **Flonicamid 50 WG** + MakAdjuvol @ 0.75% **was found to be more effective against Whitefly with minimum population (1.92/3 leaves) and highest reduction (86.61%) over control followed by**

Flonicamid 50 WG + MakAdjuvol @ 1.5%**. Profenofos 50 EC +** MakAdjuvol @ 0.75 % **was found to be most effective against thrips with minimum thrips population of (4.09/3 leaves) and highest (92.80%) reduction over control which was at par with Emamectin benzoate 5 SG +** MakAdjuvol @ 1.5% **and Flonicamid 50 WG+** MakAdjuvol @ 1.5%, **followed by Flonicamid 50 WG+** MakAdjuvol @ 0.75%. **Similarly, Flonicamid 50 WG (alone) was found to be most effective against leafhopper with highest reduction (94.52%) over control and minimum leafhopper population (2.76/3 leaves) followed by Flonicamid 50 WG** + MakAdjuvol @ 1.5%**(Table 305)**. **Highest yield (15.68q/ha) was recorded in plots treated with Spinetoram 11.7 SC+** Mak Adjuvol @ 1.5% **followed by Profenofos 50 EC+** MakAdjuvol @ 1.5%. **The lowest yield (9.13 q/ha) was recorded in Control followed by Water+** MAK HMO @ 1.5 %**(Table306)**.

Here it is concluded that, insecticides like Flonicamid 50 WG (alone) vs Flonicamid 50 WG+ MakAdjuvol @ 0.75% & 1.5%, **Spinetoram 11.7 SC (alone) vs Spinetoram 11.7 SC+** Mak Adjuvol @ 0.75% & 1.5%**, Profenofos 50 EC (alone) vs Profenofos 50 EC +** Mak Adjuvol @ 0.75% & 1.5% **and Emamectin benzoate 5 SG vs Emamectin benzoate 5 SG +** Mak Adjuvol @ 0.75% & 1.5% **were differed significantly among each other as far the efficacy against sucking pest is concerned.**

Ent.7: Impact of Agronomic intervention on insect pest dynamics under HDPS (Table No 307-337)

North zone:

At **Faridkot,** lowest jassid (2.29/3 leaves), whitefly (32.69/3 leaves) & thrips (27.36/ 3leaves) population was recorded in HDPS with IPM as compared to HDPS only. Similarly, lowest green boll damage (%) due to PBW (1.67 percent) & highest fruiting body retention (47.14 percent) was recorded in HDPS with IPM as compared to HDPS only. Open boll damage (%) & locule damage (%) 1.39 percent & 0.77 percent was recorded in HDPS only. Highest yield was obtained from HDPS with IPM (18.97 Qt/ha) (Table 307-315).

Among all canopy management treatments related to HDPS, lowest jassid population (2.11/3 leaves) was recorded in HDPS+ Mepiquat chloride, least whitefly population (42.73/3 leaves) was recorded in conventional planting followed by De-topping & HDPS (90X15cm) and lowest population of thrips (33.39/3 leaves) was recorded in HDPS with Cyclanilide + Mepiquat chloride. Lowest green boll damage (%) i.e. 16.7 percent recorded in both conventional planting & HDPS with Mepiquat chloride. HDPS with Cyclanilide + Mepiquat chloride retained highest fruiting bodies percent (51.18%) followed. Negligible open boll damage (%) & locule damage (%) was recorded lowest in HDPS (90X15 cm) only. Highest yield (25.27 Qt/ha) was obtained from IPM applied, conventional planting treatment followed by HDPS (90x15cm) alone i.e. without any canopy management treatments (23.08 Qt/ha) (Table 307-315).

At **Bathinda,** lowest jassid (8.88/3 leaves), whitefly (10.59/3 leaves) & thrips (19.58/3 leaves) population was recorded in HDPS only as compared to HDPS with IPM. Highest Fruiting body retention (85.73 percent) & maximum yield (25.51 Qt/ha) was recorded in HDPS with IPM as compared to HDPS only (Table 307-315).

Among all canopy management treatments related to HDPS, lowest jassid population (0.75/3 leaves) was recorded in HDPS (90x15cm). Lowest population of whitefly (7.86/3 leaves) & thrips (13.80) was recorded in conventional planting. Conventional planting retained highest fruiting bodies percent (86.75%) followed by HDPS with Cyclanilide + Mepiquat chloride (85.32%). Highest yield (25.95 Qt/ha) was obtained from IPM applied, conventional planting followed by HDPS (90x15cm) alone i.e. without any canopy management treatments (25.23Qt/ha) (Table 307-315).

At **Hisar,** lowest jassid (1.52/3 leaves), whitefly (10.22/3 leaves) & thrips (28.45/ 3leaves) population was recorded in HDPS with IPM as compared to HDPS only. Similarly, lowest green boll damage (%) due to PBW (12.96 percent) was recorded in HDPS with IPM as compared to HDPS only. Open boll damage (%) & locule damage (%) i.e. 6.56 percent & 1.87 percent also showed a similar trend. Highest yield was also obtained from HDPS with IPM (25.67 Qt/ha) (Table 307-315).

Among all canopy management treatments, Conventional planting recorded lowest population of jassid (1.56/3 leaves) & whitefly (9.03/3 leaves) and lowest thrips population (30.99/3 leaves) and least green boll damage due to PBW (14.17 percent) were recorded in HDPS treatment with Mepiquat chloride @ 45ppm. Open boll damage (%) & locule damage (%) was recorded lowest in De-topping (6.34 percent & 1.75 percent). Highest yield (26.01 Qt/ha) was also obtained from IPM applied HDPS + De-topping treatment followed by HDPS with Cyclanilide + Mepiquat chloride i.e. 25.48 Qt/ha (Table 307-315).

At **Sirsa,** lowest jassid (2.11/3 leaves), whitefly (7.34/3 leaves) & thrips (7.39/ 3leaves) population was recorded in HDPS with IPM as compared to HDPS only. Similarly, lowest green boll damage (%) due to PBW (8.33 percent) & highest fruiting body retention (61.65 percent) was recorded in HDPS with IPM as compared to HDPS only. Open boll damage (%) & locule damage (%) i.e. 3.95 percent & 1.94 percent also showed a similar trend. Highest yield was also obtained from HDPS with IPM (20.94 Qt/ha) (Table 307-315).

Among all canopy management treatments related to HDPS, De-topping recorded least pest population & lowest green boll damage (%). HDPS (90x15cm) without any canopy management treatments retained highest fruiting bodies percent (64.01%) followed by De-topping (63.93%). Open boll damage (%) & locule damage (%) was recorded lowest in De-topping (2.73 percent &1.40 percent) followed by HDPS (90x15cm) alone. Highest yield (21.54 Qt/ha) was also obtained from IPM applied HDPS + De-topping treatment followed by HDPS (90x15cm) alone i.e. without any canopy management treatments (20.71Qt/ha) (Table 307-315).

Central zone:

At **Surat,** lowest jassid (3.62/3 leaves), whitefly (2.12/3 leaves) & thrips (4.61/ 3leaves) population was recorded in HDPS with IPM as compared to HDPS only. Similarly, lowest green boll damage (%) due to PBW (10.85 percent) & highest fruiting body retention (88.31 percent) was recorded in HDPS with IPM as compared to HDPS only. Open boll damage (%) & locule damage (%) i.e. 8.20 percent & 3.84 percent also showed a similar trend. Highest yield was also obtained from HDPS with IPM (22.81 Qt/ha) (Table 316-323).

Among all canopy management treatments related to HDPS, Cyclanilide + MC recorded least pest population, lowest green boll damage (%) & fruiting bodies retention percent (95.37%) followed by Mepiquat chloride (93.42%). Open boll damage (%) & locule damage (%) was recorded lowest in Cyclanilide + MC (6.24 percent & 2.84 percent) followed by Mepiquat chloride. Highest yield (26.10 Qt/ha) was also obtained from Cyclanilide + MC treatment followed by Mepiquat chloride (23.49Qt/ha) (Table 316-323).

At **Akola,** lowest jassid (2.77/3 leaves), whitefly (2.29/3 leaves) & thrips (3.89/ 3leaves) population was recorded in HDPS with IPM as compared to HDPS only. Similarly, lowest green boll damage (%) due to PBW (17.22 percent) was recorded in HDPS with IPM as compared to HDPS only. Open boll damage (%) & locule damage (%) i.e. 15.81 percent & 4.90 percent also showed a similar trend. Highest fruiting bodies retention percent (77.76%) & yield (19.98 Qt/ha) was also obtained from HDPS with IPM (Table 316-323).

Among all canopy management treatments related to HDPS, De-topping recorded least jassid population, lowest whitefly population recorded in Mepiquat chloride and the thrips population (4.00/3 leaves) recorded lowest in conventional planting followed by De-topping and Mepiquat chloride. Lowest green boll damage (%), open boll damage (%) & locule damage (%) were recorded in De-topping. Highest yield (20.15 Qt/ha) was also obtained from De-topping treatment followed by Mepiquat chloride (18.44 Qt/ha) and Cyclanilide + MC treatment (Table 316-323).

At **Nanded,** lowest jassid (1.64/3 leaves), whitefly (0.54/3 leaves) & thrips (1.88/ 3leaves) population was recorded in HDPS with IPM as compared to HDPS only. Similarly, lowest green boll damage (%) due to PBW (18.61 percent) & highest fruiting body retention (86.63 percent) was recorded in HDPS with IPM as compared to HDPS only. Open boll damage (%) & locule damage (%) i.e. 12.03 percent & 6.79 percent also showed a similar trend. Highest yield was also obtained from HDPS with IPM (2217 Kg/ha) as compared to HDPS only (Table 316-323).
Among all canopy management treatments, conventional planting recorded least pest population followed by Chlormequat chloride. Lowest green boll damage (%) & Open boll damage (%) were recorded in De-topping. Highest fruiting bodies percent (90.78%) retained by Chlormequat chloride followed by Cyclanilide + MC treatment. Least locule damage percent was recorded in Cyclanilide + MC. Highest yield (2075 Kg/ha) was obtained from De-topping treatment followed by Chlormequat chloride (2045 Kg/ha) (Table 316-323).

At **Junagadh,** lowest jassid (5.81/3 leaves), whitefly (4.53/3 leaves) & thrips (10.24/ 3leaves) population was recorded in HDPS with IPM as compared to HDPS only. Similarly, lowest green boll damage (%) due to PBW (10.17 percent) was recorded in HDPS with IPM as compared to HDPS only. Open boll damage (%) & locule damage (%) i.e. 13.26 percent & 8.62 percent also showed a similar trend. Highest yield was also obtained from HDPS with IPM (2746 Kg/ha) as compared to HDPS only (Table 316-323).

Among all canopy management treatments related to HDPS, De-topping recorded least pest population. Lowest green boll damage (%), open boll damage (%) & locule damage (%) were also recorded in De-topping. Highest yield (2910 Kg/ha) was also obtained from HDPS + De-topping followed by HDPS (90x15cm) alone i.e. without any canopy management treatments (2755 Kg/ha) (Table 316-323).

At **Rahuri,** lowest jassid (2.30/3 leaves), whitefly (0.72/3 leaves) & thrips (6.10/ 3leaves) population was recorded in HDPS with IPM as compared to HDPS only. Similarly, lowest green boll damage (%) due to PBW (9.38 percent) & highest fruiting bodies retention percent (87.95%) were recorded in HDPS with IPM as compared to HDPS only. Open boll damage (%) & locule damage (%) i.e. 11.28 percent & 4.76 percent also showed a similar trend. Highest yield was also obtained from HDPS with IPM (30.77 Qt/ha) as compared to HDPS only (Table 316-323).

Among all canopy management treatments related to HDPS, HDPS (90x15cm) alone i.e. without any canopy management treatments recorded least jassids population. Least whitefly and thrips population were recorded in conventional planting followed by Chlormequat chloride. Lowest green boll damage (%) 13.13 percent was recorded in De-topping. Highest fruiting bodies retention percent (91.94%) recorded in Chlormequat chloride followed by Cyclanilide + MC. Least open boll damage (%) 9.96 percent & least locule damage (%) 4.29 percent were recorded in De-topping. Highest yield (29.75 Qt/ha) was also obtained from HDPS + De-topping followed by Chlormequat chloride (29.55 Qt/ha) (Table 316-323).

South zone:

At **Coimbatore,** lowest jassid (2.03/3 leaves) & whitefly (0.47/3 leaves) population was recorded in HDPS with IPM as compared to HDPS only. Thrips population (0.24/3 leaves) was recorded lowest in HDPS only. Lowest green boll damage (%) due to PBW (5.26 percent) & highest fruiting body retention (84.56 percent) was recorded in HDPS with IPM as compared to HDPS only. Open boll damage (8.31 %) recorded lowest in HDPS only while locule damage (6.55%) lowest in HDPS with IPM. Highest yield was also obtained from HDPS with IPM (1047.83 Kg/ha) (Table 325-332).

Among all canopy management treatments related to HDPS, HDPS (90x15cm) without any canopy management treatments recorded lowest pest population & lowest green boll damage (%). HDPS (90x15cm) without any canopy management treatments retained highest fruiting bodies(87.57%) followed by Mepiquat chloride (86.12%). Open boll damage (%) & locule damage (%) was recorded lowest in HDPS (90x15cm) without any canopy management treatments i.e. 7.78 percent & 5.71 percent, respectively. Highest yield (1067.5 Kg/ha) was also obtained from IPM applied HDPS (90x15cm) alone i.e. without any canopy management treatments followed by Chlormequat chloride (1051.5 Kg/ha) (Table 325-332).

At **Lam Guntur,**lowest jassid (5.70/3 leaves), whitefly (2.77/3 leaves) & thrips (11.93/3 leaves) population was recorded in HDPS with IPM as compared to HDPS only. Lowest green boll damage (%) due to PBW (13.30 percent) & highest fruiting body retention (68.67 percent) was recorded in HDPS with IPM as compared to HDPS only. Open boll damage (%) 20.47 percent and locule damage (%) percent 20.20 percent recorded lowest in HDPS with IPM. Highest yield was also obtained from HDPS with IPM (2025 Kg/ha) (Table 325-332).

Among all canopy management treatments related to HDPS, De-topping recorded lowest pest population. Lowest green boll damage (%) was recorded in conventional planting (21.67%) followed by De-topping (22.00%). Highest fruiting bodies retention (70.54%) was recorded in Chlormequat chloride followed by De-topping (70.19%). Least open boll damage (%) was recorded in conventional planting (21.67%) followed by De-topping (22.00%). Least locule damage (%) was recorded in De-topping. Highest yield (1865 Kg/ha) was also obtained from IPM applied De-topping followed by mepiquat chloride (1775 Kg/ha) (Table 325-332).

At **Dharwad** lowest jassid (3.42/3 leaves), whitefly (3.28/3 leaves) & thrips (0.91/3 leaves) population was recorded in HDPS with IPM as compared to HDPS only. Lowest green boll damage (%) due to PBW (25.66 percent) recorded in HDPS with IPM. Highest fruiting body retention (68.46 percent) was recorded in HDPS with IPM as compared to HDPS only. Lowest open boll damage (%) 22.31 percent and locule damage (%) percent (17.87%) was recorded in HDPS with IPM. Highest yield was also obtained from HDPS with IPM (21.10 Qt/ha) (Table 325-332).

Among all canopy management treatments related to HDPS, Cyclanilide + MC recorded least jassids and whitefly population. Lowest thrips population & green boll damage (%) were recorded in conventional planting followed by HDPS (90x15cm) without any canopy management treatments. Chlormequat chloride retained highest fruiting bodies percent (68.69%). Open boll damage (18.84%) was recorded lowest in Chlormequat chloride. Lowest locule damage (18.48%) recorded in Cyclinidine + MC. Highest yield (19.71 Qt/ha) was obtained from IPM applied Cyclinidine + MC followed by Chlormequat chloride (19.63 Qt/ha) (Table 325-332).

At **Raichur,** lowest jassid (3.38/3 leaves), whitefly (1.11/3 leaves) & thrips population (1.28/3 leaves) was recorded in HDPS with IPM as compared to HDPS only. Lowest green boll damage (%) due to PBW (18.94 percent) & highest fruiting body retention (77.70 percent) was recorded in HDPS with IPM as compared to HDPS only. Least open boll damage (17.56%) and locule damage (15.85%) was recorded in HDPS with IPM. Highest yield was also obtained from HDPS with IPM (15.86 Qt/ha) (Table 325-332).

Among all canopy management treatments related to HDPS, lowest population of jassid (5.21/3 leaves) was recorded in Cyclinidine + MC, lowest population of whitefly (1.81/3 leaves) was recorded in Mepiquat chloride and lowest thrips population (2.22/3 leaves) was recorded from conventional planting. Lowest green boll damage (26.21 percent) was recorded in Cyclinidine + MC while highest retention of fruiting bodies (72.96 percent) was in Mepiquat chloride. Open boll damage and locule damage (%) was recorded lowest in Chlormequat chloride. Highest yield (14.57 Qt/ha) was also obtained from IPM applied Chlormequat chloride followed by De-topping (14.41 Qt/ha) (Table 325-332).

At **Nandyal,** lowest jassid (6.40/3 leaves), whitefly (12.80/3 leaves) & thrips population (21.50/3 leaves) was recorded in HDPS with IPM as compared to HDPS only. Lowest green boll damage (%) due to PBW (12.00 percent) & highest fruiting body retention (64.70 percent) was recorded in HDPS with IPM as compared to HDPS only. Lowest open boll damage (9.90%) & locule damage (5.20%) recorded in HDPS only(Table 325-332).

Among all canopy management treatments related to HDPS, lowest population of jassid (7.20/3 leaves) was recorded in De-topping, lowest population of whitefly (14.90/3 leaves) was recorded in Cyclinidine + MC & Chlormequat chloride. Lowest thrips population (24.70/3 leaves) was recorded from conventional planting. Green boll damage (15.00 percent) was recorded lowest in Cyclinidine + MC while highest retention of fruiting body (59.10 percent) was in Chlormequat chloride. Lowest open boll damage (8.70%) and locule damage (4.60 %) was recorded in Cyclinidine + MC (Table 325-332).

At **Chamrajnagar,** lowest jassid (4.53/3 leaves), whitefly (3.25/3 leaves) & thrips (7.01/3 leaves) population was recorded in HDPS with IPM as compared to HDPS only. Lowest green boll damage (%) due to PBW (6.25 percent) & highest fruiting body retention (68.30 percent) was recorded in HDPS with IPM as compared to HDPS only. Lowest open boll damage (7.83%), locule damage (8.92%) was recorded in HDPS with IPM. Highest yield was also obtained from HDPS with IPM (20.14 Qt/ha) (Table 325-332).

Among all canopy management treatments related to HDPS, De-topping recorded least pest population & lowest green boll damage (%) due to PBW. Highest fruiting bodies retention (68.48%) was also recorded in De-topping. Lowest open boll damage (10.43%) & locule damage (11.55%) were recorded in De-topping. Highest yield (18.93 Qt/ha) was also obtained from IPM applied De-topping followed by HDPS (90x15 cm) alone (18.01 Qt/ha) (Table 325-332).

Plant Protection Entomology Tables

Table: 1.Ent 1a. Br 22a (IET): Preliminary screening of breeding material (*G.arboreum*) for resistance to insect pest of cotton (Sucking pests) at North Zone during 2024-25.

Entry code	Name of entry	Jassids Injury Grade(JIG)*					No. of Jassids/ 3leaves				
		FA	BT	HI	SR	SG	FA	BT	HI	SR	SG
401	CISA6-11	-	I	I	II	I	-	1.10	1.90	1.39	0.17
402	PBD 161	-	I	-	II	I	1.00	1.60	-	1.32	0.13
403	**Local Check**	-	I	-	I	I	2.00	1.00	-	1.69	0.45
404	RG 944	-	I	-	II	I	1.17	1.60	-	1.26	0.19
405	PBD 166	-	I	I	II	I	0.83	1.00	2.03	2.03	0.06
406	FDK 421	-	I	I	II	I	0.83	1.10	1.80	1.51	0.09
407	RG 945	-	I	-	II	I	1.67	2.00	-	1.50	0.07
408	FDK 354	-	I	I	II	I	1.17	1.70	1.73	1.65	0.15
409	HD 584	-	I	I	II	I	0.50	1.10	1.67	1.56	0.14
410	FDK 431	-	I	I	II	I	0.83	2.00	1.70	2.38	0.42
411	HD 579	-	I	I	I	I	0.50	1.10	1.53	1.58	0.35
412	**ZC(FDK 124)**	-	I	I	II	I	0.17	1.60	1.60	1.82	0.16
413	CISA 8-1	-	I	-	II	I	0.50	1.30	-	1.42	0.08

BT- Bathinda**; FA**- Faridkot**; HI –** Hisar; **SR**- Sirs**a, SG**- Sriganganagar***JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave

Table: 2.Ent. 1a. Br 22a (IET): Preliminary screening of breeding material (*G.arboreum*) for resistance to insect pest of cotton (Sucking pests) at North Zone during 2024-25.

Entry code	Name of entry	Whitefly/ 3 leaves					Thrips/3 leaves				
		FA	BT	HI	SR	SG	FA	BT	HI	SR	SG
401	CISA6-11	-	2.30	11.33	6.90	8.14	-	-	7.67	4.21	1.99
402	PBD 161	37.33	2.70	-	7.50	5.38	0.67	-	-	5.07	1.48
403	**Local Check**	22.83	2.00	-	9.34	14.93	2.33	-	-	5.04	4.57
404	RG 944	23.50	2.50	-	8.86	10.31	0.17	-	-	4.41	2.82
405	PBD 166	41.17	3.50	9.47	8.70	5.82	2.17	-	7.07	4.84	1.33
406	FDK 421	30.83	3.10	9.20	8.11	13.94	1.67	-	8.10	4.96	5.31
407	RG 945	35.50	2.50	-	7.37	14.79	0.83	-	-	4.17	5.32
408	FDK 354	36.00	2.50	9.33	9.35	12.21	0.50	-	6.70	5.97	4.15
409	HD 584	43.83	3.30	9.07	8.55	8.96	0.50	-	7.13	4.96	2.69
410	FDK 431	32.83	2.60	9.50	9.87	10.01	0.83	-	7.03	6.14	2.71
411	HD 579	33.83	2.10	10.10	8.67	7.53	0.50	-	7.93	5.33	2.20
412	**ZC(FDK 124)**	41.50	2.60	9.17	8.90	7.97	0.17	-	7.67	5.67	2.95
413	CISA 8-1	30.00	2.40	-	9.69	8.58	0.50	-	-	5.67	3.40

BT- Bathinda**; FA**- Faridkot**; HI –** Hisar; **SR**- Sirs**a; SG**- Sriganganagar

Table: 3.Ent. 1a. Br 22a (IET): Preliminary screening of breeding material (*G.arboreum*) for resistance to insect pest of cotton (Sucking pests) at North Zone during 2024-25.

Entry code	Name of entry	Natural Enemies/ Plant*					Rosette flower (%) due to PBW#				
		FA	BT	HI	SR	SG	FA	BT	HI	SR	SG
401	CISA6-11	-	1.00	0.27	0.83	0.54	-	-	0.00	0.00	4.98
402	PBD 161	3.50	1.35	-	1.07	0.49	0.00	-	-	0.00	1.05
403	**Local Check**	3.83	1.35	-	1.44	0.45	0.00	-	-	0.00	4.06
404	RG 944	3.50	1.35	-	0.95	0.53	0.00	-	-	0.00	3.55
405	PBD 166	5.50	1.30	0.33	0.93	0.83	0.00	-	0.00	0.00	2.06
406	FDK 421	3.50	1.95	0.27	0.98	0.63	0.00	-	0.00	0.00	6.48
407	RG 945	5.00	1.75	-	1.42	0.74	0.00	-	-	0.00	4.98
408	FDK 354	5.67	1.60	0.33	1.52	0.50	0.00	-	0.00	0.00	0.64
409	HD 584	7.83	1.55	0.27	1.29	0.59	0.00	-	0.00	0.00	1.13
410	FDK 431	5.67	1.55	0.33	1.36	0.76	0.00	-	0.00	0.00	1.91
411	HD 579	5.00	1.35	0.33	1.47	0.62	0.00	-	0.00	0.00	5.98
412	**ZC(FDK 124)**	7.00	1.50	0.27	1.24	0.88	0.00	-	0.00	0.00	7.48
413	CISA 8-1	3.33	1.65	-	1.16	0.40	0.00	-	-	0.00	7.98

BT- Bathinda**; FA-** Faridkot**; HI –** Hisar; **SR-** Sirs**a; SG-** Sriganganagar, * Natural Enemies include coccinellids, chrysopids, syrphids and spider mites. #Rosette flower percent based on 50 randomly observed flower/entry

Table: 4.Ent 1a. Br 22a (IET): Preliminary screening of breeding material (*G.arboreum*) for resistance to insect pest of cotton (Sucking pests) at North Zone during 2024-25.

Entry code	Name of entry	Green Boll Damage (%) due to ABW/SBW/TC					Green Boll Damage (%) due to PBW##					Open Boll damage (%)$				
		FA	BT	HI	SR	SG	FA*	BT	HI	SR	SG	FA	BT	HI	SR	SG
401	CISA6-11	-	-	8.89	1.33	8.28	-	-	11.11	5.83	5.09	-	5.00	4.71	21.38	5.29
402	PBD 161	12.44	-	-	2.57	6.36	5.00	-	-	4.17	2.15	7.73	5.77	-	21.11	1.27
403	**Local Check**	11.80	-	-	1.15	10.46	20.00	-	-	5.83	10.62	7.77	5.08	-	16.07	12.37
404	RG 944	13.78	-	-	1.39	8.23	15.00	-	-	6.67	8.80	20.29	5.34	-	19.22	9.67
405	PBD 166	15.14	-	7.78	1.64	7.51	25.00	-	11.11	8.33	3.39	8.45	5.30	5.30	19.29	3.00
406	FDK 421	10.20	-	8.89	1.67	8.95	20.00	-	8.89	5.00	9.55	14.63	3.63	3.85	19.40	10.27
407	RG 945	11.21	-	-	1.12	9.65	20.00	-	-	7.50	10.77	11.12	7.41	-	21.03	9.87
408	FDK 354	7.19	-	7.78	1.19	8.57	25.00	-	8.89	8.33	10.85	12.18	6.94	5.92	21.49	11.47
409	HD 584	9.51	-	8.89	1.46	8.08	10.00	-	10.00	5.00	7.33	7.88	3.70	5.39	17.40	8.96
410	FDK 431	8.82	-	7.78	1.63	8.52	30.00	-	8.89	5.83	8.67	11.91	4.89	5.55	16.98	10.87
411	HD 579	6.70	-	6.67	1.04	8.29	25.00	-	8.89	6.67	4.04	7.57	7.49	3.14	17.67	4.59
412	**ZC(FDK 124)**	7.15	-	8.89	1.16	7.94	15.00	-	10.00	7.50	6.54	4.11	6.35	3.47	19.61	6.45
413	CISA 8-1	3.13	-	-	1.17	8.06	15.00	-	-	8.33	7.16	12.75	5.57	-	18.30	8.77

BT- Bathinda**; FA-** Faridkot**; HI –** Hisar; **SR-** Sirsa**; SG-** Sriganganagar, ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked) .$ Open boll damage (%) at harvest only.*Green boll damage/20 green bolls destructive sampling

Table: 5 .Ent1a. Br 22a (IET): Preliminary screening of breeding material (*G.arboreum*) for resistance to insect pest of cotton (Sucking pests) at North Zone during 2024-25.

Entry code	Name of entry	Open Locule Damage (%)					Number of Good Open Bolls/ plant				
		FA	BT	HI	SR	SG	FA	BT	HI	SR	SG
401	CISA6-11	-	2.08	2.49	11.34	1.70	-	95.00	-	78.62	92.67
402	PBD 161	3.86	1.76	-	10.84	0.23	92.27	94.15	-	78.89	97.69
403	**Local Check**	3.92	2.04	-	8.87	3.89	92.23	94.92	-	83.93	83.83
404	RG 944	8.81	2.68	-	10.01	3.68	79.71	94.65	-	80.78	88.29
405	PBD 166	3.61	1.86	3.72	9.75	1.02	91.55	94.70	-	80.71	94.96
406	FDK 421	6.04	1.82	2.07	10.23	3.11	85.37	96.37	-	80.60	85.72
407	RG 945	5.94	2.99	-	10.88	3.60	88.88	92.59	-	78.97	88.09
408	FDK 354	4.83	2.08	2.89	10.80	3.86	87.82	93.05	-	78.51	86.49
409	HD 584	3.63	1.55	3.36	8.83	3.51	92.12	96.30	-	82.60	89.00
410	FDK 431	5.42	1.64	3.08	8.90	3.96	88.09	95.10	-	83.02	87.09
411	HD 579	2.82	2.62	1.80	9.21	2.17	92.43	92.51	-	82.33	93.37
412	**ZC(FDK 124)**	1.69	2.84	2.21	10.53	2.86	95.89	93.65	-	80.39	91.51
413	CISA 8-1	5.51	1.76	-	10.70	2.30	87.25	94.42	-	81.70	89.19

BT- Bathinda**; FA-** Faridkot**; HI –** Hisar; **SR-** Sirs**a; SG-** Sriganganagar, Locule damage (%) at harvest only.

Table: 6. Ent1a. Br 25a (PHT): Preliminary screening of breeding material (Desi Hybrid) for resistance to insect pest of cotton (Sucking pests) at North Zone during 2024-25.

Entry code	Name of entry	Jassids Injury Grade(JIG)*					No. of Jassids/ 3leaves					Whitefly/ 3 leaves				
		FA	BT	HI	SR	SG	FA	BT	HI	SR	SG	FA	BT	HI	SR	SG
421	GVDH 111/22	-	I	-	I	I	-	0.00	-	0.75	0.40	-	1.90	-	3.88	16.35
422	CISAA 23-2	-	I	I	I	I	-	0.35	1.57	0.53	0.05	-	2.20	9.43	3.71	5.51
423	CISAA 23-3	-	I	I	I	I	-	0.45	1.53	0.60	0.45	-	3.00	9.32	5.13	13.00
424	**Local Check**	-	I	I	I	I	-	0.00	1.60	0.55	0.40	-	5.20	8.87	5.35	16.10
425	KR 166	-	I	I	I	I	-	0.00	1.59	0.27	0.03	-	3.30	8.93	3.57	10.87
426	GVDH 145/22	-	I	I	I	I	-	0.00	1.73	1.13	0.45	-	2.20	8.09	4.73	14.26
427	**ZC (KR 64-NZ)**	-	I	I	I	I	-	0.00	1.87	0.93	0.45	-	3.10	8.17	5.73	7.24
428	AAH 51	-	I	-	I	I	-	0.00	-	0.53	0.15	-	3.50	-	5.00	7.31
429	AAH 53	-	I	I	I	I	-	0.00	1.97	0.85	0.80	-	2.70	8.77	3.62	14.86

BT- Bathinda; **FA**- Faridkot; **HI** – Hisar; **SR**- Sirsa; **SG**- Sriganganagar, ***JIG**- Jassid Injury Grade (**I**-entire foliage free of curling and yellowing, **II**- curling of few leaves in lower portion of plant + marginal yellowing , **III**- curling of leaves almost all over the plant, **IV**- extreme curling, bronzing and drying of leave

Table: 7. Ent1a. Br 25a (PHT): Preliminary screening of breeding material (Desi Hybrid) for resistance to insect pest of cotton (Sucking pests) at North Zone during 2024-25.

Entry code	Name of entry	Thrips/3 leaves					Natural Enemies/ Plant*					Rosette flower (%) due to PBW#				
		FA	BT	HI	SR	SG	FA	BT	HI	SR	SG	FA	BT	HI	SR	SG
421	GVDH 111/22	-	0.00	-	2.93	1.62	-	1.00	-	0.45	0.49	-	-	-	0.00	5.15
422	CISAA 23-2	-	0.00	6.07	3.04	1.44	-	1.25	0.27	0.98	0.94	-	-	0.00	0.00	3.98
423	CISAA 23-3	-	0.00	5.90	4.00	2.19	-	1.15	0.33	0.80	0.69	-	-	0.00	0.00	4.94
424	**Local Check**	-	0.00	7.37	2.05	1.88	-	1.30	0.33	0.70	0.54	-	-	0.00	0.00	8.94
425	KR 166	-	0.00	5.87	2.83	2.28	-	1.25	0.27	0.77	0.79	-	-	0.00	0.00	7.45
426	GVDH 145/22	-	0.00	7.23	3.93	1.81	-	1.00	0.33	0.67	0.42	-	-	0.00	0.00	10.69
427	**ZC (KR 64-NZ)**	-	0.00	6.77	4.07	2.01	-	1.10	0.27	0.53	0.87	-	-	0.00	0.00	6.45
428	AAH 51	-	0.00	-	4.13	1.57	-	1.25	-	0.48	0.83	-	-	-	0.00	6.96
429	AAH 53	-	0.00	7.30	2.72	2.31	-	1.35	0.33	0.73	0.72	-	-	0.00	0.00	4.71

BT- Bathinda**; FA-** Faridkot**; HI –** Hisar; **SR-** Sirs**a; SG-** Sriganganagar, * Natural Enemies include coccinellids, chrysopids, syrphids and spider mites. #Rosette flower percent based on 50 randomly observed flower/entry

Table: 8. Ent1a. Br 25a (PHT): Preliminary screening of breeding material (Desi Hybrid) for resistance to insect pest of cotton (Sucking pests) at North Zone during 2024-25.

Entry code	Name of entry	Green Boll Damage (%) due to ABW/SBW/TC					Green Boll Damage (%) due to PBW##					Open Boll damage (%)$				
		FA	BT	HI	SR	SG	FA	BT	HI	SR	SG	FA	BT	HI	SR	SG
421	GVDH 111/22	-	-	-	1.08	6.95	-	-	-	5.00	7.59	-	3.88	-	22.25	10.19
422	CISAA 23-2	-	-	7.78	1.07	3.78	-	-	8.89	6.67	4.02	-	6.45	3.51	19.62	3.49
423	CISAA 23-3	-	-	8.89	1.61	4.86	-	-	10.00	8.33	6.46	-	6.53	3.44	17.65	8.59
424	**Local Check**	-	-	7.78	2.43	10.18	-	-	11.11	7.50	10.53	-	4.64	5.65	18.02	9.39
425	KR 166	-	-	12.22	1.91	8.41	-	-	8.89	8.33	9.09	-	4.33	3.90	17.77	6.99
426	GVDH 145/22	-	-	8.89	1.66	11.73	-	-	7.78	9.17	12.79	-	3.36	4.76	21.40	12.09
427	**ZC (KR 64-NZ)**	-	-	7.78	1.85	6.83	-	-	10.00	11.67	7.36	-	4.45	5.07	21.03	6.39
428	AAH 51	-	-	-	1.86	8.27	-	-	-	10.83	10.23	-	4.25	-	19.08	7.89
429	AAH 53	-	-	8.89	1.74	5.59	-	-	12.22	6.67	7.17	-	6.62	5.20	21.49	8.39

BT- Bathinda**; FA-** Faridkot**; HI –** Hisar; **SR-** Sirs**a; SG-** Sriganganagar, ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked) .$ Open boll damage (%) at harvest only.

Table: 9. Ent1a. Br 25a (PHT): Preliminary screening of breeding material (Desi Hybrid) for resistance to insect pest of cotton (Sucking pests) at North Zone during 2024-25.

Entry code	Name of entry	Open Locule Damage (%)$					Number of Good Open Bolls/ plant				
		FA	BT	HI	SR	SG	FA	BT	HI	SR	SG
421	GVDH 111/22	-	1.61	-	13.58	1.41	-	96.12	-	77.75	88.79
422	CISAA 23-2	-	2.91	1.83	12.23	1.10	-	93.55	-	80.38	95.49
423	CISAA 23-3	-	2.57	2.20	10.17	2.23	-	93.47	-	82.35	90.39
424	**Local Check**	-	1.93	3.01	10.56	2.10	-	95.36	-	81.98	89.59
425	KR 166	-	1.80	2.73	10.55	2.58	-	95.67	-	82.23	91.99
426	GVDH 145/22	-	1.46	2.86	14.16	2.28	-	96.64	-	78.60	86.19
427	**ZC (KR 64-NZ)**	-	2.12	3.11	12.46	1.53	-	95.55	-	78.97	92.59
428	AAH 51	-	1.78	-	11.72	2.00	-	95.75	-	80.92	91.09
429	AAH 53	-	2.64	3.60	13.09	1.09	-	93.38	-	78.51	90.59

BT- Bathinda**; FA-** Faridkot**; HI –** Hisar; **SR-** Sirs**a; SG-** Sriganganagar, $-Locule damage (%) at harvest only

Table: 10. Ent1a. Br 24a Preliminary screening of breeding material (*G.arboreum*) for resistance to insect pest of cotton (Sucking pests) at North Zone during 2024-25.

Entry code	Name of entry	Jassids Injury Grade(JIG)*					Jassids/ 3leaves					Whitefly/ 3 leaves				
		FA	BT	HI	SR	SG	FA	BT	HI	SR	SG	FA	BT	HI	SR	SG
4001	**FDK 124(ZC)**	-	I	I	II	I	0.17	1.10	1.73	1.82	0.68	29.17	7.90	8.57	10.10	10.13
4002	FDK 331	-	I	I	II	I	0.00	1.90	1.70	1.80	1.11	25.33	6.70	7.63	11.18	18.82
4003	RG 913	-	I	I	I	I	0.50	1.70	1.97	1.18	1.23	25.33	7.40	8.97	9.40	11.69
4004	**Local Check**	-	I	I	II	I	0.33	1.40	1.80	1.77	1.22	25.00	7.30	8.43	8.93	23.10
4005	FDK 341	-	I	I	II	I	0.33	0.90	1.70	1.97	0.96	25.17	7.10	9.03	9.25	13.28

BT- Bathinda; **FA**- Faridkot; **HI** – Hisar; **SR**- Sirsa; **SG**- Sriganganagar, ***JIG**- Jassid Injury Grade (**I**-entire foliage free of curling and yellowing, **II**- curling of few leaves in lower portion of plant + marginal yellowing , **III**- curling of leaves almost all over the plant, **IV**- extreme curling, bronzing and drying of leave)

Table: 11. Ent1a. Br 24a Preliminary screening of breeding material (*G.arboreum*) for resistance to insect pest of cotton (Sucking pests) at North Zone during 2024-25.

Entry code	Name of entry	Thrips/3 leaves					Natural Enemies/ Plant*					Rosette flower (%) due to PBW#				
		FA	BT	HI	SR	SG	FA	BT	HI	SR	SG	FA	BT	HI	SR	SG
4001	**FDK 124(ZC)**	0.50	-	7.13	4.68	7.34	7.67	1.35	0.27	1.37	1.83	0.00	0.00	0.00	0.00	3.06
4002	FDK 331	0.17	-	6.10	5.13	10.41	9.00	1.25	0.27	1.57	0.63	0.00	0.00	0.00	0.00	4.74
4003	RG 913	1.83	-	7.50	4.70	11.41	7.67	1.45	0.40	1.73	1.08	0.00	0.00	0.00	0.00	7.87
4004	**Local Check**	0.33	-	7.77	5.75	13.64	7.50	1.25	0.33	1.68	0.53	0.00	0.00	0.00	0.00	4.88
4005	FDK 341	0.00	-	7.23	5.35	12.01	11.00	1.35	0.27	1.70	1.65	0.00	0.00	0.00	0.00	6.44

BT- Bathinda**; FA**- Faridkot**; HI –** Hisar; **SR**- Sirs**a; SG**- Sriganganagar, * Natural Enemies include coccinellids, chrysopids, syrphids and spider mites. #Rosette flower percent based on 50 randomly observed flower/entry

Table: 12. Ent1a. Br 24a Preliminary screening of breeding material (*G.arboreum*) for resistance to insect pest of cotton (Sucking pests) at North Zone during 2024-25.

Entry code	Name of entry	Green Boll Damage (%) due to ABW/SBW/TC					Green Boll Damage (%) due to PBW##					Open Boll damage (%)$				
		FA	BT	HI	SR	SG	FA	BT	HI	SR	SG	FA	BT	HI	SR	SG
4001	**FDK 124(ZC)**	1.26	-	8.89	1.53	7.65	10.00	-	11.11	4.38	4.72	7.80	4.64	5.49	16.78	5.93
4002	FDK 331	5.90	-	8.89	1.49	7.10	10.00	-	8.89	8.75	7.22	5.55	6.62	5.05	17.18	12.86
4003	RG 913	2.59	-	7.78	1.33	8.18	5.00	-	11.11	7.50	10.26	7.44	3.82	5.53	18.51	10.88
4004	**Local Check**	2.67	-	5.56	1.66	10.33	15.00	-	10.00	9.38	8.72	7.34	5.25	6.55	17.81	13.85
4005	FDK 341	6.07	-	10.00	1.33	7.77	20.00	-	11.11	8.75	7.06	9.00	5.17	6.38	18.64	8.90

BT- Bathinda**; FA**- Faridkot**; HI –** Hisar; **SR**- Sirs**a; SG**- Sriganganagar, ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked) .$ Open boll damage (%) at harvest only, .*Green boll damage/20 green bolls destructive sampling

Table: 13. Ent1a. Br 24a Preliminary screening of breeding material (*G.arboreum*) for resistance to insect pest of cotton (Sucking pests) at North Zone during 2024-25

Entry code	Name of entry	Open Locule Damage (%)$					Number of Good Open Bolls/ plant				
		FA	BT	HI	SR	SG	FA	BT	HI	SR	SG
4001	**FDK 124(ZC)**	3.28	1.93	2.16	10.23	0.86	92.20	95.36	-	83.22	92.08
4002	FDK 331	2.37	2.71	3.29	10.25	4.09	94.45	94.75	-	82.82	90.09
4003	RG 913	3.74	1.60	3.38	10.88	3.02	92.56	94.88	-	81.49	85.14
4004	**Local Check**	3.28	2.63	3.99	10.15	5.99	92.66	94.75	-	82.19	79.20
4005	FDK 341	3.84	1.55	3.63	10.17	2.58	91.00	94.83	-	81.36	86.11

BT- Bathinda**; FA**- Faridkot**; HI –** Hisar; **SR**- Sirs**a; SG**- Sriganganagar, $- locule damage (%) at harvest only

Table: 14. Ent1a. Br 25a (CHT): Preliminary screening of breeding material (Desi Hybrid) for resistance to insect pest of cotton (Sucking pests) at North Zone during 2024-25.

Entry code	Name of entry	Jassids Injury Grade(JIG)*					No. of Jassids/ 3leaves					Whitefly/ 3 leaves				
		FA	BT	HI	SR	SG	FA	BT	HI	SR	SG	FA	BT	HI	SR	SG
4011	**Local Check**	-	I	I	I	I	0.00	0.00	1.47	0.42	0.34	23.17	2.50	8.00	10.27	11.58
4012	CISAA 22-3	-	I	I	I	I	0.17	0.00	1.77	1.06	0.08	26.83	2.70	7.58	9.67	7.52
4013	CISAA 22-1	-	I	I	I	I	0.83	0.00	1.43	1.00	0.52	34.33	3.00	8.77	10.88	14.09
4014	KR 162	-	I	I	I	I	0.00	0.00	1.56	0.86	0.14	30.17	2.70	6.90	9.96	5.91
4015	KR 165	-	I	I	I	I	0.00	0.00	1.67	0.82	0.33	36.50	2.60	8.10	10.31	8.00
4016	KR 164	-	I	I	I	I	0.17	0.00	1.63	1.03	0.15	30.00	2.40	8.73	10.13	4.75
4017	KR 163	-	I	I	I	I	0.00	0.00	1.73	1.03	0.23	27.00	2.50	8.87	10.82	9.72
4018	KR 161	-	I	I	I	I	0.33	0.00	1.62	0.84	0.17	28.50	2.20	8.40	9.37	15.17
4019	**ZC (KR 64)**	-	I	I	I	I	0.17	0.00	1.50	0.74	0.17	31.33	2.40	7.37	10.36	8.43
4020	KR 160	-	I	I	I	I	0.17	0.00	1.43	0.66	0.26	26.00	2.70	7.37	10.69	6.05

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar; **SR**- Sirs**a; SG**- Sriganganagar, ***JIG**- Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave)

Table: 15. Ent1a. Br 25a (CHT): Preliminary screening of breeding material (Desi Hybrid) for resistance to insect pest of cotton (Sucking pests) at North Zone during 2024-25.

Entry code	Name of entry	Thrips/3 leaves					Natural Enemies/ Plant*					Rosette flower (%) due to PBW#				
		FA	BT	HI	SR	SG	FA	BT	HI	SR	SG	FA	BT	HI	SR	SG
4011	**Local Check**	0.00	-	4.90	3.04	4.68	8.00	1.10	0.33	0.58	0.76	0.00	-	0.00	0.00	7.71
4012	CISAA 22-3	0.00	-	4.30	2.80	2.13	5.00	1.20	0.33	0.36	0.52	0.00	-	0.00	0.00	5.01
4013	CISAA 22-1	0.17	-	5.80	2.79	6.77	8.17	1.35	0.40	0.43	0.62	0.00	-	0.00	0.00	3.58
4014	KR 162	0.00	-	4.47	2.64	1.61	10.17	1.20	0.47	0.36	0.95	0.00	-	0.00	0.00	8.81
4015	KR 165	0.00	-	5.90	2.42	2.42	8.00	1.55	0.33	0.42	0.47	0.00	-	0.00	0.00	2.31
4016	KR 164	0.00	-	5.87	2.69	1.34	10.17	1.25	0.53	0.27	0.52	0.00	-	0.00	0.00	1.47
4017	KR 163	0.00	-	5.73	3.24	3.80	9.33	1.40	0.27	0.32	0.33	0.00	-	0.00	0.00	4.27
4018	KR 161	0.00	-	5.40	2.73	7.67	8.17	1.40	0.40	0.38	0.52	0.00	-	0.00	0.00	2.04
4019	**ZC (KR64)**	0.00	-	4.73	2.60	2.72	9.33	1.35	0.33	0.33	0.33	0.00	-	0.00	0.00	3.75
4020	KR 160	0.00	-	4.83	2.24	1.12	8.83	1.45	0.47	0.32	0.48	0.00	-	0.00	0.00	10.05

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar; **SR**- Sirs**a; SG**- Sriganganagar, * Natural Enemies include coccinellids, chrysopids, syrphids and spider mites. #Rosette flower percent based on 50 randomly observed flower/entry

Table: 16. Ent1a. Br 25a (CHT): Preliminary screening of breeding material (Desi Hybrid) for resistance to insect pest of cotton (Sucking pests) at North Zone during 2024-25.

Entry code	Name of entry	Green Boll Damage (%) due to ABW/SBW/TC					Green Boll Damage (%) due to PBW##					Open Boll damage (%)$				
		FA	BT	HI	SR	SG	FA	BT	HI	SR	SG	FA	BT	HI	SR	SG
4011	**Local Check**	5.36	-	7.78	1.75	9.40	10.00	-	5.56	5.00	9.44	8.95	4.46	4.60	15.09	10.49
4012	CISAA 22-3	4.21	-	8.89	2.33	10.18	15.00	-	10.00	4.17	5.05	9.23	4.25	5.86	17.57	6.03
4013	CISAA 22-1	2.09	-	5.56	2.07	10.51	15.00	-	6.67	7.50	10.25	7.22	6.91	3.89	19.66	9.00
4014	KR 162	1.00	-	5.56	1.75	5.78	25.00	-	7.78	6.67	4.62	6.34	2.64	3.75	18.21	2.56
4015	KR 165	4.41	-	6.67	1.86	9.67	20.00	-	6.67	9.17	5.87	7.54	4.74	4.48	17.68	7.02

4016	KR 164	4.79	-	6.67	1.65	5.31	10.00	-	8.89	6.67	4.82	6.84	7.44	4.80	17.38	2.96
4017	KR 163	4.35	-	7.78	2.11	8.33	15.00	-	10.00	10.83	7.42	7.71	5.93	5.38	17.77	12.17
4018	KR 161	2.40	-	5.56	1.74	6.59	5.00	-	5.56	6.67	10.80	9.89	4.45	3.41	17.50	13.65
4019	**ZC (KR 64)**	3.50	-	7.78	2.02	8.22	15.00	-	6.67	7.50	6.30	6.08	5.25	5.47	16.92	8.01
4020	KR 160	0.92	-	5.56	1.90	11.75	20.00	-	5.56	8.33	10.99	8.99	5.17	3.70	17.61	1.09

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar; **SR**- Sirs**a; SG**- Sriganganagar, ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked) .$ Open boll damage (%) at harvest only

Table: 17. Ent1a. Br 25a (CHT): Preliminary screening of breeding material (Desi Hybrid) for resistance to insect pest of cotton (Sucking pests) at North Zone during 2024-25.

Entry code	Name of entry	Open Locule Damage (%)$					Number of Good Open Bolls/ plant				
		FA	BT	HI	SR	SG	FA	BT	HI	SR	SG
4011	**Local Check**	3.87	2.23	2.94	11.18	2.96	91.05	95.54	-	84.91	88.51
4012	CISAA 22-3	3.74	1.41	2.79	13.16	1.29	90.77	95.67	-	82.43	91.96
4013	CISAA 22-1	3.25	3.12	1.83	14.43	2.42	92.78	93.09	-	80.34	81.99
4014	KR 162	2.32	1.32	2.28	12.73	0.97	93.66	97.36	-	81.79	95.43
4015	KR 165	3.16	2.37	2.67	13.23	1.64	92.46	95.26	-	82.32	90.97
4016	KR 164	3.06	3.72	2.97	13.19	0.15	93.16	92.56	-	82.62	95.03
4017	KR 163	3.59	2.09	3.17	13.52	3.62	92.29	94.07	-	82.23	84.83
4018	KR 161	4.25	1.94	2.07	13.27	4.20	90.11	95.55	-	82.50	78.34
4019	**Zonal Check(KR 64)**	2.83	2.63	4.15	12.58	2.01	93.92	93.75	-	83.08	89.98
4020	KR 160	4.34	1.55	1.98	12.61	0.41	91.01	95.92	-	82.39	96.91

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar; **SR**- Sirs**a; SG**- Sriganganagar, $-locule damage (%) at harvest only

Central Zone(Ent.1a)

Table: 18. Ent1a. Br.02c (IET): Preliminary screening of breeding material (*G. hirsutum*) under organic conditions for resistance to insect pest of cotton at Central Zone during 2024-25.(Irrigated)

Entry code	Name of entry	Jassids Injury Grade(JIG)*				No. of Jassids/ 3leaves				Whitefly/ 3 leaves			
		BW	KH	TA	RA	BW	KH	TA	RA	BW	KH	TA	RA
431	Suraksha (CC)	-	-	-	I	4.44	10.78	-	3.56	0.40	7.80	-	2.00
432	CNH 3001	-	-	-	I	2.00	15.41	-	3.61	1.59	8.62	-	2.22
433	L 1822	-	-	-	I	2.97	13.26	-	2.94	1.83	10.35	-	2.00
434	Zonal Check	-	-	-	I	1.12	19.77	-	3.50	3.19	11.84	-	2.00
435	NH768	-	-	-	I	1.41	20.71	-	3.33	5.57	10.55	-	1.89
436	AKH 2009	-	-	-	I	2.59	16.68	-	2.72	11.14	10.60	-	2.33
437	CNH 2219	-	-	-	I	3.96	18.28	-	3.00	12.37	15.74	-	2.11
438	TCH 2001	-	-	-	I	2.81	13.69	-	3.11	8.37	14.31	-	1.94
439	L 1651	-	-	-	II	2.37	17.18	-	3.17	5.92	14.84	-	1.83
440	GBHV 227	-	-	-	I	4.79	20.24	-	3.17	2.52	13.63	-	1.89
441	AKH 2018-6	-	-	-	II	2.90	12.20	-	3.00	1.87	14.74	-	2.33
442	CSH NB 101	-	-	-	II	2.97	11.10	-	3.39	0.99	14.33	-	2.33
443	NH761	-	-	-	I	4.73	9.97	-	2.39	2.45	14.39	-	1.83
444	GISV 419	-	-	-	I	5.67	11.25	-	3.28	2.66	16.49	-	1.83
445	BS277-24	-	-	-	I	2.00	12.05	-	2.56	1.85	6.25	-	1.83
446	BS144-24	-	-	-	II	3.63	12.05	-	2.72	2.79	8.48	-	2.17
447	KGH 2411	-	-	-	I	8.95	9.96	-	3.00	4.37	9.35	-	2.39
448	RHC 2018	-	-	-	I	3.03	6.00	-	2.94	6.65	8.62	-	1.89
449	RHC 2107	-	-	-	I	4.53	8.85	-	2.94	7.75	6.53	-	2.00
450	TCH 1966	-	-	-	I	5.34	9.40	-	3.00	8.87	10.46	-	2.28
451	GSHV 271	-	-	-	I	5.41	9.00	-	2.72	4.75	13.68	-	1.94
452	NDLH 2097	-	-	-	I	5.41	12.13	-	2.83	8.93	8.99	-	2.00
453	RHC 1904	-	-	-	I	5.87	12.26	-	3.00	4.05	5.70	-	1.89
454	NDLH 2092-3	-	-	-	I	10.62	13.77	-	2.94	4.53	10.35	-	2.06
455	CNH 3002	-	-	-	II	9.96	13.36	-	3.00	1.96	11.35	-	1.94
456	AKH 2002	-	-	-	I	-	12.05	-	2.39	-	11.07	-	1.94
457	Local Check	-	-	-	I	14.60	14.06	-	0.00	3.33	10.48	-	0.00
458	ADB755	-	-	-	I	9.21	16.35	-	2.67	0.00	10.06	-	2.22

BW- Bhawanipatna, **KH-** Khandwa**, TA-**Talod, **RA-**Rahuri ***JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave)

Table: 19. Ent1a. Br.02c (IET): Preliminary screening of breeding material (*G. hirsutum*) under organic conditions for resistance to insect pest of cotton at Central Zone during 2024-25. (Irrigated)

Entry code	Name of entry	Thrips / 3 leaves				Aphids/ 3 leaves				Natural Enemies/ Plant*			
		BW	KH	TA	RA	BW	KH	TA	RA	BW	KH	TA	RA
431	Suraksha (CC)	2.93	-	-	27.39	0.00	17.35	-	21.44	0.00	-	-	1.94
432	CNH 3001	1.23	-	-	29.56	0.00	12.23	-	24.28	0.00	-	-	1.61
433	L 1822	1.23	-	-	25.67	2.67	15.31	-	21.11	0.59	-	-	2.00
434	Zonal Check	0.00	-	-	25.78	2.03	106.28	-	21.17	0.59	-	-	2.33
435	NH768	2.53	-	-	23.11	2.48	16.36	-	26.44	0.29	-	-	1.94
436	AKH 2009	5.30	-	-	11.67	0.89	16.80	-	16.11	0.29	-	-	1.61
437	CNH 2219	1.40	-	-	22.61	0.76	22.21	-	22.94	0.23	-	-	1.89
438	TCH 2001	2.67	-	-	21.00	3.56	20.95	-	23.39	0.65	-	-	2.28
439	L 1651	3.70	-	-	23.28	0.89	8.38	-	26.72	0.45	-	-	2.22
440	GBHV 227	3.67	-	-	27.83	3.49	15.33	-	28.33	0.36	-	-	1.94
441	AKH 2018-6	1.43	-	-	22.61	0.00	15.24	-	27.28	0.29	-	-	1.78
442	CSH NB 101	1.07	-	-	22.83	0.00	16.28	-	22.67	0.59	-	-	1.72
443	NH761	0.00	-	-	22.67	0.32	19.00	-	24.89	0.29	-	-	1.94
444	GISV 419	1.40	-	-	23.56	4.00	17.45	-	26.61	0.00	-	-	2.17
445	BS277-24	3.13	-	-	23.89	4.93	12.25	-	25.78	0.00	-	-	1.83
446	BS144-24	2.30	-	-	23.78	0.32	20.00	-	27.28	0.00	-	-	2.06
447	KGH 2411	1.67	-	-	22.89	20.11	18.21	-	23.11	0.00	-	-	2.11
448	RHC 2018	0.60	-	-	23.39	0.57	15.38	-	23.50	0.29	-	-	1.61
449	RHC 2107	1.60	-	-	21.89	8.27	24.22	-	25.22	0.36	-	-	1.94
450	TCH 1966	0.00	-	-	21.17	0.00	17.35	-	22.61	0.00	-	-	2.28
451	GSHV 271	0.00	-	-	22.83	0.00	20.93	-	25.89	0.00	-	-	1.83
452	NDLH 2097	0.77	-	-	20.50	0.00	18.86	-	25.11	0.29	-	-	1.83
453	RHC 1904	0.00	-	-	24.67	0.00	13.70	-	25.89	0.00	-	-	1.83
454	NDLH 2092-3	0.60	-	-	23.83	2.40	14.89	-	23.11	0.65	-	-	2.00
455	CNH 3002	0.60	-	-	23.94	0.57	14.91	-	23.39	0.81	-	-	1.67
456	AKH 2002	-	-	-	18.72	-	17.00	-	20.17	-	-	-	1.72
457	Local Check	0.77	-	-	0.00	0.00	17.56	-	0.00	0.29	-	-	0.00
458	ADB755	0.47	-	-	22.78	0.00	15.72	-	22.28	1.04	-	-	2.22

BW- Bhawanipatna, **KH**- Khandwa**, TA**-Talod, **RA**-Rahuri, * Natural Enemies include coccinellids, chrysopids, syrphids and spider mites.

Table: 20. Ent1a. Br.02c (IET): Preliminary screening of breeding material (*G. hirsutum*) under organic conditions for resistance to insect pest of cotton at Central Zone during 2024-25.(Irrigated)

Entry code	Name of entry	Rosette flower (%) due to PBW#				Green Boll Damage (%) due to ABW/SBW				Green Boll Damage (%) due to PBW##				PBW larvae/ 20 green bolls			
		BW	KH	TA	RA	BW	KH	TA	RA	BW	KH	TA	RA	BW	KH	TA	RA
431	Suraksha (CC)	0.00			-	-			-	0.00	13.00		9.50	-			-
432	CNH 3001	0.00			-	-			-	0.00	16.00		10.00	-			-
433	L 1822	0.00			-	-			-	0.00	15.50		7.50	-			-
434	Zonal Check	0.00			-	-			-	0.00	14.50		13.00	-			-
435	NH768	0.00			-	-			-	0.00	11.00		10.00	-			-
436	AKH 2009	0.00			-	-			-	6.67	12.00		10.50	-			-
437	CNH 2219	0.00			-	-			-	13.33	14.50		13.00	-			-
438	TCH 2001	0.00			-	-			-	6.67	14.50		8.00	-			-
439	L 1651	0.00			-	-			-	13.33	14.00		8.50	-			-
440	GBHV 227	0.00			-	-			-	0.00	11.00		11.00	-			-
441	AKH 2018-6	0.00			-	-			-	0.00	10.00		13.50	-			-
442	CSH NB 101	0.00			-	-			-	6.67	30.50		17.00	-			-
443	NH761	0.00			-	-			-	13.33	15.00		10.00	-			-
444	GISV 419	0.00			-	-			-	16.67	13.50		10.00	-			-
445	BS277-24	0.00			-	-			-	0.00	14.00		13.50	-			-
446	BS144-24	0.00			-	-			-	0.00	11.50		11.50	-			-
447	KGH 2411	0.00			-	-			-	0.00	18.00		9.50	-			-
448	RHC 2018	0.00			-	-			-	0.00	22.00		10.00	-			-
449	RHC 2107	0.00			-	-			-	0.00	11.50		11.00	-			-
450	TCH 1966	0.00			-	-			-	0.00	15.00		10.50	-			-
451	GSHV 271	0.00			-	-			-	20.00	11.00		8.00	-			-
452	NDLH 2097	0.00			-	-			-	3.33	15.00		8.50	-			-
453	RHC 1904	0.00			-	-			-	13.33	12.50		11.00	-			-
454	NDLH 2092-3	0.00			-	-			-	0.00	19.00		13.50	-			-
455	CNH 3002	0.00			-	-			-	13.33	14.00		10.50	-			-
456	AKH 2002	-			-	-			-	-	16.00		-	-			-
457	Local Check	0.00			-	-			-	13.33	13.00		0.00	-			-
458	ADB755	0.00			-	-			-	0.00	13.00		8.50	-			-

BW- Bhawanipatna, **KH**- Khandwa**, TA**-Talod, **RA**-Rahuri, #Rosette flower percent based on 50 randomly observed flower/entry, ## Green boll damage due to PBW through destructive sampling from 20 green boll/entry (randomly picked) .

Table: 21. Ent1a. Br.02c (IET): Preliminary screening of breeding material (*G. hirsutum*) under organic conditions for resistance to insect pest of cotton at Central Zone during 2024-25. (Irrigated)

Entry code	Name of entry	Open Boll damage (%) $				Locule damage (%) $				Number of Good open bolls/plant			
		BW	KH	TA	RA	BW	KH	TA	RA	BW	KH	TA	RA
431	Suraksha (CC)	21.82	-	-	11.93	2.24	-	-	4.77	10.80	-	-	54.17
432	CNH 3001	0.00	-	-	11.32	0.00	-	-	4.32	12.48	-	-	51.33
433	L 1822	24.00	-	-	10.05	5.31	-	-	5.06	5.76	-	-	54.67
434	Zonal Check	17.87	-	-	9.78	3.35	-	-	3.75	9.60	-	-	62.33
435	NH768	7.87	-	-	10.20	1.02	-	-	2.67	13.68	-	-	52.67
436	AKH 2009	18.00	-	-	11.54	1.45	-	-	4.63	8.16	-	-	42.17
437	CNH 2219	15.48	-	-	15.02	1.90	-	-	4.94	6.48	-	-	31.17
438	TCH 2001	24.83	-	-	5.71	2.18	-	-	1.88	5.52	-	-	69.50
439	L 1651	20.00	-	-	8.37	2.18	-	-	3.28	6.00	-	-	58.67
440	GBHV 227	35.56	-	-	10.56	6.61	-	-	4.31	4.56	-	-	50.00
441	AKH 2018-6	15.00	-	-	13.94	0.00	-	-	5.13	6.72	-	-	40.17
442	CSH NB 101	10.71	-	-	16.35	4.49	-	-	5.48	12.24	-	-	35.83
443	NH761	41.45	-	-	6.79	6.40	-	-	2.07	8.64	-	-	57.83
444	GISV 419	11.43	-	-	8.83	1.58	-	-	3.25	9.12	-	-	56.83
445	BS277-24	35.43	-	-	12.74	2.37	-	-	4.96	17.76	-	-	47.00
446	BS144-24	6.67	-	-	14.04	1.11	-	-	5.74	12.24	-	-	37.33
447	KGH 2411	45.71	-	-	12.22	12.86	-	-	5.18	9.36	-	-	34.67
448	RHC 2018	7.06	-	-	9.02	0.00	-	-	5.04	19.20	-	-	41.17
449	RHC 2107	5.63	-	-	10.04	0.45	-	-	5.88	14.64	-	-	39.00
450	TCH 1966	9.23	-	-	9.39	0.00	-	-	4.90	17.28	-	-	42.83
451	GSHV 271	9.09	-	-	7.05	0.00	-	-	2.92	14.64	-	-	61.67
452	NDLH 2097	10.34	-	-	7.51	0.25	-	-	3.34	25.44	-	-	53.33
453	RHC 1904	8.84	-	-	8.71	0.32	-	-	4.05	21.12	-	-	52.00
454	NDLH 2092-3	11.08	-	-	11.74	1.32	-	-	4.15	14.16	-	-	38.83
455	CNH 3002	4.86	-	-	12.05	0.40	-	-	5.64	17.04	-	-	31.50
456	AKH 2002	-	-	-	15.01	-	-	-	5.81	-	-	-	32.33
457	Local Check	30.00	-	-	0.00	1.19	-	-	0.00	8.64	-	-	0.00
458	ADB755	6.21	-	-	10.64	0.00	-	-	4.39	13.20	-	-	43.83

BW- Bhawanipatna, **KH-** Khandwa**, TA-**Talod, **RA-**Rahuri, $ Open boll, locule damage (%) at harvest only.

Table: 22. Ent1a. Br.02c (IET): Preliminary screening of breeding material (*G. hirsutum*) under organic conditions for resistance to insect pest of cotton at Central Zone during 2024-25.(Rainfed)

Entry code	Name of entry	Jassids Injury Grade(JIG)*		No. of Jassids/ 3leaves		Whitefly/ 3 leaves		Thrips/ 3 leaves		Aphids/3 leaves		Natural Enemies/ Plant**	
		AK	SU	AK	SU	AK	SU	AK	SU	AK	SU	AK	SU
431	Suraksha (CC)	-	I	-	1.99	-	1.59	-	25.77	-	26.51	-	1.20
432	CNH 3001	-	I	-	3.65	-	3.71	-	32.85	-	34.32	-	1.40
433	L 1822	-	II	-	6.52	-	3.39	-	32.30	-	32.06	-	1.46
434	Zonal Check	-	II	-	5.79	-	3.13	-	32.47	-	31.90	-	0.74
435	NH768	-	I	-	3.24	-	3.78	-	34.06	-	26.38	-	1.37
436	AKH 2009	-	II	-	5.26	-	4.46	-	30.31	-	34.19	-	1.63
437	CNH 2219	-	II	-	6.77	-	3.57	-	27.84	-	33.00	-	1.80
438	TCH 2001	-	I	-	4.65	-	3.66	-	29.41	-	33.51	-	1.80
439	L 1651	-	I	-	3.06	-	3.78	-	33.38	-	32.98	-	1.58
440	GBHV 227	-	I	-	4.85	-	3.19	-	30.65	-	30.06	-	1.39
441	AKH 2018-6	-	II	-	6.06	-	3.33	-	36.19	-	36.08	-	1.50
442	CSH NB 101	-	I	-	3.86	-	4.80	-	29.38	-	36.02	-	1.73
443	NH761	-	I	-	3.32	-	4.27	-	28.18	-	35.99	-	1.46
444	GISV 419	-	I	-	2.56	-	3.98	-	31.52	-	36.73	-	1.33
445	BS277-24	-	I	-	3.05	-	3.72	-	32.40	-	35.55	-	1.60
446	BS144-24	-	I	-	2.99	-	4.53	-	28.33	-	36.81	-	1.53
447	KGH 2411	-	II	-	6.52	-	3.19	-	29.96	-	34.32	-	1.13
448	RHC 2018	-	I	-	3.46	-	3.85	-	31.05	-	37.98	-	0.70
449	RHC 2107	-	I	-	4.26	-	4.27	-	31.64	-	31.61	-	1.33
450	TCH 1966	-	II	-	6.11	-	4.51	-	37.04	-	32.79	-	1.00
451	GSHV 271	-	I	-	4.72	-	2.74	-	38.30	-	30.97	-	0.70
452	NDLH 2097	-	I	-	2.92	-	2.73	-	35.09	-	28.88	-	1.07
453	RHC 1904	-	I	-	3.24	-	3.39	-	28.66	-	32.67	-	1.18
454	NDLH 2092-3	-	I	-	4.46	-	4.32	-	26.06	-	39.78	-	1.85
455	CNH 3002	-	I	-	3.53	-	3.45	-	25.02	-	35.32	-	1.07
456	AKH 2002	-	I	-	3.12	-	2.85	-	30.99	-	32.45	-	1.00
457	Local Check	-	I	-	3.05	-	3.52	-	28.78	-	31.17	-	1.00
458	ADB755	-	I	-	2.77	-	3.53	-	35.26	-	34.71	-	0.49

AK- Akola, **SU**-Surat, ***JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave, ** Natural Enemies include coccinellids, chrysopids, syrphids and spider mites,

Table: 23. Ent1a. Br.02c (IET): Preliminary screening of breeding material (*G. hirsutum*) under organic conditions for resistance to insect pest of cotton at Central Zone during 2024-25. (Rainfed)

Entry code	Name of entry	Rosette flower (%) due to PBW#		Green Boll Damage (%) due to ABW/SBW		Green Boll Damage (%) due to PBW##		Open Boll damage (%)$		Open Locule Damage (%) $		Number of Good Open Bolls/plant	
		AK	SU	AK	SU	AK	SU	AK	SU	AK	SU	AK	SU
431	Suraksha (CC)	-	0.40	-	6.47	-	4.53	-	4.44	-	2.28	-	24.99
432	CNH 3001	-	3.20	-	12.75	-	16.34	-	9.01	-	3.87	-	27.63
433	L 1822	-	0.47	-	6.73	-	1.15	-	7.73	-	3.01	-	20.96
434	Zonal Check	-	3.54	-	14.26	-	19.98	-	10.50	-	4.03	-	24.65
435	NH768	-	3.05	-	6.05	-	9.99	-	5.94	-	3.27	-	22.95
436	AKH 2009	-	4.55	-	8.00	-	9.99	-	7.05	-	3.29	-	26.96
437	CNH 2219	-	2.71	-	9.24	-	15.71	-	12.80	-	6.04	-	19.95
438	TCH 2001	-	2.34	-	12.95	-	23.16	-	14.95	-	7.98	-	21.66
439	L 1651	-	5.92	-	8.74	-	4.53	-	5.93	-	3.78	-	23.97
440	GBHV 227	-	3.91	-	13.14	-	9.99	-	8.94	-	5.82	-	22.97
441	AKH 2018-6	-	4.83	-	8.58	-	13.00	-	7.04	-	3.15	-	20.96
442	CSH NB 101	-	5.55	-	5.50	-	13.00	-	8.56	-	3.46	-	19.32
443	NH761	-	4.25	-	4.75	-	16.34	-	7.33	-	3.81	-	22.00
444	GISV 419	-	4.68	-	3.82	-	19.98	-	7.42	-	3.07	-	19.85
445	BS277-24	-	5.54	-	5.04	-	6.69	-	7.87	-	4.12	-	23.62
446	BS144-24	-	7.07	-	5.92	-	13.00	-	11.62	-	6.90	-	23.59
447	KGH 2411	-	5.74	-	7.04	-	9.99	-	10.91	-	6.18	-	24.52
448	RHC 2018	-	3.72	-	8.46	-	16.34	-	11.49	-	5.53	-	25.20
449	RHC 2107	-	6.19	-	5.95	-	9.99	-	7.48	-	3.36	-	22.97
450	TCH 1966	-	4.81	-	13.04	-	6.69	-	6.14	-	3.57	-	23.30
451	GSHV 271	-	3.94	-	7.33	-	13.00	-	9.05	-	4.56	-	24.65
452	NDLH 2097	-	5.80	-	9.62	-	23.16	-	15.05	-	9.03	-	23.65
453	RHC 1904	-	0.71	-	5.78	-	9.99	-	6.70	-	3.45	-	23.62
454	NDLH 2092-3	-	3.97	-	5.50	-	4.53	-	4.32	-	2.32	-	25.23
455	CNH 3002	-	5.30	-	8.68	-	13.00	-	8.57	-	4.31	-	24.65
456	AKH 2002	-	5.71	-	9.64	-	9.99	-	5.60	-	2.27	-	25.66
457	Local Check	-	5.87	-	7.98	-	13.00	-	7.47	-	3.14	-	24.89
458	ADB755	-	4.52	-	7.34	-	4.53	-	5.38	-	2.24	-	22.26

AK- Akola, **SU**-Surat, #Rosette flower percent based on 50 randomly observed flower/entry , ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $ Open boll, locule damage (%)at harvest only.

Table: 24. Ent1a Br-22 b (IET) - Preliminary screening of breeding material (*G. arboreum*) for resistance to insect pest of cotton at Central Zone during 2024-25. (Rainfed)

Entry code	Name of entry	Jassids Injury Grade(JIG)*		No. of Jassids/ 3leaves			Whitefly/ 3 leaves			Thrips / 3 leaves		Aphids/ 3 leaves		Natural Enemies/ Plant*	
		AK	BH	AK	KH	BH	AK	KH	BH	AK	BH	KH	BH	AK	BH
461	Local Check	I	I	1.50	3.95	0.31	2.00	13.65	0.53	-	5.56	7.30	0.58	-	0.49
462	NDLA 3167-1	I	I	2.00	9.30	0.42	2.70	3.86	0.49	-	4.69	10.00	0.42	-	0.33
463	GAM 316	I	I	1.50	9.40	0.42	2.30	10.65	0.18	-	4.62	4.15	0.42	-	0.49
464	JLA 1518	I	I	1.40	12.95	0.56	2.70	5.94	0.29	-	5.96	5.80	0.56	-	0.60
465	GBAV 173	I	I	1.90	6.80	0.52	3.10	4.80	0.29	-	7.11	5.10	0.67	-	0.64
466	DAS 2451	I	I	1.60	7.95	0.67	3.20	10.60	0.40	-	6.09	3.95	0.82	-	0.51
467	AKA 2016-1	I	I	1.80	3.80	0.84	2.40	10.60	0.13	-	6.98	9.55	0.53	-	0.47
468	GAM 327	I	I	1.70	9.90	0.76	2.70	12.30	0.22	-	7.44	6.25	0.96	-	0.71
469	PA 963	I	I	1.80	7.45	0.40	3.30	12.30	0.24	-	6.78	7.30	1.36	-	0.76
470	KGA- VS 2412	I	I	2.90	12.90	0.71	2.50	5.65	0.18	-	6.36	7.95	1.47	-	0.84
471	GBAV 179	I	I	1.60	7.46	0.64	3.00	7.75	0.20	-	4.00	4.15	0.78	-	0.73
472	CNA 1089	I	I	1.60	7.95	0.87	2.40	5.70	0.16	-	4.69	6.15	0.44	-	0.62
473	JLA 1913	I	I	1.60	9.74	0.60	2.80	5.95	0.13	-	4.53	7.05	0.53	-	0.80
474	DAS 2452	I	I	1.70	8.25	0.31	2.70	8.08	0.40	-	7.98	7.65	1.47	-	0.91
475	HD 579	I	I	1.20	10.60	0.84	2.90	6.13	0.27	-	5.40	4.40	0.91	-	0.80
476	ZC	I	I	1.50	7.95	0.60	3.10	13.08	0.27	-	4.96	4.15	1.04	-	0.69
477	CNA 1090	I	I	1.70	7.95	0.80	2.10	8.73	0.36	-	6.24	6.50	0.53	-	0.44
478	AKA 2018-1	I	I	1.80	8.45	0.89	2.50	14.73	0.33	-	5.60	7.60	0.84	-	0.56
479	NDLA 3163	I	I	1.60	5.15	0.51	2.40	15.08	0.29	-	7.82	12.60	1.04	-	0.51
480	HD 584	I	I	1.40	4.40	0.64	3.20	8.65	0.36	-	7.96	12.60	2.02	-	0.73
481	KGA- VS 2413	I	I	1.60	3.10	0.78	2.70	13.23	0.29	-	4.87	7.65	1.51	-	0.58
482	PA 986	I	I	1.80	3.45	0.40	2.80	7.62	0.36	-	6.27	3.15	1.78	-	0.73

NG-Nagpur, **AK-** Akola**, BH-** Bharuch**, KH**- Khandwa, ***JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave,*- Natural Enemies include coccinellids, chrysopids, syrphids and spider mites,

Table: 25. Ent1a Br-22 b(IET) - Preliminary screening of breeding material (*G. arboreum*) for resistance to insect pest of cotton at Central Zone during 2024-25.

Entry code	Name of entry	Rosette flower (%) due to PBW[#]		Green Boll Damage (%) due to ABW/SBW		Green Boll Damage (%) due to PBW[##]			Open Boll damage (%)[$]		Open Locule Damage (%)[$]		Number of Good Open Bolls/plant	
		AK	BH	AK	BH	AK	KH	BH	AK	BH	AK	BH	AK	BH
461	Local Check	-	2.24	-	3.33	12.50	20.0	5.56	15.35	6.00	5.66	4.44	-	94.00
462	NDLA 3167-1	-	2.78	-	2.78	22.50	17.0	6.67	19.93	6.67	6.10	4.44	-	93.33
463	GAM 316	-	3.82	-	1.11	12.50	12.0	7.78	14.95	5.33	4.86	4.22	-	94.67
464	JLA 1518	-	2.06	-	2.22	12.50	11.0	3.33	17.48	8.67	6.86	7.11	-	91.33
465	GBAV 173	-	2.45	-	2.78	42.50	16.0	7.78	40.01	6.67	15.72	5.78	-	93.33
466	DAS 2451	-	3.85	-	2.78	12.50	17.0	3.33	10.84	7.33	6.90	6.00	-	92.67
467	AKA 2016-1	-	4.46	-	3.33	7.50	13.0	7.78	12.91	6.67	3.93	5.56	-	93.33
468	GAM 327	-	3.34	-	3.89	5.00	14.5	6.67	9.71	7.33	3.10	4.89	-	92.67
469	PA 963	-	2.10	-	1.67	12.50	10.0	4.44	10.55	6.67	3.18	5.11	-	93.33
470	KGA- VS 2412	-	3.17	-	3.33	32.50	16.5	3.33	30.85	8.00	9.67	6.00	-	92.00
471	GBAV 179	-	2.28	-	3.33	17.50	17.5	5.56	15.66	7.33	7.43	5.11	-	92.67
472	CNA 1089	-	2.49	-	1.11	25.00	13.5	4.44	22.12	8.00	8.23	6.44	-	92.00
473	JLA 1913	-	3.84	-	5.56	7.50	10.0	8.89	8.91	8.67	2.76	6.44	-	91.33
474	DAS 2452	-	2.56	-	3.33	20.00	15.5	3.33	19.15	5.33	5.89	4.67	-	94.67
475	HD 579	-	3.03	-	2.78	27.50	14.5	7.78	24.58	6.00	8.19	3.56	-	94.00
476	ZC	-	2.54	-	1.11	12.50	13.0	4.44	10.00	7.33	3.47	5.56	-	92.67
477	CNA 1090	-	2.38	-	2.78	22.50	16.0	5.56	24.22	8.67	8.59	6.67	-	91.33
478	AKA 2018-1	-	3.54	-	2.22	17.50	18.0	8.89	20.47	8.00	9.14	5.11	-	92.00
479	NDLA 3163	-	3.39	-	2.78	12.50	11.0	7.78	10.48	6.67	4.72	5.33	-	93.33
480	HD 584	-	2.63	-	2.22	17.50	15.5	3.33	15.04	6.00	4.98	4.22	-	94.00
481	KGA- VS 2413	-	2.31	-	2.78	22.50	16.0	4.44	21.32	7.33	8.23	5.33	-	92.67
482	PA 986	-	3.89	-	1.67	25.00	19.5	7.78	13.41	6.00	4.21	3.78	-	94.00

NG-Nagpur, **AK**- Akola, **BH**- Bharuch**, KH**- Khandwa, #Rosette flower percent based on 50 randomly observed flower/entry**NG**-Nagpur, **AK**- Akola**, BH**- Bharuch**, KH**- Khandwa, ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $ Open boll, locule damage (%) at harvest only

Table: 26. Ent1a Br. 25 b (PHT)- Preliminary screening of breeding material (Desi Hybrids) for resistance to insect pest of cotton at Central Zone during 2024-25.(Rainfed)

Entry code	Name of entry	Jassids Injury Grade(JIG)*	No. of Jassids/ 3leaves	Whitefly/ 3 leaves	Thrips / 3 leaves	Aphids/3 leaves	Natural Enemies/ Plant*
		AK	AK	AK	AK	AK	AK
491	AAH 53	I	1.30	3.10	-	-	-
492	KR 166	I	2.40	3.50	-	-	-
493	GVDH 111/22	I	1.80	2.10	-	-	-
494	ZC (NACH 560)	I	2.10	3.20	-	-	-

495	AAH 51	I	2.60	2.40	-	-	-
496	CISAA 23-2	I	2.00	2.90	-	-	-
497	GVDH 145/22	I	1.50	3.70	-	-	-
498	Local Check	I	1.40	3.30	-	-	-

AK- Akola, ***JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave), * Natural Enemies include coccinellids, chrysopids, syrphids and spider mites,

Table: 27. Ent1a Br. 25 b (PHT) Preliminary screening of breeding material (Desi Hybrids) for resistance to insect pest of cotton at Central Zone during 2024-25.(Rainfed)

Entry code	Name of entry	Rosette flower (%) due to PBW[#]	Green Boll Damage (%) due to ABW/SBW	Green Boll Damage (%) due to PBW[##]	Open Boll damage (%)[$]	Open Locule Damage (%) [$]	Number of Good Open Bolls/plant
		AK	AK	AK	AK	AK	AK
491	AAH 53	-	-	25.00	26.91	9.47	-
492	KR 166	-	-	12.50	15.10	5.42	-
493	GVDH 111/22	-	-	7.50	10.95	3.59	-
494	ZC (NACH 560)	-	-	12.50	17.95	7.36	-
495	AAH 51	-	-	17.50	23.78	8.57	-
496	CISAA 23-2	-	-	25.00	30.34	10.69	-
497	GVDH 145/22	-	-	40.00	37.57	14.28	-
498	Local Check	-	-	30.00	27.75	9.93	-

AK- Akola, #Rosette flower percent based on 50 randomly observed flower/entry , ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $ Open boll, locule damage (%)at harvest only.

Table: 28. Ent1a. Br.32b (IET): Preliminary screening of breeding material (*G. herbaceum*) under organic conditions for resistance to insect pest of cotton at Central Zone during 2024-25. (Rainfed)

Entry code	Name of entry	Jassids Injury Grade(JIG)*		No. of Jassids/ 3leaves		Whitefly/ 3 leaves		Thrips/ 3 leaves		Aphids/3 leaves		Natural Enemies / Plant[**]	
		BH	SU	BH	SU	BH	SU	BH	SU	BH	SU	BH	SU
501	GVhv 1338	I	I	0.49	2.38	0.31	2.33	6.09	10.32	0.96	23.87	0.42	0.35
502	GBhv 391	I	I	0.67	2.10	0.44	2.39	6.67	12.46	0.53	28.03	0.64	0.85
503	GShv 836/17	I	I	0.76	2.12	0.29	1.86	4.89	6.59	0.93	28.90	0.44	1.33
504	GBhv 402	I	I	0.44	2.52	0.51	2.19	6.09	10.00	0.51	27.24	0.67	0.58
505	Local Check	I	I	0.44	2.51	0.73	3.04	5.51	15.04	0.38	27.25	0.44	0.06
506	GShv 918/17	I	I	0.71	3.18	0.40	2.93	5.20	13.65	0.78	28.38	0.36	0.85
507	GVhv 1350	I	I	0.36	2.86	0.64	3.59	7.51	12.84	1.07	25.39	0.73	0.99
508	ZC (GN Cot 25)	I	I	0.60	3.33	0.78	2.73	7.40	13.99	0.73	26.65	0.67	1.26
509	GBhv 401	I	I	0.56	2.79	0.56	3.00	8.36	12.59	0.62	23.82	0.67	1.67
510	GVhv 1073	I	I	0.51	2.38	0.47	2.12	6.02	13.00	0.62	22.12	0.89	1.00
511	DDhc -2451	I	I	0.31	1.98	0.44	2.10	4.87	15.45	0.58	21.73	0.44	1.20
512	GVhv 1262	I	I	0.53	1.81	0.70	2.73	7.84	17.24	0.69	18.44	0.49	1.33

BH- Bharuch , **SU**-Surat, ***JIG**- Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave, ** Natural Enemies include coccinellids, chrysopids, syrphids and spider mites,

Table: 29. Ent1a. Br.32b (IET): Preliminary screening of breeding material (*G. herbaceum*) under organic conditions for resistance to insect pest of cotton at Central Zone during 2024-25. (Rainfed)

Entry code	Name of entry	Rosette flower (%) due to PBW#		Green Boll Damage (%) due to ABW/SBW		Green Boll Damage (%) due to PBW##		Open Boll damage (%)$		Open Locule Damage (%) $		Number of Good Open Bolls/plant(%)	
		BH	SU	BH	SU	BH	SU	BH	SU	BH	SU	BH	SU
501	GVhv 1338	3.58	1.96	3.33	12.61	7.78	9.99	9.33	9.92	6.44	4.01	90.67	22.60
502	GBhv 391	2.57	1.23	6.67	11.12	4.44	13.00	8.00	13.56	6.22	5.13	92.00	22.73
503	GShv 836/17	2.64	0.59	4.44	10.72	6.67	16.34	9.33	14.07	8.00	6.55	90.67	23.65
504	GBhv 402	2.46	3.10	3.33	14.96	6.67	23.16	9.33	13.40	7.78	5.65	90.67	22.32
505	Local Check	3.25	1.69	3.33	11.31	7.78	15.71	8.00	12.02	5.56	6.28	92.00	22.22
506	GShv 918/17	2.13	3.74	1.11	13.35	2.22	16.34	7.33	13.70	5.78	6.67	92.67	22.99
507	GVhv 1350	2.94	2.19	5.56	9.99	7.78	16.34	8.67	13.60	6.22	4.58	91.33	21.00
508	ZC (GN Cot 25)	3.26	3.17	4.44	8.01	7.78	19.98	8.67	10.95	6.00	5.14	91.33	22.03
509	GBhv 401	4.23	3.38	2.22	6.87	8.89	9.99	9.33	14.33	6.44	8.47	90.67	21.09
510	GVhv 1073	3.83	2.65	3.33	7.93	8.89	19.30	8.00	13.46	5.56	5.36	92.00	23.29
511	DDhc -2451	2.81	2.16	4.44	12.19	4.44	6.02	6.00	11.88	3.78	5.07	94.00	25.26
512	GVhv 1262	2.42	2.01	2.22	9.59	5.56	13.00	9.33	11.36	7.56	5.01	90.67	25.61

BH- Bharuch, **SU**-Surat, #Rosette flower percent based on 50 randomly observed flower/entry , ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $ Open boll, locule damage (%)at harvest only. .*Green boll damage/20 green bolls destructive sampling

Table: 30. Ent1a Br-03 c (PVT) - Preliminary screening of breeding material (*G. hirsutum* Organic Cotton) for resistance to insect pest of cotton at Central Zone during 2024-25. (Rainfed)

Entry code	Name of entry	Jassids Injury Grade(JIG)*	No. of Jassids/ 3leaves	Whitefly/ 3 leaves	Thrips / 3 leaves	Aphids/3 leaves	Natural Enemies/ Plant*
		SU	SU	SU	SU	SU	SU
4101	AKH 1514	I	1.67	2.89	21.09	23.36	1.39
4102	GSHV 269	I	3.87	2.90	32.82	33.65	1.70
4103	Zonal	I	4.37	3.36	34.49	33.99	2.20
4104	Local Check	I	3.90	2.86	33.09	32.29	1.90
4105	GBHV 257	I	3.69	3.10	29.62	26.98	0.99
4106	AKH 2018-7	I	2.80	2.95	36.28	32.79	1.26
4107	Suraksha (CC)	I	2.28	1.44	29.57	35.80	1.29
4108	GSHV 266	II	5.90	2.50	33.07	30.80	1.30
4109	TCH 1999	II	5.06	2.46	32.28	28.17	1.38
4110	AKH 10-3	II	6.10	3.80	32.79	27.80	1.39

SU- Surat**, *JIG**- Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave

Table: 31. Ent1a Br-03 c (PVT) - Preliminary screening of breeding material (*G. hirsutum* Organic Cotton) for resistance to insect pest of cotton at Central Zone during 2024-25. (Rainfed)

Entry code	Name of entry	Rosette flower (%) due to PBW[#]	Green Boll Damage (%) due to ABW/SBW	Green Boll Damage (%) due to PBW[##]	Open Boll damage (%)[$]	Open Locule Damage (%) [$]	Number of Good Open Bolls/plant
		SU	SU	SU	SU	SU	SU
4101	AKH 1514	0.81	7.27	2.56	7.09	3.73	35.50
4102	GSHV 269	5.21	9.93	14.63	10.29	6.01	28.39
4103	Zonal	7.80	11.05	14.63	10.04	5.59	30.50
4104	Local Check	4.58	7.50	19.98	17.83	9.00	30.45
4105	GBHV 257	4.81	12.58	2.56	8.49	4.40	34.49
4106	AKH 2018-7	9.06	7.77	19.98	12.54	6.43	29.87
4107	Suraksha (CC)	5.07	7.57	14.63	9.72	5.26	30.48
4108	GSHV 266	6.07	7.13	24.81	11.23	6.76	29.93
4109	TCH 1999	6.22	9.38	14.63	14.43	6.37	29.00
4110	AKH 10-3	6.63	12.20	24.81	12.73	7.38	32.48

SU- Surat**, *** Natural Enemies include coccinellids, chrysopids, syrphids and spider mites, #Rosette flower percent based on 50 randomly observed flower/entry **NG-**Nagpur, **SU-** Surat**, AK-**Akola, ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $ Open boll, locule damage (%) at harvest only

Table: 32. Ent1a Br-03 c (PVT) - Preliminary screening of breeding material (*G. hirsutum* Organic Cotton) for resistance to insect pest of cotton at Central Zone during 2024-25. (Irrigated)

Entry code	Name of entry	Jassids Injury Grade(JIG)[*]		No. of Jassids/ 3leaves				Whitefly/ 3 leaves				Thrips/ 3 leaves			
		BW	RA	BW	RA	KH	TA	BW	RA	KH	TA	BW	RA	KH	TA
4101	AKH 1514	-	I	5.32	2.56	9.81	-	1.53	1.97	11.10	-	0.17	21.19	-	-
4102	GSHV 269	-	I	8.11	3.02	7.11	-	0.40	2.16	7.90	-	0.20	21.62	-	-
4103	Zonal Check	-	III	3.85	3.11	6.30	-	0.00	2.17	8.43	-	0.33	19.40	-	-
4104	Local Check	-	-	-	0.00	8.68	-	-	0.00	13.08	-	-	0.00	-	-
4105	GBHV 257	-	I	6.42	2.45	6.80	-	0.73	2.17	10.82	-	0.00	21.49	-	-
4106	AKH 2018-7	-	I	4.13	2.19	8.25	-	1.06	1.53	11.48	-	0.00	7.30	-	-
4107	Suraksha (CC)	-	II	6.49	2.67	10.90	-	5.56	2.11	12.77	-	0.00	21.80	-	-
4108	GSHV 266	-	I	4.66	3.13	11.50	-	14.39	2.03	10.56	-	0.00	21.98	-	-
4109	TCH 1999	-	III	3.85	2.54	8.56	-	17.00	2.08	10.36	-	0.53	22.48	-	-
4110	AKH 10-3	-	II	2.75	3.09	7.73	-	0.00	1.97	9.92	-	4.47	22.51	-	-

BW- Bhawanipatana, RA- Rahuri , KH- Khandwa, TA-Talod , **JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave**.**

Table: 33. Ent1a Br-03 c (PVT) - Preliminary screening of breeding material (*G. hirsutum* Organic Cotton) for resistance to insect pest of cotton at Central Zone during 2024-25. (Irrigated)

Entry code	Name of entry	Aphids/ 3 leaves				Natural Enemies/ Plant*				Rosette flower (%) due to PBW#			
		BW	RA	KH	TA	BW	RA	KH	TA	BW	RA	KH	TA
4101	AKH 1514	0.57	22.61	17.75	-	0.00	2.22	-	-	0.00	-	-	-
4102	GSHV 269	1.65	19.93	13.36	-	0.36	2.15	-	-	0.00	-	-	-
4103	Zonal Check	0.00	21.35	15.45	-	0.00	2.11	-	-	0.00	-	-	-
4104	Local Check	-	0.00	23.91	-	-	0.00	-	-	-	-	-	-
4105	GBHV 257	0.00	25.85	7.23	-	0.75	2.01	-	-	0.00	-	-	-
4106	AKH 2018-7	0.00	12.46	15.80	-	0.00	1.78	-	-	0.00	-	-	-
4107	Suraksha(CC)	8.40	21.29	10.80	-	0.65	1.89	-	-	0.00	-	-	-
4108	GSHV 266	0.00	22.73	14.30	-	0.00	2.15	-	-	0.00	-	-	-
4109	TCH 1999	0.00	21.86	13.30	-	0.36	2.08	-	-	0.00	-	-	-
4110	AKH 10-3	0.00	20.52	9.55	-	0.52	1.65	-	-	0.00	-	-	-

BW- Bhawanipatana, RA- Rahuri , KH- Khandwa, TA-Talod ,* Natural Enemies include coccinellids, chrysopids, syrphids and spider mites, #Rosette flower percent based on 50 randomly observed flower/entry

Table: 34. Ent1a Br-03 c (PVT) - Preliminary screening of breeding material (*G. hirsutum* Organic Cotton) for resistance to insect pest of cotton at Central Zone during 2024-25. (Irrigated)

Entry code	Name of entry	Green Boll Damage (%) due to PBW##				Open Boll damage (%)$				Open Locule Damage (%)$				Number of Good Open Bolls/plant	
		BW	RA	KH	TA	BW	RA	KH	TA	BW	RA	KH	TA	BW	RA
4101	AKH 1514	13.33	11.17	13.50	-	4.14	13.11	-	-	0.34	5.18	-	-	20.16	38.11
4102	GSHV 269	13.33	13.10	11.00	-	13.22	15.44	-	-	5.05	6.47	-	-	25.2	31.00
4103	Zonal Check	13.33	9.12	13.50	-	2.40	11.24	-	-	0.00	4.81	-	-	23.52	46.33
4104	Local Check	-	0.00	12.00	-	-	0.00	-	-	-	0.00	-	-	-	0.00
4105	GBHV 257	0.00	11.63	13.50	-	9.23	11.81	-	-	0.00	5.39	-	-	20.16	44.50
4106	AKH 2018-7	0.00	9.30	11.00	-	1.58	11.10	-	-	0.40	4.48	-	-	18	55.67
4107	Suraksha(CC)	13.33	13.15	16.00	-	10.29	14.08	-	-	0.88	5.76	-	-	15.36	37.33
4108	GSHV 266	23.33	11.62	18.50	-	20.57	13.28	-	-	0.84	5.00	-	-	20.88	46.17
4109	TCH 1999	0.00	13.92	10.00	-	13.04	15.01	-	-	1.67	6.64	-	-	19.68	30.22
4110	AKH 10-3	13.33	15.57	14.50	-	8.14	18.03	-	-	0.00	7.38	-	-	13.2	29.00

BW- Bhawanipatana, RA- Rahuri , , KH- Khandwa, TA-Talod , ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $ Open boll, locule damage (%) at harvest only

Table: 35. Ent1a Br.05c (CHT)- Preliminary screening of breeding material (HxH hybrids) under organic conditions for resistance to insect pest of cotton at Central Zone during 2024-25.(Irrigated)

Entry code	Name of entry	Jassids Injury Grade(JIG)*				No. of Jassids/ 3leaves				Whitefly/ 3 leaves			
		BW	KH	TA	RA	BW	KH	TA	RA	BW	KH	TA	RA
4121	KGHH-bio-2409	-	-	-	I	2.44	12.00	-	3.01	0.87	7.21	-	2.01
4122	KGHH -VS-2318-1	-	-	-	II	9.19	13.45	-	3.05	0.80	8.50	-	2.02
4123	GSHH 08/2019	-	-	-	I	6.47	11.75	-	2.65	0.47	10.10	-	2.42
4124	Partech 29	-	-	-	I	13.75	12.30	-	3.21	1.26	11.61	-	1.88

4125	Partech 30	-	-	-	II	9.41	14.05	-	2.61	0.47	10.08	-	2.21
4126	Bunny (CC)	-	-	-	I	14.38	15.75	-	2.72	0.00	13.00	-	2.02
4127	Zonal Check (NHH 44)	-	-	-	-	3.73	12.05	-	0.00	1.40	13.90	-	0.00
4128	Partech 30 Plus	-	-	-	II	7.91	11.28	-	3.05	0.40	12.34	-	2.21
4129	Partech 28	-	-	-	I	5.08	12.21	-	3.04	2.52	11.10	-	2.09
4130	KGHH- bio- 2408	-	-	-	II	11.60	10.14	-	2.80	0.80	11.25	-	2.40

BW- Bhawanipatna, **KH-** Khandwa**, TA-**Talod, **RA-**Rahuri ***JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave)

Table: 36. Ent1a Br.05c (CHT)- Preliminary screening of breeding material (HxH hybrids) under organic conditions for resistance to insect pest of cotton at Central Zone during 2024-25.(Irrigated)

Entry code	Name of entry	Thrips/ 3 leaves				Aphids/ 3 leaves				Natural Enemies/ Plant*			
		BW	KH	TA	RA	BW	KH	TA	RA	BW	KH	TA	RA
4121	KGHH-bio-2409	3.30	-	-	25.05	0.39	14.10	-	19.64	0.59	-	-	2.41
4122	KGHH -VS-2318-1	0.90	-	-	23.60	0.00	12.45	-	19.39	0.97	-	-	2.62
4123	GSHH 08/2019	0.67	-	-	20.82	0.32	13.95	-	20.56	0.59	-	-	1.80
4124	Partech 29	1.27	-	-	20.50	0.89	14.45	-	21.35	0.52	-	-	2.00
4125	Partech 30	0.57	-	-	21.79	0.71	15.40	-	20.49	0.13	-	-	1.86
4126	Bunny (CC)	1.20	-	-	24.53	3.12	14.05	-	23.09	0.00	-	-	2.07
4127	Zonal Check (NHH 44)	1.33	-	-	0.00	3.76	13.36	-	0.00	0.00	-	-	0.00
4128	Partech 30 Plus	0.97	-	-	19.50	0.00	12.15	-	21.06	0.59	-	-	2.10
4129	Partech 28	0.53	-	-	19.65	3.56	14.60	-	19.26	0.52	-	-	2.15
4130	KGHH- bio- 2408	1.53	-	-	20.45	4.89	12.50	-	21.13	0.33	-	-	2.15

BW- Bhawanipatna, **KH-** Khandwa**, TA-**Talod, **RA-**Rahuri. * Natural Enemies include coccinellids, chrysopids, syrphids and spider mites.

Table: 37. Ent1a Br.05c (CHT)- Preliminary screening of breeding material (HxH hybrids) under organic conditions for resistance to insect pest of cotton at Central Zone during 2024-25.(Irrigated)

Entry code	Name of entry	Rosette flower (%) due to PBW#				Green Boll Damage (%) due to ABW/SBW				Green Boll Damage (%) due to PBW##			
		BW	KH	TA	RA	BW	KH	TA	RA	BW	KH	TA	RA
4121	KGHH-bio-2409	0.00	-	-	-	-	-	-	-	23.33	9.50	-	8.00
4122	KGHH -VS-2318-1	0.00	-	-	-	-	-	-	-	13.33	11.00	-	9.72
4123	GSHH 08/2019	0.00	-	-	-	-	-	-	-	13.33	9.50	-	7.18
4124	Partech 29	0.00	-	-	-	-	-	-	-	23.33	7.00	-	8.50
4125	Partech 30	0.00	-	-	-	-	-	-	-	0.00	11.00	-	9.60
4126	Bunny (CC)	0.00	-	-	-	-	-	-	-	23.33	11.50	-	6.05
4127	Zonal Check (NHH 44)	0.00	-	-	-	-	-	-	-	0.00	12.50	-	0.00
4128	Partech 30 Plus	0.00	-	-	-	-	-	-	-	13.33	13.00	-	11.57
4129	Partech 28	0.00	-	-	-	-	-	-	-	16.67	13.50	-	8.20
4130	KGHH- bio- 2408	0.00	-	-	-	-	-	-	-	10.00	10.50	-	8.20

BW- Bhawanipatna, **KH-** Khandwa**, TA-**Talod, **RA-**Rahuri, #Rosette flower percent based on 50 randomly observed flower/entry, ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked) .

Table:38. Ent1a Br.05c (CHT)- Preliminary screening of breeding material (HxH hybrids) under organic conditions for resistance to insect pest of cotton at Central Zone during 2024-25.(Irrigated)

Entry code	Name of entry	Open Boll damage (%) $				Locule damage (%) $				Number of Good open bolls/plant			
		BW	KH	TA	RA	BW	KH	TA	RA	BW	KH	TA	RA
4121	KGHH-bio-2409	7.06	-	-	11.23	1.14	-	-	4.44	11.52	-	-	53.74
4122	KGHH -VS-2318-1	3.81	-	-	10.64	0.90	-	-	4.35	14.64	-	-	46.27
4123	GSHH 08/2019	12.63	-	-	9.11	1.10	-	-	4.38	24.48	-	-	57.88
4124	Partech 29	2.73	-	-	9.50	1.44	-	-	3.85	20.64	-	-	58.93
4125	Partech 30	4.00	-	-	11.37	0.00	-	-	4.85	20.88	-	-	50.27
4126	Bunny (CC)	0.00	-	-	7.25	0.00	-	-	2.55	19.68	-	-	63.60
4127	Zonal Check (NHH 44)	3.96	-	-	0.00	0.36	-	-	0.00	21.12	-	-	0.00
4128	Partech 30 Plus	4.21	-	-	12.96	0.48	-	-	5.88	13.2	-	-	39.60
4129	Partech 28	15.00	-	-	10.48	0.00	-	-	4.45	6.72	-	-	44.60
4130	KGHH- bio- 2408	1.32	-	-	10.23	0.48	-	-	4.51	21.6	-	-	58.77

BW- Bhawanipatna, **KH**- Khandwa**, TA**-Talod, **RA**-Rahuri, $ Open boll, locule damage (%) at harvest only.

Table: 39. Ent1a Br.05c (CHT)- Preliminary screening of breeding material (HxH hybrids) under organic conditions for resistance to insect pest of cotton at Central Zone during 2024-25.(Rainfed)

Entry code	Name of entry	Jassids Injury Grade(JIG)*	No. of Jassids/ 3leaves	Whitefly/ 3 leaves	Thrips / 3 leaves	Aphids/3 leaves	Natural Enemies/ Plant*
		SU	SU	SU	SU	SU	SU
4121	KGHH-bio-2409	I	1.85	2.90	23.54	21.21	0.90
4122	KGHH -VS-2318-1	I	4.37	3.69	31.30	32.38	1.06
4123	GSHH 08/2019	II	4.50	2.19	34.19	30.29	1.30
4124	Partech 29	I	1.10	3.00	25.89	25.32	1.80
4125	Partech 30	I	3.71	3.27	29.79	30.50	1.30
4126	Bunny (CC)	I	3.39	3.59	21.87	35.54	1.80
4127	Zonal Check (NHH 44)	I	2.60	2.59	28.27	33.68	1.67
4128	Partech 30 Plus	I	2.68	2.28	28.37	36.83	0.79
4129	Partech 28	I	3.48	3.10	38.08	24.02	0.39
4130	KGHH- bio- 2408	II	5.49	4.00	36.22	27.74	1.50

AK- Akola, **NG**-Nagpur**, SU**-Surat, ***JIG**- Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave, * Natural Enemies include coccinellids, chrysopids, syrphids and spider mites,

Table: 40. Ent1a Br.05c (CHT)- Preliminary screening of breeding material (HxH hybrids) under organic conditions for resistance to insect pest of cotton at Central Zone during 2024-25.(Rainfed)

Entry code	Name of entry	Rosette flower (%) due to PBW[#]	Green Boll Damage (%) due to ABW/SBW	Green Boll Damage (%) due to PBW[##]	Open Boll damage (%)[$]	Open Locule Damage (%) [$]	Number of Good Open Bolls/plant
		SU	SU	SU	SU	SU	SU
4121	KGHH-bio-2409	3.42	5.31	9.99	7.27	3.60	33.97
4122	KGHH -VS-2318-1	7.37	11.31	14.63	11.89	5.96	25.50
4123	GSHH 08/2019	9.61	14.22	19.98	11.67	6.34	29.97
4124	Partech 29	6.59	6.36	9.99	7.09	3.45	34.49
4125	Partech 30	2.71	7.28	19.98	9.64	4.58	26.99
4126	Bunny (CC)	6.65	7.63	24.81	15.48	7.07	26.92
4127	Zonal Check (NHH 44)	4.53	7.36	29.98	10.16	5.76	30.50
4128	Partech 30 Plus	6.10	6.29	9.99	7.56	3.72	33.97
4129	Partech 28	5.30	5.21	14.63	7.54	3.41	28.50
4130	KGHH- bio- 2408	6.10	8.75	14.63	9.47	4.79	28.48

SU-Surat, #Rosette flower percent based on 50 randomly observed flower/entry , ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $ Open boll, locule damage (%)at harvest only.

Table:41. Ent1a Br-03 a/b (PVT) -Preliminary screening of breeding material (*G. hirsutum* Coloured Cotton) for resistance to insect pest of cotton at Central Zone during 2024-25. (Irrigated).

Entry code	Name of entry	Jassids Injury Grade(JIG)*	No. of Jassids/ 3leaves		Whitefly/ 3 leaves		Thrips / 3 leaves	Aphids/3 leaves		Natural Enemies/ Plant[*]
		JU	JU	KH	JU	KH	JU	JU	KH	JU
4141	FC4001	-	9.40	13.70	9.23	11.70	12.37	12.47	20.88	-
4142	CNH-22196 (CC)	-	8.60	18.70	9.37	13.85	9.20	10.83	16.08	-
4143	CNH-22197 (CC)	-	6.90	11.06	7.17	12.66	12.03	8.27	14.25	-
4144	FC 4002	-	7.90	16.45	7.07	13.95	14.83	8.03	12.23	-
4145	FC 4003	-	7.03	34.38	7.93	17.66	10.73	9.20	14.19	-
4146	Local Check	-	8.13	10.57	10.70	11.69	10.33	10.03	16.96	-
4147	Phule Yamuna (ZC)	-	10.03	8.85	10.83	13.14	14.60	10.50	13.25	-
4148	16301 DB	-	10.70	6.67	8.67	9.65	13.63	12.43	15.81	-

JU- Junagadh, ***JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave), * Natural Enemies include coccinellids, chrysopids, syrphids and spider mites,

Table: 42. Ent1a Br-03 a/b (PVT)- Preliminary screening of breeding material (*G. hirsutum* Coloured Cotton) for resistance to insect pest of cotton at Central Zone during 2024-25. (Irrigated)

Entry code	Name of entry	Rosette flower (%) due to PBW[#]	Green Boll Damage (%) due to ABW/SBW	Green Boll Damage (%) due to PBW[##]		Open Boll damage (%)[$]	Open Locule Damage (%) [$]	Number of Good Open Bolls/plant
		JU	JU	JU	KH	JU	JU	JU
4141	FC4001	-	-	20.40	17.0	27.20	21.07	-
4142	CNH-22196 (CC)	-	-	17.22	14.5	24.33	17.48	-
4143	CNH-22197 (CC)	-	-	14.56	16.5	18.95	13.69	-
4144	FC 4002	-	-	13.28	16.0	18.24	12.61	-
4145	FC 4003	-	-	19.74	17.0	25.99	19.94	-
4146	Local Check	-	-	16.46	11.0	22.43	16.81	-
4147	Phule Yamuna (ZC)	-	-	15.30	13.0	20.87	14.95	-
4148	16301 DB	-	-	19.04	29.0	25.17	19.07	-

JU- Junagadh, #Rosette flower percent based on 50 randomly observed flower/entry , ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $ Open boll, locule damage (%) at harvest only.

Table: 43. Ent1a Br-03 a/b (PVT) - Preliminary screening of breeding material (*G. hirsutum* Coloured Cotton) for resistance to insect pest of cotton at Central Zone during 2024-25. (Rainfed)

Entry code	Name of entry	Jassids Injury Grade(JIG)*	No. of Jassids/ 3leaves	Whitefly/ 3 leaves	Thrips / 3 leaves	Aphids/3 leaves	Natural Enemies/ Plant[*]
		SU	SU	SU	SU	SU	SU
4141	FC4001	I	4.37	3.50	31.50	16.77	1.29
4142	CNH-22196 (CC)	I	4.30	3.13	32.44	33.36	0.77
4143	CNH-22197 (CC)	I	3.08	2.70	33.27	14.15	0.39
4144	FC 4002	I	4.00	3.40	28.53	32.39	1.67
4145	FC 4003	II	5.30	2.19	31.59	32.45	2.29
4146	Local Check	I	4.29	3.00	34.37	32.80	1.10
4147	Phule Yamuna (ZC)	II	6.30	2.09	29.50	27.96	1.49
4148	16301 DB	I	3.96	1.29	36.76	32.30	1.39

NG-Nagpur, **SU-** Surat**, JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave, * Natural Enemies include coccinellids, chrysopids, syrphids and spider mites, #Rosette flower percent based on 50 randomly observed flower/entry

Table: 44. Ent1a Br-03 a/b (PVT) - Preliminary screening of breeding material (*G. hirsutum* Coloured Cotton) for resistance to insect pest of cotton at Central Zone during 2024-25. (Rainfed)

Entry code	Name of entry	Rosette flower (%) due to PBW[#]	Green Boll Damage (%) due to ABW/SBW	Green Boll Damage (%) due to PBW[##]	Open Boll damage (%)[$]	Open Locule Damage (%) [$]	Number of Good Open Bolls/plant
		SU	SU	SU	SU	SU	SU
4141	FC4001	5.64	8.81	9.99	8.79	4.27	29.40
4142	CNH-22196 (CC)	5.08	7.59	24.81	9.12	4.90	31.40
4143	CNH-22197 (CC)	3.19	5.86	9.99	7.14	3.56	30.48
4144	FC 4002	4.95	8.96	29.98	9.96	4.58	25.96
4145	FC 4003	5.04	10.06	18.96	10.03	5.08	23.48
4146	Local Check	4.65	13.43	14.63	5.79	3.04	25.92
4147	Phule Yamuna (ZC)	4.47	9.37	19.98	8.24	4.06	23.96
4148	16301 DB	4.52	7.12	14.63	7.26	3.57	29.50

NG-Nagpur, **SU-** Surat**,** ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $ Open boll, locule damage (%) at harvest only

Table: 45. Ent1a Br-24 b (CVT) - Preliminary screening of breeding material (*G. arboreum*) for resistance to insect pest of cotton at Central Zone during 2024-25.

Entry code	Name of entry	Jassids InjuryGrade(JIG)*		No. of Jassids/ 3leaves		Whitefly/ 3 leaves		Aphids/ 3 leaves
		AK	KH	AK	KH	AK	KH	KH
4151	ZC (CNA1032)	I		1.30	15.86	1.90	8.75	18.20
4152	CNA 1085	I		2.00	7.22	3.40	10.10	15.67
4153	JLA 1707	I		1.30	6.93	3.00	14.38	22.83
4154	GAM 296	I		1.30	8.73	3.30	11.25	13.35
4155	Local Check	I		1.10	8.63	2.00	10.73	14.85
4156	CNA 2248	I		1.10	10.50	2.80	11.18	15.40
4157	AKA 2016-3	I		0.80	10.00	2.70	16.13	13.35
4158	CNA - 2249 (CC)	I		0.90	10.38	2.40	14.48	14.15

NG-Nagpur, **AK-** Akola**, KH**- Khandwa, ***JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave.

Table: 46. Ent1a Br-24 b(CVT) - Preliminary screening of breeding material (*G. arboreum*) for resistance to insect pest of cotton at Central Zone during 2024-25.

Entry code	Name of entry	Green Boll Damage (%) due to PBW[##]			Open Boll damage (%)[$]			Open Locule Damage (%)[$]		
		AK	KH	NG	AK	KH	NG	AK	KH	NG
4151	ZC (CNA1032)	7.50	16.00		11.82	-		4.71	-	
4152	CNA 1085	15.00	23.50		17.42	-		7.36	-	
4153	JLA 1707	12.50	18.50		14.16	-		5.07	-	
4154	GAM 296	22.50	13.50		21.01	-		8.33	-	
4155	Local Check	7.50	12.50		11.81	-		4.35	-	
4156	CNA 2248	12.50	15.00		16.09	-		6.17	-	
4157	AKA 2016-3	5.00	16.00		11.96	-		4.58	-	
4158	CNA - 2249 (CC)	35.00	18.50		30.67	-		11.39	-	

NG-Nagpur, **AK-** Akola**, KH**- Khandwa, ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $ Open boll, locule damage (%) at harvest only

Table: 47. Ent1a Br-14 a(CVT)- Preliminary screening of breeding material (*G. babarbadense*) for resistance to insect pest of cotton at Central Zone during 2024-25. (Rahuri)

Entry code	Name of entry	(JIG)*	No. of Jassids/ 3leaves	Whitefly/ 3 leaves	Thrips / 3 leaves	Aphids/ 3 leaves	Natural Enemies/ Plant**	Percent fruiting body damage	Green Boll Damage (%) due to PBW##	Open Boll damage (%)$	Open Locule Damage (%)$	Number of Good Open Bolls/plant
4231	CCB 22-1	II	7.00	2.50	11.56	15.00	3.50	9.08	21.50	32.67	13.08	13.17
4232	SIMA B-8	II	6.61	2.50	14.78	13.44	3.50	12.58	23.00	31.98	13.90	12.67
4233	CCB 23-1	II	7.44	2.06	12.67	12.61	3.11	12.50	16.00	17.72	6.82	31.83
4234	CCB 22-2	II	5.83	2.56	12.61	13.17	3.44	7.67	10.50	15.07	6.68	38.67
4235	CCB 24-1	II	6.44	2.39	13.89	15.11	3.50	11.92	17.00	16.12	6.16	35.00
4236	ZC	II	5.94	2.39	13.28	12.39	3.28	6.57	7.50	9.73	3.65	56.00
4237	QC (Suvin)	II	6.06	2.33	12.67	13.67	3.39	8.25	9.50	10.52	4.09	56.67
4238	CCB-24-2	II	6.17	2.61	12.89	15.00	3.78	10.17	16.00	15.10	7.25	33.67

JIG*- Jassids InjuryGrade, **-Natural Enemies include coccinellids, chrysopids, syrphids and spider mites, ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $ Open boll, locule damage (%) at harvest only

Table: 48. Ent1a. Br.02c (IET)- Preliminary screening of breeding material *(G. hirsutum)* under organic conditions for resistance to insect pest of cotton at South Zone during 2024-25. (Irrigated)

Entry code	Name of entry	Jassids Injury Grade(JIG)*			No. of Jassids/ 3leaves			Whitefly/ 3 leaves			Thrips/ 3 leaves		
		CBE	LG	RC	CBE	LG	RC	CBE	LG	RC	CBE	LG	RC
431	Suraksha (CC)	-	II	III	-	3.80	3.31	-	1.80	2.00	-	1.67	24.17
432	CNH 3001	-	III	III	-	3.43	2.65	-	1.67	2.38	-	0.60	23.78
433	L 1822	-	III	IV	-	3.13	3.44	-	1.70	1.88	-	0.80	24.18
434	Zonal Check	-	IV	III	-	3.87	4.08	-	1.47	1.38	-	0.93	27.05
435	NH768	-	III	II	-	3.30	3.34	-	1.73	1.50	-	1.33	28.99
436	AKH 2009	-	II	II	-	2.97	3.05	-	1.80	3.00	-	1.23	32.37
437	CNH 2219	-	III	II	-	3.20	3.54	-	1.87	2.88	-	0.17	29.84
438	TCH 2001	-	II	II	-	3.00	4.22	-	1.30	2.75	-	0.27	33.12
439	L 1651	-	III	II	-	2.67	3.59	-	1.90	2.63	-	0.30	37.91
440	GBHV 227	-	II	II	-	3.27	4.09	-	2.40	2.38	-	0.63	37.04
441	AKH 2018-6	-	II	I	-	3.10	5.85	-	2.10	2.88	-	0.30	28.34
442	CSH NB 101	-	III	II	-	3.47	5.78	-	2.77	1.88	-	0.57	29.96
443	NH761	-	II	II	-	2.67	3.55	-	2.70	3.25	-	0.67	34.23
444	GISV 419	-	III	II	-	2.93	6.64	-	2.57	2.38	-	0.27	38.28
445	BS277-24	-	II	II	-	2.53	5.17	-	2.47	2.38	-	1.00	36.36
446	BS144-24	-	III	II	-	2.67	3.71	-	2.03	1.88	-	0.13	29.42
447	KGH 2411	-	III	II	-	2.77	5.48	-	1.83	2.13	-	0.27	35.89
448	RHC 2018	-	III	II	-	3.10	3.70	-	2.80	3.75	-	0.87	39.01
449	RHC 2107	-	IV	II	-	5.63	3.97	-	2.67	3.00	-	0.43	37.65
450	TCH 1966	-	III	II	-	3.80	3.82	-	1.57	2.50	-	0.83	38.36
451	GSHV 271	-	II	II	-	2.37	4.90	-	2.27	2.13	-	0.17	34.00
452	NDLH 2097	-	II	II	-	2.57	3.21	-	2.67	1.13	-	0.93	34.75

453	RHC 1904	-	II	II	-	3.20	3.85	-	2.50	2.38	-	0.60	36.14
454	NDLH 2092-3	-	II	II	-	3.47	3.59	-	2.37	3.00	-	0.67	29.80
455	CNH 3002	-	III	II	-	2.30	4.26	-	2.00	2.13	-	0.80	29.17
456	AKH 2002	-	II	II	-	3.93	5.40	-	1.37	2.38	-	0.63	31.45
457	Local Check	-	II	II	-	2.77	3.72	-	2.13	1.88	-	0.27	34.37
458	ADB755	-	III	II	-	2.70	3.60	-	1.37	1.75	-	1.20	33.62

CBE- Coimbatore, **LG-**Lam Guntur, **RC-**Raichur ***JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave

Table: 49. Ent1a. Br.02c (IET)- Preliminary screening of breeding material *(G. hirsutum)* under organic conditions for resistance to insect pest of cotton at South Zone during 2024-25. (Irrigated)

Entry code	Name of entry	Aphids/ 3 leaves			Natural Enemies/ Plant*			Rosette flower (%) due to PBW#		
		CBE	LG	RC	CBE	LG	RC	CBE	LG	RC
431	Suraksha (CC)	-	1.03	8.17	-	0.20	1.16	-	6.67	10.88
432	CNH 3001	-	1.97	7.45	-	0.07	1.60	-	10.00	11.61
433	L 1822	-	2.37	11.56	-	0.17	0.87	-	16.67	12.40
434	Zonal Check	-	1.83	12.19	-	0.27	0.98	-	10.00	9.97
435	NH768	-	1.23	10.87	-	0.03	2.18	-	15.00	11.55
436	AKH 2009	-	1.20	11.53	-	0.13	1.16	-	5.00	11.12
437	CNH 2219	-	0.93	13.29	-	0.10	1.49	-	3.33	11.47
438	TCH 2001	-	2.30	12.82	-	0.10	1.93	-	13.33	9.51
439	L 1651	-	1.43	10.09	-	0.07	1.56	-	10.00	11.24
440	GBHV 227	-	1.67	15.44	-	0.17	2.22	-	8.33	11.44
441	AKH 2018-6	-	2.00	10.72	-	0.17	1.79	-	5.00	11.37
442	CSH NB 101	-	2.13	10.52	-	0.03	1.57	-	8.33	11.40
443	NH761	-	1.47	13.19	-	0.33	1.68	-	6.67	11.03
444	GISV 419	-	1.63	12.45	-	0.07	2.29	-	8.33	11.20
445	BS277-24	-	1.80	12.90	-	0.13	1.96	-	6.67	11.17
446	BS144-24	-	1.57	11.08	-	0.30	1.63	-	5.00	11.38
447	KGH 2411	-	1.33	12.86	-	0.30	2.25	-	6.67	11.06
448	RHC 2018	-	1.87	15.63	-	0.20	2.22	-	5.00	10.97
449	RHC 2107	-	1.27	13.40	-	0.17	3.23	-	3.33	11.36
450	TCH 1966	-	1.00	13.23	-	0.03	3.21	-	5.00	10.82
451	GSHV 271	-	1.53	14.78	-	0.40	2.00	-	5.00	11.37
452	NDLH 2097	-	1.40	12.38	-	0.30	2.25	-	3.33	12.23
453	RHC 1904	-	1.80	9.20	-	0.17	2.00	-	10.00	11.17
454	NDLH 2092-3	-	1.30	13.21	-	0.00	1.17	-	10.00	11.34
455	CNH 3002	-	1.50	13.05	-	0.30	3.04	-	10.00	11.05
456	AKH 2002	-	0.80	13.60	-	0.20	1.89	-	5.00	10.99
457	Local Check	-	1.83	16.24	-	0.10	1.81	-	3.33	11.06
458	ADB755	-	1.80	11.41	-	0.20	2.40	-	8.33	12.78

CBE- Coimbatore, **LG-**Lam Guntur, **RC-**Raichur, * Natural Enemies include coccinellids, chrysopids, syrphids and spider mites, #Rosette flower percent based on 50 randomly observed flower/entry

Table: 50. Ent1a. Br.02c (IET)- Preliminary screening of breeding material *(G. hirsutum)* under organic conditions for resistance to insect pest of cotton at South Zone during 2024-25. (Irrigated)

Entry code	Name of entry	Green Boll Damage (%) due to PBW##			Open Boll damage (%)$			Open Locule Damage (%)$			Number of Good Open Bolls/plant		
		CBE	LG	RC	CBE	LG	RC	CBE	LG	RC	CBE	LG	RC
431	Suraksha (CC)	-	28.33	38.50	-	51.33	51.97	-	24.67	41.20	-	6.47	14.15
432	CNH 3001	-	26.67	45.00	-	44.04	48.21	-	20.74	30.86	-	7.90	11.30
433	L 1822	-	31.67	77.10	-	34.71	55.22	-	20.13	57.09	-	6.20	22.88
434	Zonal Check	-	31.67	32.15	-	40.35	49.90	-	15.99	28.54	-	7.00	22.70
435	NH768	-	35.00	32.15	-	28.96	52.23	-	12.35	36.89	-	8.60	14.00
436	AKH 2009	-	25.00	25.70	-	31.12	66.31	-	17.30	15.08	-	8.07	14.30
437	CNH 2219	-	21.67	32.15	-	51.28	50.58	-	22.58	72.17	-	5.33	16.00
438	TCH 2001	-	28.33	19.30	-	38.09	53.42	-	17.78	50.36	-	7.73	23.00
439	L 1651	-	31.67	32.15	-	22.54	44.70	-	14.32	12.76	-	5.73	9.50
440	GBHV 227	-	26.67	45.00	-	19.18	46.77	-	9.01	22.16	-	5.13	13.80
441	AKH 2018-6	-	26.67	32.10	-	21.96	46.01	-	8.53	9.57	-	9.13	22.20
442	CSH NB 101	-	21.67	25.73	-	20.04	52.23	-	10.47	18.47	-	6.87	13.50
443	NH761	-	35.00	25.70	-	20.26	55.29	-	11.44	16.57	-	5.40	19.00
444	GISV 419	-	18.33	38.55	-	10.30	54.92	-	7.51	18.82	-	10.00	13.70
445	BS277-24	-	26.67	45.00	-	12.79	56.70	-	11.99	35.61	-	8.13	14.20
446	BS144-24	-	26.67	32.15	-	28.17	52.58	-	18.51	42.89	-	8.60	20.20
447	KGH 2411	-	31.67	25.75	-	10.10	36.63	-	10.07	6.03	-	8.67	27.90
448	RHC 2018	-	23.33	32.15	-	10.31	30.53	-	6.64	15.43	-	10.27	26.50
449	RHC 2107	-	25.00	19.30	-	13.37	63.11	-	10.69	45.02	-	9.40	13.70
450	TCH 1966	-	28.33	38.60	-	13.17	57.16	-	9.24	25.53	-	7.07	18.70
451	GSHV 271	-	30.00	38.55	-	18.27	54.18	-	6.77	27.15	-	8.27	15.40
452	NDLH 2097	-	30.00	64.30	-	13.30	59.17	-	7.98	28.54	-	6.80	14.20
453	RHC 1904	-	28.33	45.00	-	14.36	41.46	-	6.90	33.08	-	7.07	16.20
454	NDLH 2092-3	-	31.67	44.95	-	13.62	70.00	-	10.01	13.08	-	7.80	20.10
455	CNH 3002	-	28.33	45.00	-	21.05	48.55	-	7.85	33.95	-	5.73	27.45
456	AKH 2002	-	25.00	25.75	-	11.01	52.01	-	5.37	45.37	-	10.53	14.50
457	Local Check	-	35.00	32.15	-	9.57	51.08	-	5.23	21.11	-	9.47	18.60
458	ADB755	-	26.67	57.85	-	12.30	58.01	-	6.63	18.62	-	8.47	14.40

CBE- Coimbatore, **LG-**Lam Guntur, **RC-**Raichur, ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $ Open boll, locule damage (%) at harvest only

Table: 51. Ent1a. Br.02c (IET): Preliminary screening of breeding material *(G. hirsutum)* under organic conditions for resistance to insect pest of cotton at South Zone during 2024-25.(Rainfed)

Entry code	Name of entry	Jassids Injury Grade(JIG)*		No. of Jassids/ 3leaves		Whitefly/ 3 leaves		Thrips / 3 leaves		Aphids/3 leaves		Natural Enemies/ Plant*		Rosette flower (%) due to PBW#	
		DH	PA	DH	PA	DH	PA	DH	PA	DH	PA	DH	PA	DH	PA
431	Suraksha (CC)	III	-	2.58	1.07	1.60	1.78	19.34	1.04	6.54	-	0.92	-	8.53	-
432	CNH 3001	III	-	2.07	0.95	1.90	1.62	19.02	1.27	5.96	-	1.26	-	9.11	-
433	L 1822	IV	-	2.69	1.52	1.50	1.39	19.34	1.05	9.24	-	0.69	-	9.74	-
434	Zonal Check	III	-	3.19	1.89	1.10	1.88	21.64	1.07	9.75	-	0.78	-	7.82	-
435	NH768	II	-	2.61	1.05	1.20	1.77	23.19	1.59	8.70	-	1.72	-	9.07	-
436	AKH 2009	II	-	2.38	0.77	2.40	1.75	25.89	1.23	9.22	-	0.92	-	8.72	-
437	CNH 2219	II	-	2.76	1.30	2.30	1.79	23.87	1.60	10.63	-	1.18	-	9.00	-
438	TCH 2001	II	-	3.30	1.22	2.20	2.12	26.50	1.56	10.25	-	1.52	-	7.46	-
439	L 1651	II	-	2.81	1.09	2.10	1.56	30.33	1.54	8.07	-	1.23	-	8.81	-
440	GBHV 227	II	-	3.20	1.27	1.90	1.89	29.63	1.76	12.35	-	1.75	-	8.97	-
441	AKH 2018-6	I	-	4.57	1.17	2.30	2.00	22.67	1.82	8.57	-	1.41	-	8.91	-
442	CSH NB 101	II	-	4.52	1.17	1.50	1.90	23.97	1.56	8.41	-	1.24	-	8.95	-
443	NH761	II	-	2.78	1.26	2.60	2.12	27.39	1.49	10.55	-	1.32	-	8.65	-
444	GISV 419	II	-	5.19	1.20	1.90	1.99	30.63	1.59	9.96	-	1.81	-	8.78	-
445	BS277-24	II	-	4.04	1.09	1.90	1.94	29.09	1.89	10.32	-	1.55	-	8.76	-
446	BS144-24	II	-	2.90	1.30	1.50	2.22	23.54	1.46	8.87	-	1.29	-	8.93	-
447	KGH 2411	II	-	4.28	1.34	1.70	1.54	28.71	1.64	10.29	-	1.78	-	8.68	-
448	RHC 2018	II	-	2.89	1.32	3.00	1.98	31.21	1.22	12.50	-	1.76	-	8.60	-
449	RHC 2107	II	-	3.10	1.26	2.40	2.16	30.12	1.53	10.72	-	2.56	-	8.91	-
450	TCH 1966	II	-	2.98	1.37	2.00	2.24	30.69	1.81	10.59	-	2.54	-	8.49	-
451	GSHV 271	II	-	3.83	1.37	1.70	2.59	27.20	1.06	11.82	-	1.58	-	8.91	-
452	NDLH 2097	II	-	2.51	1.32	0.90	2.25	27.80	1.32	9.90	-	1.78	-	9.59	-
453	RHC 1904	II	-	3.01	1.21	1.90	2.31	28.91	0.90	7.36	-	1.58	-	8.76	-
454	NDLH 2092-3	II	-	2.81	1.30	2.40	2.12	23.84	1.01	10.57	-	0.92	-	8.89	-
455	CNH 3002	II	-	3.33	1.56	1.70	2.58	23.33	1.03	10.44	-	2.41	-	8.66	-
456	AKH 2002	II	-	4.22	1.40	1.90	2.42	25.16	1.24	10.88	-	1.49	-	8.62	-
457	Local Check	II	-	2.91	1.22	1.50	1.94	27.49	1.16	12.99	-	1.43	-	8.67	-
458	ADB755	II	-	2.81	1.26	1.40	2.64	26.89	1.01	9.12	-	1.90	-	10.01	-

DH-Dharwad, **PA**-Perambalur, ***JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave), * Natural Enemies include coccinellids, chrysopids, syrphids and spider mites,

Table: 52. Ent1a. Br.02c (IET): Preliminary screening of breeding material *(G. hirsutum)* under organic conditions for resistance to insect pest of cotton at South Zone during 2024-25.(Rainfed)

Entry code	Name of entry	Green Boll Damage (%) due to PBW##				Open Boll damage (%)$				Open Locule Damage (%)$				Number of Good Open Bolls/plant	
		AD	DH	ND	PA	AD	DH	ND	PA	AD	DH	ND	PA	AD	DH
431	Suraksha (CC)	-	30.00	-	7.02	-	40.92	-	6.18	-	32.44	-	3.68	-	59.65
432	CNH 3001	-	35.00	-	7.02	-	37.96	-	7.02	-	24.30	-	3.68	-	62.58
433	L 1822	-	60.00	-	10.35	-	43.48	-	5.35	-	44.95	-	3.68	-	57.05
434	Zonal Check	-	25.00	-	3.68	-	39.29	-	7.85	-	22.48	-	7.02	-	61.37
435	NH768	-	25.00	-	7.02	-	41.13	-	7.85	-	29.05	-	3.68	-	59.47
436	AKH 2009	-	20.00	-	3.68	-	52.21	-	7.35	-	11.88	-	7.02	-	48.34
437	CNH 2219	-	25.00	-	7.02	-	39.83	-	7.85	-	56.83	-	7.02	-	60.79
438	TCH 2001	-	15.00	-	3.68	-	42.06	-	8.68	-	39.65	-	7.02	-	58.65
439	L 1651	-	25.00	-	7.02	-	35.20	-	11.24	-	10.05	-	10.35	-	65.51
440	GBHV 227	-	35.00	-	10.35	-	36.82	-	7.50	-	17.45	-	7.02	-	63.88
441	AKH 2018-6	-	25.00	-	7.02	-	36.23	-	8.68	-	7.54	-	7.02	-	64.43
442	CSH NB 101	-	20.00	-	7.02	-	41.12	-	7.85	-	14.55	-	3.68	-	59.32
443	NH761	-	20.00	-	3.68	-	43.54	-	8.68	-	13.05	-	7.02	-	56.95
444	GISV 419	-	30.00	-	10.35	-	43.24	-	7.85	-	14.82	-	7.02	-	57.21
445	BS277-24	-	35.00	-	3.68	-	44.65	-	9.52	-	28.04	-	7.02	-	55.94
446	BS144-24	-	25.00	-	7.02	-	41.40	-	8.68	-	33.78	-	3.88	-	59.27
447	KGH 2411	-	20.00	-	7.02	-	28.85	-	8.68	-	4.75	-	3.68	-	71.85
448	RHC 2018	-	25.00	-	10.35	-	24.04	-	7.85	-	12.15	-	3.68	-	76.70
449	RHC 2107	-	15.00	-	7.02	-	49.69	-	11.34	-	35.45	-	10.35	-	50.79
450	TCH 1966	-	30.00	-	7.02	-	45.00	-	11.12	-	20.10	-	10.35	-	55.61
451	GSHV 271	-	30.00	-	6.67	-	42.66	-	7.50	-	21.38	-	3.33	-	57.86
452	NDLH 2097	-	50.00	-	6.67	-	46.59	-	7.13	-	22.48	-	6.67	-	53.89
453	RHC 1904	-	35.00	-	3.33	-	32.64	-	7.50	-	26.05	-	6.67	-	68.04
454	NDLH 2092-3	-	35.00	-	3.33	-	55.12	-	9.20	-	10.30	-	6.67	-	45.32
455	CNH 3002	-	35.00	-	10.00	-	38.23	-	7.50	-	26.73	-	6.67	-	62.39
456	AKH 2002	-	20.00	-	6.67	-	40.96	-	11.33	-	35.73	-	10.00	-	59.68
457	Local Check	-	25.00	-	10.00	-	40.22	-	7.83	-	16.63	-	6.67	-	60.32
458	ADB755	-	45.00	-	6.67	-	45.68	-	8.33	-	14.66	-	6.67	-	54.83

AD- Adilabad **, DH**-Dharwad, **ND**- Nandyal, **PA**-Perambalur, #Rosette flower percent based on 50 randomly observed flower/entry , ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $ Open boll, locule damage (%)at harvest only.

Table: 53. Ent1a Br-22 b(IET) - Preliminary screening of breeding material (*G. arboreum*) for resistance to insect pest of cotton at South Zone during 2024-25. (Rainfed)

Entry code	Name of entry	Jassids Injury Grade(JIG)*		No. of Jassids/ 3leaves		Whitefly/ 3 leaves		Thrips / 3 leaves		Aphids/3 leaves		Natural Enemies/ Plant*	
		DH	ND	DH	ND	DH	ND	DH	ND	DH	ND	DH	ND
461	Local Check	I	-	1.57	5.20	1.10	16.25	27.40	14.73	9.00	-	1.01	-
462	NDLA 3167-1	I	-	3.48	4.50	0.30	14.93	29.31	11.20	8.59	-	0.46	-
463	GAM 316	I	-	2.38	4.68	1.10	12.50	24.55	17.28	8.23	-	0.75	-
464	JLA 1518	I	-	1.34	6.65	0.60	17.28	26.50	16.20	5.19	-	0.23	-
465	GBAV 173	I	-	1.87	6.15	1.20	12.65	23.05	14.60	6.02	-	0.60	-
466	DAS 2451	I	-	2.06	3.75	1.40	14.90	25.48	12.50	5.54	-	0.40	-
467	AKA 2016-1	I	-	2.38	3.50	1.60	17.33	25.47	20.20	7.28	-	0.86	-
468	GAM 327	I	-	2.06	4.53	1.50	16.40	25.78	20.90	10.26	-	0.37	-
469	PA 963	I	-	2.39	5.35	1.50	12.98	27.20	16.85	9.36	-	1.27	-
470	KGA- VS 2412	I	-	2.17	3.05	1.00	16.93	25.28	14.50	9.83	-	0.54	-
471	GBAV 179	I	-	2.17	4.33	1.10	13.98	25.87	13.35	11.31	-	0.63	-
472	CNA 1089	I	-	2.05	4.58	0.90	12.53	26.17	16.28	6.51	-	0.17	-
473	JLA 1913	I	-	1.65	5.78	0.80	16.20	23.01	12.90	4.04	-	0.43	-
474	DAS 2452	I	-	1.96	6.85	1.80	17.93	25.49	13.45	8.11	-	1.32	-
475	HD 579	I	-	2.28	6.68	1.30	12.78	25.28	12.70	5.21	-	0.69	-
476	ZC	I	-	2.28	7.13	1.40	12.15	24.48	14.90	7.27	-	0.78	-
477	CNA 1090	I	-	2.38	4.68	1.20	13.88	23.26	19.28	5.33	-	0.17	-
478	AKA 2018-1	I	-	2.18	4.88	1.60	16.13	23.47	18.38	9.86	-	0.89	-
479	NDLA 3163	I	-	1.66	4.95	1.40	12.55	27.91	21.43	8.93	-	0.75	-
480	HD 584	I	-	3.06	4.88	1.40	12.25	26.83	14.40	5.73	-	0.66	-
481	KGA- VS 2413	I	-	2.26	4.55	1.00	12.53	23.57	15.13	6.75	-	0.78	-
482	PA 986	I	-	3.22	4.53	1.20	16.35	25.39	13.98	7.26	-	1.38	-

DH-Dharwad, **ND**- Nandyal, ***JIG**- Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave), * Natural Enemies include coccinellids, chrysopids, syrphids and spider mites,

Table: 54. Ent1a Br-22 b(IET) - Preliminary screening of breeding material (*G. arboreum*) for resistance to insect pest of cotton at South Zone during 2024-25. (Rainfed)

Entry code	Name of entry	Rosette flower (%) due to PBW[#]		Green Boll Damage (%) due to ABW/SBW		Green Boll Damage (%) due to PBW[##]		Open Boll damage (%)[$]		Open Locule Damage (%)[$]		Number of Good Open Bolls/plant	
		DH	ND	DH	ND	DH	ND	DH	ND	DH	ND	DH	ND
461	Local Check	8.94	-	-	-	35.00	27.50	12.50	4.45	28.05	4.50	88.38	-
462	NDLA 3167-1	8.21	-	-	-	25.00	20.00	27.82	3.85	12.67	5.00	72.92	-
463	GAM 316	8.11	-	-	-	25.00	22.50	39.74	5.25	10.89	3.50	60.81	-
464	JLA 1518	8.57	-	-	-	35.00	27.50	19.86	5.00	11.88	4.50	80.90	-
465	GBAV 173	8.32	-	-	-	35.00	50.50	34.66	4.05	20.62	2.50	65.93	-
466	DAS 2451	8.45	-	-	-	25.00	30.00	21.74	5.80	18.78	3.00	79.04	-
467	AKA 2016-1	8.65	-	-	-	40.00	30.00	20.28	5.25	25.82	4.00	80.50	-
468	GAM 327	8.27	-	-	-	35.00	31.50	39.80	6.50	16.93	3.00	60.82	-
469	PA 963	8.47	-	-	-	25.00	27.50	21.94	6.10	12.67	3.50	78.80	-
470	KGA- VS 2412	8.64	-	-	-	35.00	20.00	23.77	15.65	30.34	13.00	77.01	-
471	GBAV 179	9.67	-	-	-	45.00	30.00	50.00	5.50	15.39	4.50	50.42	-
472	CNA 1089	7.59	-	-	-	25.00	27.50	20.42	7.10	27.78	4.50	80.38	-
473	JLA 1913	8.47	-	-	-	35.00	25.00	25.00	8.65	14.80	4.50	75.70	-
474	DAS 2452	8.96	-	-	-	20.00	22.50	14.74	7.50	6.33	3.50	86.13	-
475	HD 579	8.60	-	-	-	30.00	22.50	18.45	7.75	4.75	4.50	82.31	-
476	ZC (	8.17	-	-	-	35.00	27.50	23.10	7.15	10.05	3.50	77.68	-
477	CNA 1090	8.25	-	-	-	25.00	27.50	18.18	5.80	5.94	6.00	82.63	-
478	AKA 2018-1	8.33	-	-	-	25.00	25.00	20.81	6.50	28.05	5.00	79.97	-
479	NDLA 3163	8.74	-	-	-	30.00	25.00	17.46	7.75	6.27	5.50	83.30	-
480	HD 584	10.14	-	-	-	50.00	25.00	19.64	7.35	7.69	5.00	81.21	-
481	KGA- VS 2413	8.87	-	-	-	35.00	20.00	30.09	7.00	39.10	7.00	70.67	-
482	PA 986	8.77	-	-	-	25.00	20.00	29.17	6.80	26.43	6.00	71.50	-

DH-Dharwad, **ND**-Nandyal, #Rosette flower percent based on 50 randomly observed flower/entry , ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $ Open boll, locule damage (%)at harvest only.

Table: 55. Ent1a Br-03 c (PVT) - Preliminary screening of breeding material (*G. hirsutum* Organic Cotton) for resistance to insect pest of cotton at South Zone during 2024-25. (Irrigated)

Entry code	Name of entry	Jassids Injury Grade(JIG)[*]			No. of Jassids/ 3leaves			Whitefly/ 3 leaves			Thrips/ 3 leaves		
		CBE	LG	RC	CBE	LG	RC	CBE	LG	RC	CBE	LG	RC
4201	Zonal check (suraj)	-	III	II	-	3.37	8.32	-	3.20	1.88	-	1.00	32.97
4202	Suraksha (CC)	-	III	II	-	4.43	8.49	-	3.27	2.25	-	0.63	31.44
4203	AKH 10-3	-	III	III	-	2.77	9.26	-	2.60	1.88	-	0.67	30.48
4204	Local Check	-	II	III	-	3.07	9.55	-	2.50	3.00	-	1.07	34.86
4205	GBHV 257	-	II	I	-	2.90	8.47	-	2.73	1.88	-	0.53	31.86

CBE- Coimbatore, **LG**-Lam Guntur, **RC**-Raichur, ***JIG**- Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave

Table: 56. Ent1a Br-03 c (PVT) - Preliminary screening of breeding material (*G. hirsutum* Organic Cotton) for resistance to insect pest of cotton at South Zone during 2024-25. (Irrigated)

Entry code	Name of entry	Aphids/ 3 leaves			Natural Enemies/ Plant*			Rosette flower (%) due to PBW#			Green Boll Damage (%) due to ABW/SBW		
		CBE	LG	RC	CBE	LG	RC	CBE	LG	RC	CBE	LG	RC
4201	Zonal check (suraj)	-	1.43	12.80	-	0.17	1.13	-	5.00	11.73	-	-	-
4202	Suraksha (CC)	-	2.27	13.03	-	0.43	1.82	-	5.00	9.74	-	-	-
4203	AKH 10-3	-	1.63	12.89	-	0.10	2.03	-	5.00	11.08	-	-	-
4204	Local Check	-	2.00	11.90	-	0.00	2.22	-	10.00	11.37	-	-	-
4205	GBHV 257	-	1.37	14.67	-	0.07	2.16	-	10.00	11.22	-	-	-

CBE- Coimbatore, **LG**-Lam Guntur, **RC**-Raichur, * Natural Enemies include coccinellids, chrysopids, syrphids and spider mites, #Rosette flower percent based on 50 randomly observed flower/entry

Table: 57. Ent1a Br-03 c (PVT) - Preliminary screening of breeding material (*G. hirsutum* Organic Cotton) for resistance to insect pest of cotton at South Zone during 2024-25. (Irrigated)

Entry code	Name of entry	Green Boll Damage (%) due to PBW##			Open Boll damage (%)$			Open Locule Damage (%)$			Number of Good Open Bolls/plant		
		CBE	LG	RC	CBE	LG	RC	CBE	LG	RC	CBE	LG	RC
4201	Zonal check (suraj)	-	20.00	32.15	-	17.20	44.35	-	9.12	25.53	-	6.93	33.80
4202	Suraksha (CC)	-	21.67	25.70	-	18.12	59.76	-	10.29	35.28	-	6.13	36.30
4203	AKH 10-3	-	21.67	32.20	-	10.31	72.65	-	8.44	42.80	-	6.13	30.50
4204	Local Check	-	23.33	38.60	-	19.17	52.12	-	13.28	37.59	-	7.93	34.50
4205	GBHV 257	-	28.33	32.15	-	15.17	70.77	-	7.95	41.31	-	10.07	35.35

CBE- Coimbatore, **LG**-Lam Guntur, **RC**-Raichur,, ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $ Open boll, locule damage (%) at harvest only

Table: 58. Ent1a Br-03 c (PVT) - Preliminary screening of breeding material (*G. hirsutum* Organic Cotton) for resistance to insect pest of cotton at South Zone during 2024-25. (Rainfed)

Entry code	Name of entry	Jassids Injury Grade(JIG)*			No. of Jassids/ 3leaves			Whitefly/ 3 leaves			Thrips/ 3 leaves		
		DH	ND	PA	DH	ND	PA	DH	ND	PA	DH	ND	PA
4201	Zonal check (suraj)	II	-	-	6.50	-	1.11	1.50	-	2.49	26.37	-	0.86
4202	Suraksha (CC)	II	-	-	6.63	-	1.13	1.80	-	2.27	25.15	-	1.22
4203	AKH 10-3	II	-	-	7.23	-	0.95	1.50	-	1.90	24.38	-	1.10
4204	Local Check	II	-	-	7.46	-	1.19	2.40	-	2.59	27.89	-	1.16
4205	GBHV 257	I	-	-	6.62	-	1.21	1.50	-	2.80	25.48	-	0.70

DH-Dharwad, **ND**- Nandyal **, PA**-Perambalur, , ***JIG**- Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leaves.

Table: 59. Ent1a Br-03 c (PVT) - Preliminary screening of breeding material (*G. hirsutum* Organic Cotton) for resistance to insect pest of cotton at South Zone during 2024-25. (Rainfed)

Entry code	Name of entry	Aphids/ 3 leaves			Natural Enemies/ Plant*			Rosette flower (%) due to PBW#		
		DH	ND	PA	DH	ND	PA	DH	ND	PA
4201	Zonal check (suraj)	10.24	-	-	0.89	-	-	9.20	-	-
4202	Suraksha (CC)	10.42	-	-	1.44	-	-	7.63	-	-
4203	AKH 10-3	10.31	-	-	1.61	-	-	8.69	-	-
4204	Local Check	9.52	-	-	1.75	-	-	8.91	-	-
4205	GBHV 257	11.74	-	-	1.70	-	-	8.80	-	-

DH-Dharwad, **ND**- Nandyal, **PA-**Perambalur, * Natural Enemies include coccinellids, chrysopids, syrphids and spider mites, #Rosette flower percent based on 50 randomly observed flower/entry

Table: 60. Ent1a Br-03 c (PVT) - Preliminary screening of breeding material (*G. hirsutum* Organic Cotton) for resistance to insect pest of cotton at South Zone during 2024-25. (Rainfed)

Entry code	Name of entry	Green Boll Damage (%) due to PBW##			Open Boll damage (%)$			Open Locule Damage (%)$			Number of Good Open Bolls/plant		
		DH	ND	PA	DH	ND	PA	DH	ND	PA	DH	ND	PA
4201	Zonal check (suraj)	25.00	-	10.35	34.92	-	7.85	20.10	-	7.02	65.63	-	-
4202	Suraksha (CC)	20.00	-	3.68	47.06	-	9.52	27.78	-	7.02	53.50	-	-
4203	AKH 10-3	25.00	-	7.02	57.20	-	8.68	33.70	-	3.88	43.20	-	-
4204	Local Check	30.00	-	3.68	41.04	-	7.32	29.60	-	7.02	59.55	-	-
4205	GBHV 257	25.00	-	7.02	55.72	-	7.85	32.53	-	7.02	44.66	-	-

DH-Dharwad, **ND**- Nandyal, **PA-**Perambalur, , ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $ Open boll, locule damage (%) at harvest only

Table: 61. Ent1a Br.05c (CHT)- Preliminary screening of breeding material (HxH hybrids) under organic conditions for resistance to insect pest of cotton at South Zone during 2024-25.(Irrigated)

Entry code	Name of entry	Jassids Injury Grade (JIG)*	No. of Jassids/ 3leaves	Whitefly/ 3 leaves	Thrips / 3 leaves	Aphids/ 3 leaves	Natural Enemies/ Plant**	Rosette flower (%) due to PBW#	Green Boll Damage (%) due to PBW##	Open Boll damage (%)$	Open Locule Damage (%)$	Number of Good Open Bolls/plant
		LG	LG	LG	LG	LG	LG	LG	LG	LG	LG	LG
4211	Partech 28	III	3.70	2.23	0.50	1.37	0.30	8.33	20.17	12.74	8.25	8.00
4212	ZC	III	3.00	2.07	0.10	1.43	0.00	3.33	25.00	14.40	7.37	7.53
4213	Bunny (CC)	II	3.03	1.60	0.03	1.27	0.10	6.67	26.67	17.38	8.47	14.13
4214	Partech 29	III	3.80	1.80	0.27	1.40	0.13	15.00	30.00	12.34	6.44	10.47
4215	KGHH-VS-2318-1	III	3.67	1.67	0.60	1.30	0.13	5.00	20.00	9.89	6.02	11.87
4216	Partech 30 Plus	IV	4.30	2.67	0.17	1.60	0.13	6.67	33.33	10.72	9.23	8.07

LG-Lam Guntur, **JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave**)** * *Natural Enemies include coccinellids, chrysopids, syrphids and spider mites, #Rosette flower percent based on 50 randomly observed flower/entry **CBE-** Coimbatore, **LG-**Lam Guntur, **RC-**Raichur, ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $ Open boll, locule damage (%) at harvest only

Table: 62. Ent1a Br.05c (CHT)- Preliminary screening of breeding material (HxH hybrids) under organic conditions for resistance to insect pest of cotton at South Zone during 2024-25.(Rainfed)

Entry code	Name of entry	Jassids Injury Grade(JIG)*	No. of Jassids/ 3leaves			Whitefly/ 3 leaves			Thrips / 3 leaves			Aphids/3 leaves			Natural Enemies/ Plant**
		DH	DH	ND	PA	DH	ND	PA	DH	ND	PA	DH	ND	PA	DH
4211	Partech 28	I	5.33	-	1.18	1.10	-	2.28	24.26	-	0.87	6.24	-	-	1.72
4212	ZC	II	3.59	-	1.27	1.40	-	2.09	25.57	-	0.98	5.89	-	-	2.47
4213	Bunny (CC)	II	4.51	-	1.53	1.20	-	2.55	26.49	-	1.00	7.86	-	-	1.87
4214	Partech 29	II	4.41	-	1.37	1.20	-	2.39	26.99	-	1.21	6.46	-	-	0.89
4215	KGHH-VS-2318-1	II	3.69	-	1.19	1.30	-	1.91	29.09	-	1.13	8.38	-	-	1.55
4216	Partech 30 Plus	II	4.53	-	1.23	1.40	-	2.61	26.78	-	0.98	8.35	-	-	1.12

DH-Dharwad, **ND**- Nandyal, **PA**-Perambalur, ***JIG**- Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave, ** Natural Enemies include coccinellids, chrysopids, syrphids and spider mites,

Table:63. Ent1a Br.05c – (CHT)- Preliminary screening of breeding material (HxH hybrids) under organic conditions for resistance to insect pest of cotton at South Zone during 2024-25.(Rainfed)

Entry code	Name of entry	Rosette flower (%) due to PBW#	Green Boll Damage (%) due to PBW##			Open Boll damage (%)$			Locule Damage (%)$			Number of Good Open Bolls/plant		
		DH	DH	ND	PA	DH	ND	PA	DH	ND	PA	DH	ND	PA
4211	Partech 28	8.66	25.00	-	6.82	36.98	-	7.65	51.34	-	6.82	63.63	-	-
4212	ZC	8.87	20.00	-	3.48	39.48	-	8.48	37.83	-	6.82	61.14	-	-
4213	Bunny(CC)	8.76	30.00	-	6.82	39.98	-	11.20	28.05	-	10.15	60.46	-	-
4214	Partech 29	8.56	35.00	-	10.15	35.04	-	7.65	25.13	-	6.82	65.58	-	-
4215	KGHH-VS-2318-1	8.17	20.00	-	3.48	45.51	-	9.32	37.70	-	6.82	55.07	-	-
4216	Partech 30 Plus	8.74	30.00	-	6.82	45.70	-	8.48	29.60	-	3.68	54.90	-	-

DH-Dharwad, **ND**- Nandyal, **PA**-Perambalur, #Rosette flower percent based on 50 randomly observed flower/entry , ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $ Open boll, locule damage (%)at harvest only.

Table: 64. Ent1a Br-03 a/b (CC)-(PVT)- Preliminary screening of breeding material (*G. hirsutum*) for resistance to insect pest of cotton (Sucking pests) at South Zone during 2024-25. (Irrigated)

Entry code	Name of entry	Jassids Injury Grade(JIG)*			No. of Jassids/ 3leaves			Whitefly/ 3 leaves			Thrips / 3 leaves		
		LG	RC	SVPR	LG	RC	SVPR	LG	RC	SVPR	LG	RC	SVPR
4221	Local Check	IV	III	II	5.57	5.11	2.33	2.10	1.50	2.33	0.60	34.74	-
4222	DHCC 2351	IV	II	II	4.80	5.39	2.60	1.70	2.25	2.60	0.17	32.87	-
4223	CNH-22196 (CC)	IV	II	III	4.43	3.89	3.87	2.33	1.25	3.87	0.33	29.46	-
4224	FC 4003	III	II	II	3.80	4.46	2.47	2.73	2.50	2.47	0.80	30.22	-
4225	FC 4001	IV	I	II	5.20	6.61	3.00	2.40	2.25	3.00	0.63	31.73	-
4226	Suraj (Zonal Check)	III	I	II	3.67	5.09	2.73	2.37	2.00	2.73	0.47	27.19	-
4227	FC 4002	IV	II	III	4.73	5.89	2.00	2.43	2.63	2.00	0.80	28.58	-
4228	CNH-22197 (CC)	IV	II	III	5.30	5.64	2.33	2.70	2.38	2.33	0.47	28.83	-

LG-Lam Guntur**, RC**-Raichur **, SVPR-** Sirivilliputhur ***JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave,

Table: 65. Ent1a Br-03 a/b (CC)-(PVT)- Preliminary screening of breeding material (*G. hirsutum*) for resistance to insect pest of cotton (Sucking pests) at South Zone during 2024-25. (Irrigated)

Entry code	Name of entry	Aphids/ 3 leaves			Natural Enemies/ Plant*			Rosette flower (%) due to PBW#		
		LG	RC	SVPR	LG	RC	SVPR	LG	RC	SVPR
4221	Local Check	1.20	9.60	-	0.20	1.52	-	15.00	11.20	-
4222	DHCC 2351	1.17	13.45	-	0.07	1.97	-	12.00	10.79	-
4223	CNH-22196 (CC)	0.73	8.30	-	0.10	1.57	-	11.67	13.06	-
4224	FC 4003	2.04	13.33	-	0.07	1.90	-	10.00	11.21	-
4225	FC 4001	1.50	8.49	-	0.10	1.89	-	13.33	11.19	-
4226	Suraj (ZC)	1.13	13.85	-	0.07	2.77	-	15.00	9.09	-
4227	FC 4002	1.10	9.57	-	0.13	2.03	-	11.67	10.01	-
4228	CNH-22197 (CC)	1.33	14.20	-	0.40	2.18	-	10.00	10.73	-

LG-Lam Guntur**, RC**-Raichur **, SVPR -** Sirivilliputhur * Natural Enemies include coccinellids, chrysopids, syrphids and spider mites, #Rosette flower percent based on 50 randomly observed flower/entry

Table: 66. Ent1a Br-03 a/b (CC) – (PVT)- Preliminary screening of breeding material (*G. hirsutum*) for resistance to insect pest of cotton (Sucking pests) at South Zone during 2024-25. (Irrigated)

Entry code	Name of entry	Green Boll Damage (%) due to PBW##			Open Boll damage (%) $			Open Locule Damage (%) $			Number of Good Open Bolls/plant		
		LG	RC	SVPR	LG	RC	SVPR	LG	RC	SVPR	LG	RC	SVPR
4221	Local Check	31.67	32.15	-	10.38	47.30	-	6.88	24.17	-	9.33	35.60	-
4222	DHCC 2351	23.50	45.00	-	5.35	37.96	-	2.09	32.26	-	11.40	39.70	-
4223	CNH-22196 (CC)	25.00	64.20	-	8.73	55.14	-	3.81	39.34	-	10.33	36.80	-
4224	FC 4003	26.83	38.55	-	10.16	43.78	-	6.92	42.89	-	11.27	41.30	-
4225	FC 4001	21.67	38.50	-	7.64	49.96	-	6.69	34.58	-	8.80	22.70	-
4226	Suraj (ZC)	23.33	19.30	-	10.81	38.78	-	5.03	34.93	-	9.93	30.90	-
4227	FC 4002	26.67	19.25	-	7.82	38.78	-	4.39	77.28	-	10.07	18.50	-
4228	CNH-22197 (CC)	26.67	38.50	-	8.14	68.77	-	5.92	35.27	-	7.53	20.80	-

LG-Lam Guntur**, RC**-Raichur**, SVPR -** Sirivilliputhur ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $ Open boll, locule damage (%) at harvest only

Table: 67. Ent1a Br-03 a/b (CC) – (PVT)- Preliminary screening of breeding material (*G. hirsutum*) for resistance to insect pest of cotton (Sucking pests) at South Zone during 2024-25. (Rainfed)

Entry code	Name of entry	Jassids Injury Grade(JIG)*		No. of Jassids/ 3leaves		Whitefly/ 3 leaves		Thrips / 3 leaves		Aphids/3 leaves		Natural Enemies/ Plant*	
		DH	ND	DH	ND	DH	ND	DH	ND	DH	ND	DH	ND
4221	Local Check	III	-	3.99	7.42	1.20	28.88	27.79	28.58	7.68	-	1.21	-
4222	DHCC 2351	II	-	4.21	7.98	1.80	26.70	26.29	31.40	10.76	-	1.55	-
4223	CNH-22196 (CC)	II	-	3.04	7.63	1.00	30.12	23.57	28.27	6.64	-	1.24	-
4224	FC 4003	II	-	3.48	4.82	2.00	15.22	24.17	16.27	10.67	-	1.50	-
4225	FC 4001	I	-	5.16	7.68	1.80	29.83	25.38	27.27	6.80	-	1.49	-
4226	Suraj (Zonal Check)	I	-	3.98	7.63	1.60	38.17	21.75	39.13	11.08	-	2.19	-
4227	FC 4002	II	-	4.61	7.80	2.10	33.72	22.87	39.43	7.65	-	1.61	-
4228	CNH-22197 (CC)	II	-	4.41	4.00	1.90	16.97	23.06	19.98	11.36	-	1.72	-

DH-Dharwad, **ND**-Nandyal, ***JIG**- Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave),

* Natural Enemies include coccinellids, chrysopids, syrphids and spider mites,

Table: 68. Ent1a Br-03 a/b (CC) - (PVT) - Preliminary screening of breeding material (*G. hirsutum*) for resistance to insect pest of cotton (Sucking pests) at South Zone during 2024-25. (Rainfed)

Entry code	Name of entry	Rosette flower (%) due to PBW#		Green Boll Damage (%) due to PBW##		Open Boll damage (%)$		Locule Damage (%)$		Number of Good Open Bolls/plant	
		DH	ND	DH	ND	DH	ND	DH	ND	DH	ND
4221	Local Check	8.79	2.67	25.00	67.50	37.24	23.37	19.03	16.33	63.25	-
4222	DHCC 2351	8.47	0.67	35.00	44.17	29.89	13.40	25.40	10.00	70.91	-
4223	CNH-22196 (CC)	10.24	1.33	50.00	35.83	43.42	15.47	30.98	10.33	57.14	-
4224	FC 4003	8.79	0.67	30.00	42.50	34.47	14.35	33.78	12.00	66.19	-
4225	FC 4001	8.77	0.67	30.00	40.00	39.34	14.17	27.23	9.33	61.26	-
4226	Suraj (ZC)	7.13	1.00	15.00	25.00	30.54	9.08	27.50	5.33	70.09	-
4227	FC 4002	7.85	2.33	15.00	42.50	30.54	14.67	60.85	12.00	70.19	-
4228	CNH-22197 (CC)	8.42	0.33	30.00	43.33	54.15	15.53	27.78	8.67	46.29	-

DH-Dharwad, **ND**-Nandyal, #Rosette flower percent based on 50 randomly observed flower/entry , ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $-Open boll, locule damage (%)at harvest only

Table: 69. Ent1a Br – 14a *G. barbadense* (CVT)- Preliminary screening of breeding material for resistance to insect pest of cotton (Sucking pests) at South Zone during 2024-25.

Entry code	Name of entry	Jassids Injury Grade (JIG)*			No. of Jassids/ 3leaves			Whitefly/ 3 leaves			Thrips / 3 leaves		
		CBE	CN	DH	CBE	CN	DH	CBE	CN	DH	CBE	CN	DH
4231	CCB 22-1	III	I	III	4.27	2.84	5.41	0.70	0.81	1.70	0.33	1.93	24.18
4232	SIMA B-8	III	I	III	3.78	2.66	4.81	0.65	0.63	1.40	0.36	1.75	24.58
4233	CCB 23-1	IV	I	III	3.53	2.31	5.65	0.47	0.28	1.20	0.24	1.40	25.91
4234	CCB 22-2	III	II	III	4.16	3.41	4.93	0.53	1.38	1.90	0.31	2.50	26.70
4235	CCB 24-1	IV	III	III	3.63	7.71	4.91	0.61	2.80	1.60	0.36	6.80	26.70
4236	ZC	III	III	III	3.89	8.56	4.38	0.60	2.09	1.60	0.22	7.65	25.46
4237	QC (Suvin)	III	I	III	4.08	2.71	5.02	0.42	0.68	1.50	0.38	1.80	23.49
4238	CCB-24-2	III	III	III	3.76	5.91	5.41	0.56	2.64	1.50	0.27	5.00	23.67

CBE- Coimbatore, **CN-** Chamraj Nagar, **DH-**Dharwad, ***JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave)

Table: 70. Ent1a Br-14a *G. barbadense* (CVT)-Preliminary screening of breeding material for resistance to insect pest of cotton (Sucking pests) at South Zone during 2024-25.

Entry code	Name of entry	Aphid/3 leaves			Natural Enemies/ Plant*			Rosette flower (%) due to PBW#			Green Boll Damage (%) due to ABW/SBW/TC		
		CBE	CN	DH	CBE	CN	DH	CBE	CN	DH	CBE	CN	DH
4231	CCB 22-1	0.10	30.88	9.87	0.30	1.64	2.70	2.11	-	10.36	-	0.00	-
4232	SIMA B-8	0.12	29.25	7.85	0.66	1.46	2.67	3.32	-	8.64	-	0.00	-
4233	CCB 23-1	0.15	19.88	8.49	0.32	1.28	2.38	2.72	-	8.68	-	0.00	-
4234	CCB 22-2	0.15	26.28	8.93	0.33	2.21	2.53	3.08	-	8.85	-	0.00	-
4235	CCB 24-1	0.19	34.13	10.29	0.29	2.81	1.64	2.08	-	9.07	-	0.00	-
4236	ZC	0.13	35.13	8.36	0.43	2.93	2.24	2.03	-	8.54	-	0.00	-
4237	QC (Suvin)	0.15	17.78	11.12	0.41	1.51	2.64	1.36	-	8.50	-	0.00	-
4238	CCB-24-2	0.13	32.50	5.94	0.30	2.51	1.01	1.54	-	8.54	-	0.00	-

CBE- Coimbatore, **CN-** Chamraj Nagar, **DH-**Dharwad, * Natural Enemies include coccinellids, chrysopids, syrphids and spider mites, #Rosette flower percent based on 50 randomly observed flower/entry,

Table: 71. Ent1a. Br-14a *G. barbadense* (CVT)- Preliminary screening of breeding material for resistance to insect pest of cotton (Sucking pests) at South Zone during 2024-25.

Entry code	Name of entry	Green Boll Damage (%) due to PBW##			Open Boll damage (%)$			Open Locule Damage (%)$			Number of Good Open Bolls/plant		
		CBE	CN	DH	CBE	CN	DH	CBE	CN	DH	CBE	CN	DH
4231	CCB 22-1	4.21	5.00	55.00	9.52	8.50	43.89	6.42	17.50	38.55	85.44	74.00	56.67
4232	SIMA B-8	6.75	13.50	20.00	9.89	18.50	63.35	5.45	27.50	33.08	86.94	76.00	37.07
4233	CCB 23-1	7.81	6.00	25.00	10.78	10.50	49.46	8.60	12.50	28.79	86.56	66.50	51.13
4234	CCB 22-2	3.39	5.00	15.00	8.35	7.00	52.57	6.43	15.00	38.35	91.45	69.50	47.95
4235	CCB 24-1	7.34	8.50	25.00	8.54	13.50	54.19	5.64	17.50	28.57	86.96	79.00	46.34
4236	ZC	7.71	13.50	30.00	7.59	18.50	40.06	6.51	27.50	27.53	88.09	76.00	60.54
4237	QC (Suvin)	5.81	8.00	30.00	9.08	13.00	63.74	8.33	17.50	43.40	85.01	72.50	36.59
4238	CCB-24-2	8.82	7.50	40.00	11.23	12.50	45.51	8.95	12.50	46.27	84.14	79.50	55.05

CBE- Coimbatore, **CN-** Chamraj Nagar, **DH-**Dharwad, * ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $-Open boll, locule damage (%) at harvest only

Table: 72. Ent1a Br-24 b: *G. arboreum* (CVT) Preliminary screening of breeding material for resistance to insect pest of cotton (Sucking pests) at South Zone during 2024-25.

Entry code	Name of entry	Jassids Injury Grade(JIG)*		No. of Jassids/ 3 leaves		Whitefly/ 3 leaves		Thrips / 3 leaves		Aphid/3 leaves		Natural Enemies/ Plant*	
		DH	ND	DH	ND	DH	ND	DH	ND	DH	ND	DH	ND
4241	CNA 1084	I	-	2.26	4.05	1.20	6.63	28.29	12.92	3.86	-	0.32	-
4242	DDCC 1 (CC)	I	-	2.06	5.10	0.60	3.60	30.02	8.70	4.01	-	0.40	-
4243	Local Check	I	-	2.09	5.70	1.60	9.04	26.29	14.63	5.39	-	0.66	-
4244	ZC (DLSa 17)	I	-	2.89	4.28	1.00	10.43	24.03	12.48	6.21	-	1.61	-
4245	DWDa 2252	I	-	2.89	4.88	1.20	7.53	14.93	13.70	4.88	-	1.09	-
4246	CNA 1085	I	-	1.86	4.58	1.30	9.58	16.42	13.37	3.73	-	1.35	-

DH- Dharwad**, ND**-Nandyal, ***JIG**- Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave), #Natural Enemies include coccinellids, chrysopids, syrphids and spider mites

Table: 73. Ent1a Br-24 b: *G. arboreum* (CVT) Preliminary screening of breeding material for resistance to insect pest of cotton (Sucking pests) at South Zone during 2024-25.

Entry code	Name of entry	Rosette flower (%) due to PBW#		Green Boll Damage (%) due to ABW/SBW/TC		Green Boll Damage (%) due to PBW##		Open Boll damage (%)$		Open Locule Damage (%)$		Number of Good Open Bolls/plant	
		DH	ND	DH	ND	DH	ND	DH	ND	DH	ND	DH	ND
4241	CNA 1084	9.19	-	-	-	30.00	14.17	20.92	4.08	18.52	3.00	79.84	-
4242	DDCC 1 (CC)	8.72	-	-	-	35.00	20.00	24.29	5.88	32.55	5.50	76.40	-
4243	Local Check	8.77	-	-	-	25.00	45.00	21.64	8.55	7.93	7.25	79.18	-
4244	ZC (DLSa 17)	7.45	-	-	-	15.00	21.67	26.80	6.50	31.07	5.50	73.90	-
4245	DWDa 2252	8.68	-	-	-	20.00	50.83	15.37	10.30	23.25	9.00	85.48	-
4246	CNA 1085	8.57	-	-	-	45.00	20.00	15.28	6.33	10.32	4.75	85.53	-

DH- Dharwad**, ND**-Nandyal, , #Rosette flower percent based on 50 randomly observed flower/entry, **square damage due to ABW, ## Green boll damage due to PBW through destructive sampling from 10 green boll/entry (randomly picked), $-Open boll, locule damage (%) at harvest only

Table: 74. Ent. 1b. Advanced screening of promising entries for development of repository for sucking pests at North Zone during 2024-25.

Entry Name	Mean Jassids grade(JIG)/Plant**		Leafhopper/ 3 leaves		Whitefly/ 3 leaves	
	FA	BT	FA	BT	FA	SR
CNH108	II	-	0.89	-	47.33	10.18
RS2943	II	-	0.39	2.30	54.17	11.20
FBt1908	II	-	0.44	2.13	39.11	9.78
CICR Bt 27-1	II	-	1.56	2.33	57.56	10.72
F1528	II	-	0.83	-	53.06	10.63
NGP-117	II	-	0.83	-	52.33	11.29
CNH 1155	II	-	0.17	-	9.39	8.29
EC-700108	II	-	0.67	-	53.11	10.97
CNH 1156	II	-	0.28	-	16.11	9.06

EC-344385	III	-	0.89	-	77.50	11.78
BGDS-1063	II	-	0.72	-	83.17	11.49
SCS-1001	II	-	0.50	-	65.39	11.17
HAU Bt2	II	-	1.17	3.03	57.06	9.30
ARCV44Bt	II	-	0.94	2.83	44.72	10.27
FBt1911	II	-	0.61	2.50	49.17	10.90
PBH Bt16	III	-	0.89	2.30	69.94	10.17
F2732	III	-	1.22	2.10	59.11	10.79
CNH 1157	II	-	0.06	-	11.89	8.76
RS2013	II	-	1.06	2.10	59.33	9.84
GA	IV	-	1.22	1.97	84.39	11.30
LK861	II	-	1.06	-	55.94	9.94
Phule 688	III	-	1.00	-	70.33	11.27
EC-700010	II	-	0.89	-	71.50	11.94
EC-700014	II	-	0.89	-	83.72	12.10
GISV 199	II	-	0.89	-	76.44	11.31
EC-692145	II	-	1.56	-	80.33	-
EC-692146	III	-	0.83	-	54.67	-
EC700072	III	-	2.00		86.06	11.91
LPS141	III	-	1.11		71.72	8.37
HS6	II	-	0.89	2.10	59.67	15.02
LD491	II	-	0.33		45.44	-
LH2107	II	-	1.39		61.72	9.74
HS 310	-	-	-	1.97	-	11.80
PBH 79	-	-	-	2.50	-	11.64
Bt 2	-	-	-	1.90	-	-
Bt 3	-	-	-	2.27	-	-
F 2228	-	-	-	2.03	-	-

Whitefly at Faridkot & Sirsa**, Leafhopper**- Trial conducted at Faridkot & Bathinda, ****JIG**- Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave).

Table: 75. Ent. 1 b. advanced screening of promising entries for development of repository for sucking pests at North Zone during 2024-25.

Entry Name	Whitefly							
	Whitefly (Avg.) Ovipositional preference /3 Cages		Whitefly (Avg.) Ovipositional preference /3 Cages		Whitefly Settling preference /Leaf		Whitefly (Avg.) Settling preference /3 Leaves	
	(Field Condition)		(Net Condition)		(Lab Condition)		(Net House)	
	FA#	SR	FA#	SR	FA#	SR	FA#	SR
NGP-117	-	10.33	-	8.33	-	3.67	-	9.67
EC-700108	-	12.67	-	23.33	-	3.67	-	7.00
EC-344385	-	13.67	-	11.33	-	18.33	-	11.33
BGDS-1063	-	6.00	-	10.33	-	4.50	-	11.83
SCS-1001	-	14.33	-	19.33	-	4.67	-	4.67
RS2013	-	8.33	-	7.33	-	2.33	-	7.67
LK861	-	2.33	-	5.67	-	8.00	-	5.17
LPS141	-	4.33	-	6.33	-	2.00	-	10.17
HS6	-	25.00	-	31.00	-	18.83	-	15.00

Whitefly – Conducted by Faridkot & Sirsa, **# Data not received**

Table:76. Ent.1b. advanced screening of promising entries for development of repository for sucking pests during 2024-25.

Entry Name	Trichome Length (µm)		Trichome Density (cm^2)		Chlorophyll Content SPAD(mg/g)		Total Phenol conc.(mg/ gm)		Total Tannin conc.(mg/ml)	
	FA	SR	FA	SR	FA	SR	FA	SR	FA	SR
NGP 117	-	12.00	-	573.56	-	43.48	-	113.20	-	NG*
EC 700108	-	13.77	-	492.78	-	43.87	-	109.69	-	3.96
EC 344385	-	15.12	-	483.78	-	39.78	-	111.84	-	2.52
BGDS 1063	-	18.12	-	407.89	-	40.88	-	115.35	-	6.97
SCS 1001	-	20.79	-	599.56	-	44.13	-	90.53	-	3.84
LK-861	-	17.03	-	479.67	-	38.33	-	90.83	-	NG*
LPS-141	-	17.41	-	392.33	-	46.50	-	193.42	-	0.80
HS-6	-	14.15	-	369.78	-	45.42	-	211.84	-	NG*
RS-2013	-	16.71	-	447.11	-	45.38	-	81.80	-	NG*

***NG- Negligible**

Table: 77. Ent. 1 b. Advanced screening of promising entries for development of repository for Sucking Pest at North Zone during 2024-25.

Entry Name	Thrips/3leaves	
	HI	SR
NGP 117	-	8.11
EC 700108	-	8.64
EC 344385	-	8.69
BGDS 1063	-	9.16
SCS 1001	-	8.92
LK-861	-	8.53
LPS-141	-	7.97
HS-6	-	10.16
RS-2013	-	8.29
FBt 101	13.58	-
PAU Bt 3	14.42	-
ARCV 91 BGII	13.78	-
FBt 103	14.17	-
F 2228	13.32	-
RS 3019	14.21	-
RS 3030	14.82	-
FBt 102	14.67	-

Thrips– Conducted by Hisar & Sirsa

Table: 78. Ent. 1 b. Advanced screening of promising entries for development of repository for sucking pests at Central Zone during 2024-25 (Net House Condition).

Entry Name	Mean Jassids Injury Grade (JIG)/Plant**					Leafhopper/ 3 leaves					Thrips/3 leaves		
	BW	JU	SU	NA	RA	BW	JU	SU	NA	RA	AK	JU	RA
AKH 10-3	-	I	-	II	I	-	9.22	-	2.69	3.17	-	7.07	6.62
GSHV-266	-	I	I	II	I	-	10.14	2.73	2.31	3.30	-	5.77	7.18
GISV-269	-	I	-	-	-	-	9.84	-	-	-	-	8.60	-
GSHV-269	-	-	I	III	I	-	-	3.18	3.56	3.40	-	-	6.40
GJHV-257	-	I	-	-	-	-	7.46	-	-		-	8.80	-
GBHV- 257		-	I	II	I		-	3.13	3.16	3.77	-	-	7.22
WGMCV-326	-	I	-	-	-	-	8.10	-	-	-	-	7.53	-
FC4001	-	I	-	-	-	-	8.70	-	-	-	-	8.27	-
16301DB	-	I	-	-	I	-	8.06	-	-	3.13	-	5.67	8.24
GTHV13/28	-	I	I		I	-	7.76	4.46	-	3.10	-	6.33	8.62
DCH-32/Suvin	-	I	IV	III	II	-	16.76	20.51	7.42	5.80	-	7.60	6.63
NDLH-1938	-	I	I	II	I	-	5.26	4.06	1.96	3.07	-	6.53	7.82

In Net House Condition) Leafhopper- Bhawanipatna Junagadh, Surat, Nanded,& Rahuri, **Thrips**- Junagadh , Rahuri, & Akola ****JIG**- Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave).

Table: 79. Ent. 1 b. Advanced screening of promising entries for development of repository for sucking pests at Central Zone during 2024-25 (Net House Condition).

Entry Code	Entry Name	Av. No. of eggs laid/plant (Leafhopper Oviposition preference)					Total number of neonate release for study (Leafhopper					No. of live nymphs during development(Leafhopper)				
		BW	JU	SU	NA	RA	BW	JU	SU	NA	RA	BW	JU	SU	NA	RA
AKH 10-3	-	-	-	-	-	-	-	10.00	-	-	-	-	7.00	-	-	-
GSHV-266	-	-	-	11.33	-	-	-	10.00	50.00	-	-	-	6.00	28.00	-	-
GISV-269	-	-	-	-	-	-	-	10.00	-	-	-	-	5.00	-	-	-
GSHV-269	-		-	10.67	-	-	-	-	50.00	-	-	-	-	30.33	-	-
GJHV-257	-	-	-	-	-	-	-	10.00	-	-	-	-	6.00	-	-	-
GBHV- 257	-	-	-	13.67	-	-		-	50.00	-	-	-	-	33.33	-	-
WGMCV-326	-	-	-	-	-	-	-	10.00	-	-	-	-	7.00	-	-	-
FC4001	-	-	-	-	-	-	-	10.00	-	-	-	-	6.00	-	-	-
16301DB	-	-	-	-	-	-	-	10.00	-	-	-	-	7.00	-	-	-
GTHV13/28	-	-	-	16.33	-	-		10.00	50.00	-	-	-	5.00	34.33	-	-
DCH-32/Suvin	-	-	-	24.67	-	-		10.00	50.00	-	-	-	6.00	35.67	-	-
NDLH-1938	-	-	-	12.00	-	-		10.00	50.00	-	-	-	5.00	25.67	-	-

(In Net House Condition) Leafhopper- Bhawanipatna Junagadh, Surat, Nanded, & Rahuri,

Table: 80. Ent. 1 b. Advanced screening of promising entries for development of repository for sucking pests at Central Zone during 2024-25 (Net House Condition).

Entry Name	No. of dead nymphs during development (Leafhopper)					Yield (q/ha.)						
	BW	JU	NA	SU	RA	AK	BW	JU	NG	NA	SU	RA
AKH 10-3	-	3.00	-	-	-	-	-	-	-	-	-	8.60
GSHV-266	-	4.00	-	22.00	-	-	-	-	-	-	-	7.10
GISV-269	-	5.00	-	-	-	-	-	-	-	-	-	-
GSHV- 269	-	-	-	19.67	-	-	-	-	-	-		6.85
GJHV-257	-	4.00	-	-	-	-	-	-	-	-	-	-
GBHV- 257		-	-	16.67	-	-		-			-	10.05
WGMCV-326	-	3.00	-	-	-	-	-	-	-	-	-	-
FC4001	-	4.00	-	-	-	-	-	-	-	-	-	-
16301DB	-	7.00	-	-	-	-	-	-	-	-	-	7.65
GTHV13/28	-	5.00	-	15.67	-	-	-	-	-	-	-	7.35
DCH-32/Suvin	-	4.00	-	14.33	-	-	-	-	-	-	-	6.75
NDLH-1938	-	5.00	-	24.33	-	-	-	-	-	-	-	8.90

(In Net House Condition) Leafhopper- Bhawanipatana **,**Junagadh, Surat, Nanded Rahuri, *** Data not received**

Table: 81. Ent. 1 b. Advanced screening of promising entries for development of repository for sucking pests at Central Zone during 2024-25.(Net House condition)

Entry Name	Nymphal duration and mortality(Jassid)			Nymphal duration and mortality(Jassid)			Nymphal duration and mortality(Jassid)			Nymphal duration and mortality(Jassid)			Nymphal duration and mortality(Jassid)		
	Total nymphal duration#		Mortality ** (%)	Total nymphal duration#		Mortality** (%)	Total nymphal duration# Range (Days)		Mortality ** (%)	Total nymphal duration# Range (Days)		Mortality ** (%)	Total nymphal duration# Range (Days)		Mortality ** (%)
	Range (Days)	Mean ±SD		Range (Days)	Mean ±SD		Range (Days)	Mean ±SD		Range (Days)	Mean ±SD		Range (Days)	Mean ±SD	
	BW			JU			SU			NA*			RA*		
AKH 10-3	-	-	-	14-15	14.29	30.00	-	-	-	-	-	-	-	-	-
GSHV-266	-	-	-	16-18	17.00	40.00	-	12.00	-	-	-	-	-	-	-
GISV-269	-	-	-	10-11	9.00	50.00	-	-	-	-	-	-	-	-	-
GSHV- 269	-	-	-	-	-	-	-	10.00	-	-	-	-	-	-	-
GJHV-257/	-	-	-	18-20	19.33	33.00	-	-	-	-	-	-	-	-	-
GBHV- 257	-	-	-	-	-	-	-	10.00	-		-	-	-		-
WGMCV-326	-	-	-	17-20	18.71	30.00	-	-	-	-	-	-	-	-	-
FC4001	-	-	-	15-16	16.00	40.00	-	-	-	-	-	-	-	-	-
16301DB	-	-	-	16-19	17.71	30.00	-	-	-	-	-	-	-	-	-
GTHV13/28	-	-	-	15-17	16.20	50.00	-	9.00	-	-	-	-	-	-	-
DCH-32/Suvin	-	-	-	8-10	9.00	40.00	-	7.00	-	-	-	-	-	-	-
NDLH-1938	-	-	-	14-15	14.80	50.00	-	13.00	-	-	-	-	-	-	-

Leafhopper- Bhawanipatna**,** Junagadh, Surat, Nanded, Rahuri,

Table: 82. Ent. 1 b. Advanced screening of promising entries for development of repository for sucking pests at Central Zone during 2024-25 (Net House Condition).

Entry Name	Open boll damage (%)				Locule damage (%)			
	JU	NA	NG	RA	JU	NA	NG	RA
AKH 10-3	-	-	-	20.05	-	-	-	7.35
GSHV-266	-	-	-	11.35	-	-	-	3.20
GSHV-269	-	-	-	14.28	-	-	-	4.45
GBHV- 257	-	-	-	`12.95	-	-	-	4.12
WGMCV-326	-	-	-	-	-	-	-	-
FC4001	-	-	-	-	-	-	-	-
16301DB	-	-	-	12.25	-	-	-	3.85

GTHV13/28	-	-	-	16.60	-	-	-	5.33
DCH-32/Suvin	-	-	-	17.10	-	-	-	6.40
NDLH-1938	-	-	-	10.05	-	-	-	5.65

(In Net House Condition) PBW - Junagadh, , Nanded , Nagpur, Rahuri, *** Data not received**

Table: 83. Ent. 1 b. Advanced screening of promising entries for development of repository for sucking pests at Central Zone during 2024-25 (Open Field Condition).

Entry Name	Mean Jassids Injury Grade(JIG)/Plant**			Leaf hopper / 3 leaves			Thrips/3 leaves
	SU	NA	RA	SU	NA	RA	RA
AKH 10-3	-	-	I	-	-	2.38	6.38
GSHV-266	I	-	I	2.39	-	2.73	6.50
GSHV-269	I	-	I	2.48	-	2.69	7.50
GBHV- 257	I	-	I	2.73	-	2.79	7.03
WGMCV-326	-	-	-	-	-	-	-
FC4001	-	-	-	-	-	-	-
16301DB	-	-	I	-	-	2.70	7.67
GTHV13/28	I	-	I	3.83	-	2.66	10.97
DCH32/Suvin	IV	-	II	18.66	-	5.30	5.77
NDLH-1938	I	-	I	3.32	-	2.53	7.47

(Open field condition) Leafhopper- Conducted by Bhawanipatna, Junagadh,Surat , Nanded, Rahuri, **Thrips-** Akola **,** Junagadh, Rahuri ****JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave).

Table: 84. Ent. 1 b. Advanced screening of promising entries for development of repository for sucking pests at Central Zone during 2024-25 (Open Field Condition).

Entry Name	Open boll damage (%)	Locule damage (%)
	RA	RA
AKH 10-3	20.28	6.50
GSHV-266	12.65	3.92
GSHV-269	15.50	5.01
GBHV- 257	13.41-	4.86
WGMCV-326	-	-
FC4001	-	-
16301DB	11.67	4.55
GTHV13/28	17.77	6.44
DCH-32/Suvin	18.38	7.20
NDLH-1938	10.67	4.67

(In Net House Condition) PBW - Junagadh, , Nanded , Nagpur, Rahuri,

Table: 85. Ent.1 b. Advanced screening of promising entries for development of repository for Bollworm at Central Zone during 2024-25 (Open Field Condition).

Entry Name	No of Larva of PBW (10 bolls destructive sampling)				Green boll damage (%) due to PBW/10 bolls through destructive sampling				Yield (q./ha)					
	JU	NA	NG	RA	JU	NA	NG	RA	AK	JU	SU	NA	NG	RA
AKH 10-3	-	-	-	-	-	-	-	-	-	21.60	-	3.60	-	9.20
GSHV-266	-	-	-	-	-	-	-	-	-	22.82	14.06	7.20	-	7.53
GISV-269	-	-	-	-	-	-	-	-	-	24.25	-	-	-	-
GSHV- 269	-	-	-	-	-	-	-	-	-	-	12.12	3.96	-	7.20
GJHV-257	-	-	-	-	-	-	-	-	-	28.77	-	-	-	-
GBHV- 257	-	-	-	-	-	-	-	-	-	-	15.83	6.24	-	11.27
WGMCV-326	-	-	-	-	-	-	-	-	-	29.43	-	-	-	-
FC4001	-	-	-	-	-	-	-	-	-	27.34	-	-	-	-
16301DB	-	-	-	-	-	-	-	-	-	25.79	-	-	-	7.25
GTHV13/28	-	-	-	-	-	-	-	-	-	23.37	14.74	-	-	7.50
DCH-32/Suvin	-	-	-	-	-	-	-	-	-	20.39	0.86	3.00	-	6.50
NDLH-1938	-	-	-	-	-	-	-	-	-	27.12	12.69	5.04	-	9.47

(Open field condition) PBW- Conducted by Junagadh, Nanded, Nagpur & Rahuri,

Table: 86. Ent 1 b. Evaluation of promising entries from Ent. (1b) for creation of repository for Sucking Pest tolerant genotypes at Central Zone during 2024-25. (Morphological and Biological Evaluation for Leafhopper).

Entry Name	Length of Trichomes(µm)								Trichome Density(cm^2)			
	Midrib				Lamina							
	SU	JU	NA	RA	SU	JU	NA	RA	SU	JU	NA	RA
AKH 10-3	-	-	-	-	-	-	-	-	-	-	120.00	-
GSHV-266	-	-	-	-	-	-	-	-	314.33	-	128.67	-
GSHV269	-	-	-	-	-	-	-	-	306.67	-	91.33	-
GBHV- 257	-	-	-	-	-	-	-	-	284.33	-	101.33	-
WGMCV-326	-	-	-	-	-	-	-	-	-	-	-	-
FC4001	-	-	-	-	-	-	-	-	-	-	-	-
16301DB	-	-	-	-	-	-	-	-	-	-	-	-
GTHV13/28	-	-	-	-	-	-	-	-	291.00	-	-	-
DCH-32/Suvin	-	-	-	-	-	-	-	-	127.00	-	68.00	-
NDLH-1938	-	-	-	-	-	-	-	-	343.67	-	96.00	-

Conducted by Surat , Junagadh, Nanded & Rahuri, *No. of trichomes/ 0.5 sq. cm. leaf area

Table: 87. Ent. 1 b. Advanced screening of promising entries for development of repository for sucking pests at South Zone during 2024-25.(open field condition)

Entry Name	Mean Jassids Injury Grade (JIG)/Plant**			Leafhopper / 3 leaves			Thrips / 3 leaves		
	CBE	DH	RC	CBE	DH	RC	CBE	ND	SVPR
AKH13	-	I	-	-	3.60	-	-	-	-
CNH-1155	-	II	-	-	4.30	-	-	-	-
CNH-1156	-	II	-	-	5.80	-	-	-	-
CNH-1157	-	I	-	-	4.20	-	-	-	-
RHC-1409	-	II	-	-	5.10	-	-	-	-
RCH1651	-	II	-	-	5.10	-	-	-	-
Suvin/ DCH 32	-	IV	-	4.88	7.30	-	0.55	-	-
Suraj	-	III	-	-	6.10	-	-	-	-
NDLH 1938	-	II	-	1.94	4.10	-	0.21	-	-
NDLH 1428	-	-	II	-	-	7.97	-	-	-
GBHV-257	II	I	II	1.50	3.50	10.29	0.18	-	-
GTHV 13/28	II	II	III	1.46	3.80	11.07	0.18	-	-
GSHV-266	II	II	II	1.39	3.90	9.52	0.13	-	-
GSHV-269	III	II	II	1.69	3.70	11.84	0.20	-	-

Leafhopper- Conducted by Coimbatore Dharwad, Raichur, **Thrips**- Conducted by Coimbatore, Nandyal, Srivilliputtur, ****-JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave).

Table: 88. Ent. 1 b. Advanced screening of promising entries for development of repository for Pink bollworm at South Zone during 2024-25. (open field condition)

Entry Name	Rosette flower damage (%) by PBW (10 Flower/Plant)			Green boll damage (%) due to PBW/10 bolls through destructive sampling			No of Larva of PBW (10 bolls destructive sampling)			Open Boll Damage (%)		
	CBE	RC	SVPR	CBE	RC	SVPR	CBE	RC	SVPR	CBE	RC	SVPR
AKH13	-	-	-	-	-	-	-	-	-	-	-	-
CNH-1155	-	-	-	-	-	-	-	-	-	-	-	-
CNH-1156	-	-	-	-	-	-	-	-	-	-	-	-
CNH-1157	-	-	-	-	-	-	-	-	-	-	-	-
RHC-1409	-	-	-	-	-	-	-	-	-	-	-	-
RCH1651	-	-	-	-	-	-	-	-	-	-	-	-
Suvin/ DCH 32	4.14	-	-	8.38	-	-	8.54	-	-	9.86	-	-
Suraj	-	-	-	-	-	-	-	-	-	-	-	-
NDLH 1938	1.53	-	-	2.48		-	7.18		-	7.27		-
NDLH 1428	-	19.53	-	-	29.36	-	-	34.13	-	-	33.12	-
GBHV-257	3.31	25.27	-	7.46	34.24	-	7.70	41.82	-	9.71	38.74	-
GTHV 13/28	3.25	11.66	-	6.44	25.09	-	7.09	33.80	-	9.00	25.18	-
GSHV-266	3.19	23.52	-	3.60	30.83	-	6.34	29.81	-	9.39	28.16	-
GSHV-269	3.27	19.94	-	6.86	32.20	-	7.13	45.38	-	10.91	44.75	-

PBW- Conducted by Coimbatore, Raichur & Srivilliputtur

Table: 89. Ent. 1 b. Advanced screening of promising entries for development of repository for sucking pests at South Zone during 2024-25. .(open field condition)

Entry Name	Locule damage (%)			Good Open Bolls (%)			Yield (q./ha)				
	CBE	RC	SVPR	CBE	RC	SVPR	CBE	DH	ND	RC	SVPR
AKH13	-	-	-	-	-	-	-	6.11	-	-	-
CNH-1155	-	-	-	-	-	-	-	5.70	-	-	-
CNH-1156	-	-	-	-	-	-	-	4.50	-	-	-
CNH-1157	-	-	-	-	-	-	-	5.10	-	-	-
RHC-1409	-	-	-	-	-	-	-	6.74	-	-	-
RCH1651	-	-	-	-	-	-	-	5.69	-	-	-
Suvin/ DCH 32	6.78	-	-	80.72	-	-	9.58	1.81	-	-	-
Suraj	-	-	-	-	-	-	-	4.44	-	-	-
NDLH 1938	2.93	-	-	89.92		-	10.56	2.29	-	-	-
NDLH 1428	-	29.00	-	-	66.88	-	-		-	9.45	-
GBHV-257	7.03	34.62	-	90.48	61.26	-	9.99	5.34	-	5.95	-
GTHV 13/28	6.58	21.06	-	91.84	74.82	-	10.05	4.59	-	10.33	-
GSHV-266	6.12	24.04	-	92.52	71.84	-	10.17	4.10	-	11.36	-
GSHV-269	7.42	40.63	-	88.19	55.25	-	9.89	2.66	-	5.02	-

PBW- Conducted by Coimbatore, Raichur & Srivilliputtur

Table: 90. Ent 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for sucking pests tolerant genotypes at North Zone during 2024-25 (Morphological and Biological Evaluation for Whitefly).

Entry name	Mean whitefly on 5th node leaf disc*		Whitefly/3 leaves in field conditions		Whitefly ovi positional preference in field conditions (Eggs/3Cage)*		Whitefly ovi positional preference in Net conditions (Eggs/3Cage)*		Whitefly settling preference in lab conditions/Leaf (%)*		Whitefly settling preference in polyhouse conditions/3Leaves (%)*	
	FA	SR	FA	SR	FA	SR	FA	SR	FA	SR	FA	SR
NGP-102	5.40	3.50	17.00	11.97	-	14.00	-	11.00	-	3.33	-	17.50
NGP-127	4.60	3.29	13.00	12.07	-	15.67	-	21.67	-	4.67	-	6.83
EC-700090	4.93	3.76	14.67	11.55	-	11.50	-	15.67	-	6.67	-	10.33
EC-700140	10.00	3.79	40.00	12.13	-	10.67	-	17.00	-	3.83	-	6.50
PBH-79	15.13	3.79	65.67	11.64	-	12.33	-	14.00	-	4.17	-	14.50
DHY-286	11.47	4.05	47.33	12.63	-	14.00	-	10.00	-	11.17	-	8.33
LK-861	10.93	3.29	44.67	9.94	-	2.33	-	5.67	-	8.00	-	5.17
HS-310	14.87	3.52	64.33	11.80	-	12.00	-	19.67	-	4.67	-	9.50
LPS-141	21.40	3.11	97.00	8.37	-	4.33	-	6.33	-	2.00	-	10.17
GA	11.20	2.83	46.00	11.30	-	12.67	-	10.33	-	5.50	-	9.60
LD-491	27.00	3.35	125.00	11.64	-	11.50	-	12.00	-	6.67	-	10.50
F-2732	17.40	2.77	77.00	10.79	-	13.00	-	14.67	-	2.67	-	11.33
RS-2013	19.53	2.74	87.67	9.84	-	8.33	-	7.33		2.33	-	7.67
HS-6	23.80	3.36	109.00	15.02	-	25.00	-	31.00		18.83		15.00
SCS-1001	21.27	3.35	96.33	11.17	-	14.33	-	19.33	-	4.67	-	4.67
BGDS-1063	12.93	3.77	54.67	11.49	-	6.00	-	10.33	-	4.50	-	11.83
EC-344385	10.73	3.71	43.67	11.78	-	13.67	-	11.33	-	18.33	-	11.33
NGP-117	11.53	3.85	47.67	11.29	-	10.33	-	8.33	-	3.67	-	9.67

Whitefly- Conducted by Faridkot & Sirsa ***Based on total no of Adult released. ** Data not received**

Table: 91. Ent 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for sucking pests tolerant genotypes at North Zone during 2024-25 (Morphological and Biological Evaluation for Whitefly).

Entry Name	Trichome Length (µm)		Trichome Density (cm^2)		Chlorophyll Content SPAD(mg/g)		Total Phenol conc.(mg/ gm)		Total Tannin conc.(mg/ml)	
	FA	SR	FA	SR	FA	SR	FA	SR	FA	SR
NGP 102	-	12.36	-	627.22	-	39.38	-	77.37	-	1.19
NGP 127	-	17.29	-	478.22	-	45.68	-	110.40	-	4.37
EC 700090	-	12.51	-	411.22	-	42.42	-	101.10	-	0.41
EC 700140	-	15.37	-	503.56	-	42.65	-	70.48	-	3.06
DHY 286	-	17.11	-	329.56	-	37.87	-	54.04	-	4.49
PBH 79	-	15.42	-	430.33	-	40.15	-	108.03	-	9.91
HS 310	-	14.77	-	481.11	-	41.65	-	104.91	-	0.97
LK-861	-	17.03	-	479.67	-	38.33	-	90.83	-	NG*
LPS-141	-	17.41	-	392.33	-	46.50	-	193.42	-	0.80
HS-6	-	14.15	-	369.78	-	45.42	-	211.84	-	NG*
RS-2013	-	16.71	-	447.11	-	45.38	-	81.80	-	NG*

***NG- Negligible**

Table: 92. Ent 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for sucking pests tolerant genotypes at North Zone during 2024-25.

Entry Name	Thrips/3leaves	
	HI	SR
NGP 102	-	8.63
NGP 127	-	9.01
EC 700090	-	9.09
EC 700140	-	8.74
DHY 286	-	9.15
PBH 79	-	9.13
HS 310	-	9.31
LK-861	-	8.53
LPS-141	-	7.97
HS-6	-	10.16
RS-2013	-	8.29

Thrips– Conducted by Hisar & Sirsa.

Table: 93. Ent 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for Bollworm tolerant genotypes at North Zone during 2024-25.

Entry Name	Rosette flower damage (%) by PBW (10 Flower/Plant)		No of Larva of PBW (10 bolls destructive sampling)		Green boll damage (%) due to PBW/10 bolls through destructive sampling	
	HI	BT	HI	BT	HI	BT
FBt 101	-	-	1.00	-	18.89	-
PAU Bt 3	-	-	0.45	-	5.56	-
ARCV 91 BGII	-	-	1.78	-	26.67	-
FBt 103	-	-	1.11	-	21.11	-
F 2228	-	-	1.22	-	20.00	-
RS 3019	-	-	0.44	-	5.56	-
RS 3030	-	-	0.44	-	7.78	-
FBt 102	-	-	0.78	-	11.11	-

PBW – Conducted by Hisar,

Table: 94. Ent 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for Sucking Pest & Bollworm tolerant genotypes at Central Zone during 2024-25 (Open Field Condition).

Entry Name	Mean Jassid Injury Grade (JIG)/Plant**					Leaf hopper / 3 leaves					Thrips/3 leaves		
	BW	JU	NA	RA	SU	BW	JU	NA	RA	SU	AK	JU	RA
AKH-1302	-	-	-	II		-	-	-	1.95		-	-	20.37
GISV-323	-	-	-	II	I	-	-	-	2.27	2.90	-	-	24.40
GJHV-522	-	-	-	I	I	-	-	-	2.33	3.39	-	-	27.13
RAH-1076	-	-	-	I	I	-	-	-	2.35	3.10	-	-	24.00
AKH2013-3	-	-	-	I	I	-	-	-	1.92	4.60	-	-	9.23
GISV216	-	-	-	I	I	-	-	-	2.18	2.69	-	-	28.83
GJHV548	-	-	-	II	I	-	-	-	2.42	4.30	-	-	26.63
NH677	-	-	-	I	I	-	-	-	2.18	4.80	-	-	23.00
NH737	-	-	-	I	II	-	-	-	2.32	6.28	-	-	28.87
RHC1409	-	-	-	I	I	-	-	-	2.27	4.38	-	-	24.63
CNH1155	-	-	-	I	I	-	-	-	2.25	3.30	-	-	11.13
CNH1156	-	-	-	II	II	-	-	-	2.28	6.70	-	-	28.10
CNH1157	-	-	-	II	II	-	-	-	2.25	6.90	-	-	22.90
DCH-32/Suvin	-	-	-	IV	IV	-	-	-	7.84	18.50	-	-	15.67
NDLH 1938	-	-	-	I	I	-	-	-	2.37	3.19	-	-	21.30

(Open Field Conditions) Leafhopper- Conducted by Junagadh, Surat, Rahuri, Bhwanipatna**,** Nanded**, Thrips-**Conducted by Akola, Junagadh, Rahuri, ****JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave),

Table: 95. Ent. 1 c Advanced screening of promising entries for development of repository for sucking pests at Central Zone during 2024-25 (Open Field Condition).

Entry Name	Open boll damage (%)				Locule damage (%)				Yield (q./ha)					
	JU	NA	NG	RA	JU	NA	NG	RA	AK	JU	NA	NG	RA	SU
AKH-1302	-	-	-	10.84	-	-	-	4.04	-	31.08	7.92	-	10.05	-
GISV-323	-	-	-	12.02	-	-	-	4.27	-	22.49	7.08	-	8.96	11.96
GJHV-522	-	-	-	13.24	-	-	-	4.90	-	29.27	9.96	-	8.66	9.26
RAH-1076	-	-	-	11.10	-	-	-	4.14	-	27.94	9.72	-	10.46	11.83
AKH2013-3	-	-	-	10.76	-	-	-	3.66	-	18.02	6.96	-	11.28	13.12
GISV216	-	-	-	13.66	-	-	-	6.44	-	19.68	5.04	-	8.45	14.66
GJHV548	-	-	-	9.56	-	-	-	3.92	-	28.94	5.40	-	8.39	6.69
NH677	-	-	-	7.47	-	-	-	3.24	-	27.12	7.08	-	10.90	9.26
NH737	-	-	-	12.00	-	-	-	4.76	-	30.09	6.24	-	9.30	8.75
RHC1409	-	-	-	11.27	-	-	-	4.65	-	22.98	6.84	-	9.76	12.61
CNH1155	-	-	-	8.93	-	-	-	2.86	-	26.12	-	-	11.65	11.06
CNH1156	-	-	-	9.38	-	-	-	3.89	-	23.64	-	-	11.35	11.58
CNH1157	-	-	-	13.31	-	-	-	4.96	-	28.44	-	-	10.54	12.09
DCH-32/Suvin	-	-	-	11.06	-	-	-	3.91	-	21.00	3.00	-	8.05	1.93
NDLH 1938	-	-	-	9.76	-	-	-	4.56	-	26.79	5.04	-	9.95	10.81

(In Net House Condition) PBW - Junagadh, , Nanded , Nagpur, Rahuri,

Table: 96. Ent 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for Sucking Pest tolerant genotypes at Central Zone during 2024-25 (Net House Condition).

Entry Name	Mean Jassids Injury Grade (JIG)**					Leaf hopper / 3 leaves					*Av. No. of eggs laid/plant (Jassid Oviposition preference)		Total number of neonate release for study (Jassids)	
	BW	JU	NA	RA	SU	BW	JU	NA	RA	SU	RA	SU	RA	SU
AKH-1302	-	I	II	II		-	10.24	2.58	2.65	-	-	-	-	-
GISV-323	-	I	II	II	I	-	8.86	2.04	2.95	3.08	-	9.67	-	50.00
GJHV-522	-	I	III	I	I	-	6.80	3.02	3.02	4.10	-	11.67	-	50.00
RAH-1076	-	I	II	I	I	-	10.90	2.33	2.97	3.40	-	10.33	-	50.00
AKH2013-3	-	I	II	I	I	-	7.20	2.20	2.59	4.69	-	10.33	-	50.00
GISV216	-	I	II	I	I	-	10.60	3.04	2.87	3.10	-	8.33	-	50.00
GJHV548	-	I	II	II	I	-	7.48	3.82	3.07	4.69	-	11.33	-	50.00
NH677	-	I	II	I	I	-	6.42	2.22	2.80	5.10	-	12.67	-	50.00
NH737	-	I	II	I	II	-	8.40	2.79	2.99	6.80	-	13.67	-	50.00

RHC1409	-	I	II	I	I	-	9.64	2.27	2.95	4.58	-	17.33	-	50.00
CNH1155	-	I	-	I	I	-	8.72	-	2.94	3.80	-	9.33	-	50.00
CNH1156	-	I	-	II	II	-	7.14	-	2.93	7.59	-	14.67	-	50.00
CNH1157	-	I	-	II	II	-	7.88	-	2.92	7.19	-	16.67	-	50.00
DCH-32/Suvin	-	I	IV	IV	IV	-	15.82	7.40	8.66	20.78	-	24.67	-	50.00
NDLH 1938	-	I	II	I	I	-	5.66	2.00	3.02	4.10	-	12.00	-	50.00

(In Net House Condition) Leafhopper- Conducted by Bhawanipatna, Junagadh, Nanded, Rahuri & Surat ****JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave), *** Data not received.**

Table: 97. Ent. 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for Sucking Pest & Bollworm tolerant genotypes at Central Zone during 2024-25(Net House Condition).

Entry Name	No. of live nymphs during development(Jassid)					No. of dead nymphs during development(Jassid)					Thrips/3 leaves		
	BW	JU	NA	RA	SU	BW	JU	NA	RA	SU	AK	JU*	RA
AKH-1302	-	7	-	-	-	-	3	-	-	-	-	-	-
GISV-323	-	7	-	-	25.67	-	3	-	-	24.33	-	34.18	-
GJHV-522	-	7	-	-	26.67	-	3	-	-	23.33	-	31.90	-
RAH-1076	-	6	-	-	26.67	-	4	-	-	23.33	-	33.00	-
AKH2013-3	-	6	-	-	31.33	-	4	-	-	18.67	-	30.48	-
GISV216	-	5	-	-	25.33	-	5	-	-	24.67	-	31.50	-
GJHV548	-	5	-	-	29.33	-	5	-	-	20.67	-	34.49	-
NH677	-	7	-	-	28.67	-	3	-	-	21.33	-	37.59	-
NH737	-	6	-	-	29.00	-	4	-	-	21.00	-	32.74	-
RHC1409	-	7	-	-	25.33	-	3	-	-	24.67	-	36.59	-
CNH1155	-	5	-	-	26.33	-	5	-	-	23.67	-	37.19	-
CNH1156	-	6	-	-	32.33	-	4	-	-	17.67	-	35.42	-
CNH1157	-	7	-	-	31.67	-	3	-	-	18.33	-	37.02	-
DCH-32/Suvin	-	6	-	-	35.67	-	4	-	-	14.33	-	40.60	-
NDLH 1938	-	5	-	-	25.67	-	5	-	-	24.33	-	34.66	-

(In Net House Condition) Leafhopper- Conducted by Bhwanipatna, Junagadh, Surat, Nanded, **Thrips-** Conducted by Akola, Junagadh, Rahuri, , #-Presumend based on the successful emergence of neonate nymphs from the puncture on midrub and vein during 5th to 8th day of pair release, *** Data not received.**

Table: 98. Ent 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for Bollworm tolerant genotypes at Central Zone during 2024-25(Net House Condition).

Entry Name	Green boll damage (%) due to PBW/10 bolls through destructive sampling				No of Larva of PBW (10 bolls destructive sampling)				Rosette flower damage (%) by PBW (10 Flower/Plant)			
	JU	NA	NG	RA	JU	NA	NG	RA	JU	NA	NG	RA
AKH-1302	-	-	-	-	-	-	-	-	-	-	-	-
GISV-323	-	-	-	-	-	-	-	-	-	-	-	-
GJHV-522	-	-	-	-	-	-	-	-	-	-	-	-
RAH-1076	-	-	-	-	-	-	-	-	-	-	-	-
AKH2013-3	-	-	-	-	-	-	-	-	-	-	-	-
GISV216	-	-	-	-	-	-	-	-	-	-	-	-
GJHV548	-	-	-	-	-	-	-	-	-	-	-	-
NH677	-	-	-	-	-	-	-	-	-	-	-	-
NH737	-	-	-	-	-	-	-	-	-	-	-	-
RHC1409	-	-	-	-	-	-	-	-	-	-	-	-
CNH1155	-	-	-	-	-	-	-	-	-	-	-	-
CNH1156	-	-	-	-	-	-	-	-	-	-	-	-
CNH1157	-	-	-	-	-	-	-	-	-	-	-	-
DCH-32/Suvin	-	-	-	-	-	-	-	-	-	-	-	-
NDLH 1938	-	-	-	-	-	-	-	-	-	-	-	-

(In Net House Condition) PBW- Conducted by Junagadh, Nanded, Nagpur& Rahuri, * Data not received.

Table: 99. Ent 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for Bollworm tolerant genotypes at Central Zone during 2024-25(Net House Condition).

Entry Name	Open boll damage%				Locule damage %				Yield (q./ha)						
	JU	NA	NG	RA	JU	NA	NG	RA	AK	BW	JU	NA	NG	RA	SU
AKH-1302	-	-	-	11.12	-	-	-	4.34	-	-	-	-	-	8.95	-
GISV-323	-	-	-	12.27	-	-	-	4.56	-	-	-	-	-	8.04	-
GJHV-522	-	-	-	13.47	-	-	-	5.12	-	-	-	-	-	7.95	-
RAH-1076	-	-	-	11.26	-	-	-	4.36	-	-	-	-	-	9.38	-
AKH2013-3	-	-	-	11.11	-	-	-	3.91	-	-	-	-	-	10.05	-
GISV216	-	-	-	13.89	-	-	-	6.63	-	-	-	-	-	7.78	-
GJHV548	-	-	-	9.76	-	-	-	4.14	-	-	-	-	-	7.28	-
NH677	-	-	-	7.75	-	-	-	3.39	-	-	-	-	-	9.85	-
NH737	-	-	-	12.22	-	-	-	5.02	-	-	-	-	-	8.70	-
RHC1409	-	-	-	11.52	-	-	-	4.93	-	-	-	-	-	8.82	-
CNH1155	-	-	-	9.18	-	-	-	3.11	-	-	-	-	-	10.90	-
CNH1156	-	-	-	9.61	-	-	-	4.14	-	-	-	-	-	10.15	-
CNH1157	-	-	-	13.59	-	-	-	5.18	-	-	-	-	-	9.65	-
DCH-32/Suvin	-	-	-	11.47	-	-	-	4.21	-	-	-	-	-	7.50	-
NDLH 1938	-	-	-	10.06	-	-	-	4.81	-	-	-	-	-	8.08	-

(In Net House Condition) PBW- Conducted by Junagadh, Nanded, Nagpur& Rahuri, *** Data not received.**

Table: 100. Ent 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for Sucking Pest tolerant genotypes at Central Zone during 2024-25.

Entry Name	Nymphal duration and mortality(Jassid)			Nymphal duration and mortality(Jassid)			Nymphal duration and mortality(Jassid)		
	Total nymphal duration#		Mortality ** (%)	Total nymphal duration#		Mortality** (%)	Total nymphal duration# Range (Days)		Mortality ** (%)
	Range (Days)	Mean ±SD		Range (Days)	Mean ±SD		Range (Days)	Mean ±SD	
	BW			JU			SU		
AKH-1302				13.00 - 15.00	14.29 ± 0.76	30.00			
GISV-323				17.00-20.00	18.71 ± 1.11	30.00		14.33	
GJHV-522				12.00 - 15.00	13.71 ± 1.11	30.00		12.33	
RAH-1076				16.00 - 19.00	17.50 ± 1.05	40.00		9.33	
AKH2013-3				16.00 - 18.00	17.00 ± 0.89	40.00		11.33	
GISV216				9.00 - 11.00	9.80 ± 0.84	50.00		14.00	
GJHV548				9.00 - 11.00	9.80 ± 0.84	50.00		13.33	
NH677				12.00 - 15.00	13.17 ± 1.17	40.00		12.00	
NH737				12.00 - 15.00	13.17 ± 1.17	40.00		8.67	
RHC1409				12.00 - 15.00	13.71 ± 1.11	30.00		11.33	
CNH1155				9.00 - 11.00	9.80 ± 0.84	50.00		14.67	
CNH1156				8.00 - 10.00	9.00 ± 0.89	40.00		8.67	
CNH1157				14.00 - 16.00	15.50 ± 0.63	30.00		9.00	
DCH-32/Suvin				8-10	9.00± 0.89	40.00		7.00	
NDLH 1938				14-15	14.80± 0.84	50.00		13.00	

Leafhopper- Conducted by Bhawanipatna, Junagadh, Surat, Nanded &Rahuri,** Dead nymph on the surface of midrib/vein during growth and development, # Recorded based on the emergence and removal of freshly formed adults on successive days from the same day emerged 10 neonate nymphs exposed separately for studing total nymphal duration, *** Data not received.**

Table: 101. Ent 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for Sucking Pest tolerant genotypes at Central Zone during 2024-25. (Morphological and Biological Evaluation for Leafhopper).

Entry Name	Length of Trichomes(µm)								Trichome Density(cm^2)			
	Midrib				Lamina							
	SU	JU	NA	RA	SU**	JU	NA	RA	SU	JU*	NA	RA
AKH-1302	-	-	-	-	-	-	-	0.69	-	153.67	104.67	108.67
GISV-323	-	-	-	-	0.40	-	-	0.75	293.50	189.00	106.00	103.67
GJHV-522	-	-	-	-	0.54	-	-	0.40	316.00	181.00	86.00	105.00
RAH-1076	-	-	-	-	0.59	-	-	1.17	248.50	183.67	82.67	113.67
AKH2013-3	-	-	-	-	0.35	-	-	0.85	213.50	153.67	132.00	139.67
GISV216	-	-	-	-	0.34	-	-	0.74	315.50	207.50	113.00	120.67
GJHV548	-	-	-	-	0.34	-	-	0.65	287.00	182.84	104.00	106.00
NH677	-	-	-	-	0.34	-	-	1.86	270.00	207.50	96.00	118.00
NH737	-	-	-	-	0.29	-	-	0.81	215.00	189.00	103.33	107.33
RHC1409	-	-	-	-	0.34	-	-	0.75	267.50	141.17	105.00	113.33
CNH1155	-	-	-	-	0.37	-	-	1.85	302.00	141.17	-	102.67
CNH1156	-	-	-	-	0.31	-	-	1.89	192.50	183.67	-	115.33
CNH1157	-	-	-	-	0.29	-	-	1.53	200.50	186.84	-	110.67
DCH32/Suvin	-	-	-	-	0.22	-	-	0.45	127.50	66.60	67.67	62.67
NDLH 1938	-	-	-	-	0.42	-	-	0.56	357.00	175.34	96.00	110.33

Conducted by Surat , Junagadh, Nanded & Rahuri, *No. of trichomes/ 0.5 sq. cm. leaf area, **-trichome length in mm.

Table: 102. Ent 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for Sucking Pest tolerant genotypes at Central Zone during 2024-25. (Morphological and Biological Evaluation for Leafhopper).

Entry Name	Protein (mg/g of tissue)				Tannin (mg/100g dry weight)				Total phenol(mg/g)				Flevenol (mg/g of tissue)			
	SU	JU	NA	RA	SU	JU	NA	RA	SU	JU	NA	RA	SU	JU	NA	RA
AKH-1302	-	9.82	-	3.81	-	12.90	-	5.72	-	1.22	-	10.24	-	1.81	-	-
GISV-323	11.09	9.72	-	3.66	20.24	18.06	-	4.24	4.64	3.88	-	5.88	2.40	2.49	-	-
GJHV-522	11.78	9.95	-	5.80	24.26	22.11	-	6.06	4.14	3.71	-	5.63	1.53	1.72	-	-
RAH-1076	12.07	13.15	-	4.09	18.30	12.15	-	8.13	1.28	4.09	-	12.03	2.04	2.62	-	-
AKH2013-3	11.13	10.60	-	3.53	15.68	12.82	-	9.55	2.15	1.27	-	12.80	1.82	1.88	-	-
GISV216	11.17	8.93	-	4.03	19.73	16.54	-	5.03	3.27	1.67	-	10.50	1.94	1.69	-	-
GJHV548	12.77	10.94	-	4.71	23.78	21.87	-	7.76	3.95	3.50	-	8.96	1.63	1.63	-	-
NH677	11.86	8.93	-	4.31	18.73	16.54	-	4.27	1.88	1.67	-	8.19	1.84	1.69	-	-
NH737	11.75	9.72	-	3.35	16.73	18.06	-	5.72	1.77	3.88	-	3.33	1.79	2.49	-	-
RHC1409	11.22	9.52	-	4.12	33.00	36.55	-	6.92	3.73	3.22	-	8.29	1.78	1.83	-	-
CNH1155	14.83	9.52	-	4.46	23.13	36.55	-	5.46	5.14	3.22	-	9.73	2.73	1.83	-	-
CNH1156	13.50	13.15	-	3.94	21.40	12.15	-	5.80	2.27	4.09	-	6.91	1.85	2.62	-	-
CNH1157	16.30	10.23	-	5.18	20.17	18.42	-	4.01	2.72	4.03	-	9.98	1.75	2.83	-	-
DCH32/Suvin	25.28	0.50	-	4.12	14.08	1.10	-	4.84	1.40	21.60	-	2.56	1.15	17.50	-	-
NDLH 1938	15.93	1.60	-	4.84	24.10	3.40	-	7.59	4.63	14.70	-	7.81	2.73	19.10	-	-

Conducted by Surat , Junagadh, Nanded & Rahuri

Table: 103. Ent 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for Sucking Pest tolerant genotypes at Central Zone during 2024-25. (Morphological and Biological Evaluation for Leafhopper).

Entry Name	Reducing sugar (mg/g of tissue)				Gossypol (%)			
	SU	JU	NA	RA	SU	JU	NA	RA
AKH-1302	-	9.71	-	-	-	0.85	-	5.00
GISV-323	13.06	12.52	-	-	0.79	0.83	-	5.88
GJHV-522	17.75	15.38	-	-	0.82	0.82	-	6.18
RAH-1076	17.15	16.27	-	-	0.83	0.83	-	6.69
AKH2013-3	11.98	9.82	-	-	0.82	0.83	-	8.11
GISV216	10.92	9.38	-	-	0.91	0.86	-	7.22
GJHV548	17.05	14.92	-	-	0.83	0.84	-	4.83
NH677	17.73	9.38	-	-	0.83	0.83	-	6.15
NH737	17.50	12.52	-	-	0.81	0.83	-	6.48
RHC1409	17.02	14.65	-	-	0.72	0.85	-	8.83
CNH1155	13.08	14.65	-	-	0.84	0.85	-	6.97
CNH1156	20.85	16.27	-	-	0.85	0.85	-	5.32
CNH1157	18.98	12.69	-	-	0.88	0.85	-	4.07
DCH32/Suvin	22.22	16.20	-	-	0.79	0.80	-	3.47
NDLH 1938	19.80	19.50	-	-	0.89	0.86	-	8.17

Conducted by Surat , Junagadh, Nanded & Rahuri

Table: 104. Ent 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for Sucking Pest tolerant genotypes at South Zone during 2024-25(Open field condition).

Entry Name	Mean Jassids Injury Grade (JIG)/Plant**			Leafhopper / 3 leaves			Thrips / 3 leaves		
	CBE	DH	RC	CBE	DH	RC	CBE	ND	SVPR
AKH13	-	I	-	-	3.70	-	-	-	-
CNH-1155	-	II	-	-	4.95	-	-	-	-
CNH-1156	-	II	-	-	5.50	-	-	-	-
CNH-1157	-	I	-	-	3.95	-	-	-	-
RHC-1409	-	II	-	-	5.10	-	-	-	-
RCH1651	-	II	-	-	5.90	-	-	-	-
Suvin/ DCH 32	-	III	-	-	7.80	-	-	-	-
Suraj	-	III	-	-	7.20	-	-	-	-
NDLH 1938	-	III	-	-	6.40	-	-	-	-
NDLH 1428	-	-		-	-	-	-	-	-
GBHV-257	-	I	-	-	4.10	-	-	-	-
GTHV 13/28	-	II	-	-	4.70	-	-	-	-
GSHV-266	-	II	-	-	4.50	-	-	-	-
GSHV-269	-	II	-	-	5.40	-	-	-	-

Leafhopper- Conducted by Coimbatore Dharwad, Raichur, **Thrips**- Conducted by Coimbatore, Nandyal, Srivilliputtur, ****-JIG**- Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave).

Table: 105. Ent. 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for Sucking Pest tolerant genotypes at South Zone during 2024-25(Net house condition).

Entry Name	Av. No. of eggs laid/plant (Leafhopper Oviposition preference)			Total number of neonate release for study (Leafhopper)			No. of live nymphs during development(Leafhopper)		
	CBE	DH	RC	CBE	DH	RC	CBE	DH	RC
AKH13	-	-	-	-	20.00	-	-	12.00	-
CNH-1155	-	-	-	-	20.00	-	-	13.00	-
CNH-1156	-	-	-	-	20.00	-	-	13.50	-
CNH-1157	-	-	-	-	20.00	-	-	12.50	-
RHC-1409	-	-	-	-	20.00	-	-	13.00	-
RCH1651	-	-	-	-	20.00	-	-	15.50	-
Suvin/ DCH 32	-	-	-	-	20.00	-	-	16.50	-
Suraj	-	-	-	-	20.00	-	-	12.50	-
NDLH 1938	-	-	-	-	20.00	-	-	11.50	-
NDLH 1428	-	-	-	-	-	-	-	-	-
GBHV-257	-	-	-	-	20.00	-	-	13.00	-
GTHV 13/28	-	-	-	-	20.00	-	-	10.50	-
GSHV-266	-	-	-	-	20.00	-	-	12.50	-
GSHV-269	-	-	-	-	20.00	-	-	11.50	-

Leafhopper- Conducted by Coimbatore Dharwad, Raichur,

Table: 106. Ent. 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for Sucking Pest tolerant genotypes at South Zone during 2024-25(Net house condition).

Entry Name	No. of dead nymphs during development(Leafhopper)			Settling preference mean/plant		
	CBE	DH	RC	CBE	DH	RC
AKH13	-	7.00	-	-	11.33	-
CNH-1155	-	4.50	-	-	12.83	-
CNH-1156	-	5.00	-	-	12.33	-
CNH-1157	-	6.50	-	-	11.50	-
RHC-1409	-	3.50	-	-	13.50	-
RCH1651	-	3.00	-	-	12.33	-
Suvin/ DCH 32	-	2.50	-	-	17.33	-
Suraj	-	2.50	-	-	16.00	-
NDLH 1938	-	4.50	-	-	13.17	-
NDLH 1428	-	-	-	-	-	-
GBHV-257	-	6.50	-	-	12.50	-
GTHV 13/28	-	6.50	-	-	12.67	-
GSHV-266	-	3.50	-	-	13.17	-
GSHV-269	-	3.50	-	-	13.50	-

Leafhopper- Conducted by Coimbatore Dharwad, Raichur,

Table: 107. Ent 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for Sucking Pest tolerant genotypes at South Zone during 2024-25(Net house condition).

Entry Name	Nymphal duration and mortality(Jassid)			Nymphal duration and mortality(Jassid)			Nymphal duration and mortality(Jassid)		
	Total nymphal duration#		Mortality ** (%)	Total nymphal duration#		Mortality** (%)	Total nymphal duration# Range (Days)		Mortality ** (%)
	Range (Days)	Mean ±SD		Range (Days)	Mean ±SD		Range (Days)	Mean ±SD	
	CBE			DH			RC		
AKH13	-	-	-	-	8.50	-	-	-	-
CNH-1155	-	-	-	-	11.00	-	-	-	-
CNH-1156	-	-	-	-	12.00	-	-	-	-
CNH-1157	-	-	-	-	10.83	-	-	-	-
RHC-1409	-	-	-	-	13.16	-	-	-	-
RCH1651	-	-	-	-	12.83	-	-	-	-
Suvin/ DCH 32	-	-	-	-	14.16	-	-	-	-
Suraj	-	-	-	-	13.83	-	-	-	-
NDLH 1938	-	-	-	-	12.00	-	-	-	-
GBHV-257	-	-	-	-	11.50	-	-	-	-
GTHV 13/28	-	-	-	-	13.50	-	-	-	-
GSHV-266	-	-	-	-	12.16	-	-	-	-
GSHV-269	-	-	-	-	11.83	-	-	-	-

Leafhopper- Conducted by- Coimbatore Dharwad, Raichur,

Table: 108. Ent 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for Sucking Pest tolerant genotypes at South Zone during 2024-25. (Morphological and Biological Evaluation) (Field condition)

Entry Name	Length of Trichomes(µm)						Trichome density(cm^2)			Protein (mg/g of tissue)			Tannin (mg/100g dry weight)		
	Midrib			Lamina											
	CBE	DH	RC	CBE	DH	RC	CBE	DH	RC	CBE	DH	RC	CBE	DH	RC
AKH13	-	-	-	-	29.06	-	-	272.13	-	-	-	-	-	2.44	-
CNH-1155	-	-	-	-	22.31	-	-	324.59	-	-	-	-	-	2.09	-
CNH-1156	-	-	-	-	23.51	-	-	312.78	-	-	-	-	-	2.20	-
CNH-1157	-	-	-	-	22.97	-	-	287.60	-	-	-	-	-	2.28	-
RHC-1409	-	-	-	-	17.42	-	-	193.19	-	-	-	-	-	2.38	-
RCH1651	-	-	-	-	15.34	-	-	243.32	-	-	-	-	-	1.90	-
Suvin/ DCH 32	-	-	-	0.53	14.10	-	151.00	111.19	-	-	-	-	-	2.22	-
Suraj	-	-	-	-	21.28	-	-	161.15	-	-	-	-	-	2.09	-
NDLH 1938	-	-	-	0.61	15.38	-	275.00	143.56	-	-	-	-	-	1.90	-
GBHV-257	-	-	-	0.75	18.24	-	170.00	220.33	-	-	-	-	-	2.31	-
GTHV 13/28	-	-	-	0.53	15.54	-	190.67	259.12	-	-	-	-	-	0.97	-
GSHV-266	-	-	-	0.58	22.85	-	182.33	184.10	-	-	-	-	-	0.71	-
GSHV-269	-	-	-	0.63	12.88	-	382.67	223.39	-	-	-	-	-	1.55	-

Conducted by - Coimbatore Dharwad, Raichur

Table: 109. Ent 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for Sucking Pest tolerant genotypes at South Zone during 2024-25. (Morphological and Biological Evaluation) (Field condition)

Entry Name	Total phenol(mg/g)			Total Sugars (mg/g of tissue)			Flevenol (mg/g of tissue)			Reducing sugar (mg/g of tissue)			Gossypol (%)		
	CBE	DH	RC	CBE	DH	RC	CBE	DH	RC	CBE	DH	RC	CBE	DH	RC
AKH13	-	8.11	-	-	36.29	-	-	-	-	-	45.27	-	-	1.68	-
CNH-1155	-	9.23	-	-	34.30	-	-	-	-	-	20.10	-	-	2.15	-
CNH-1156	-	7.58	-	-	58.60	-	-	-	-	-	16.71	-	-	1.49	-
CNH-1157	-	8.29	-	-	23.69	-	-	-	-	-	36.49	-	-	1.01	-
RHC-1409	-	6.33	-	-	23.08	-	-	-	-	-	30.34	-	-	3.23	-
RCH1651	-	4.12	-	-	40.11	-	-	-	-	-	23.35	-	-	2.36	-
Suvin/ DCH 32	-	3.83	-	-	32.30	-	-	-	-	-	26.13	-	-	1.59	-
Suraj	-	6.02	-	-	38.43	-	-	-	-	-	40.58	-	-	0.99	-
NDLH 1938	-	4.09	-	-	54.88	-	-	-	-	-	28.35	-	-	2.50	-
GBHV-257	-	8.17	-	-	32.94	-	-	-	-	-	29.29	-	-	1.97	-
GTHV 13/28	-	5.70	-	-	36.31	-	-	-	-	-	21.74	-	-	1.42	-
GSHV-266	-	4.58	-	-	57.35	-	-	-	-	-	28.41	-	-	1.43	-
GSHV-269	-	6.44	-	-	32.58	-	-	-	-	-	21.06	-	-	1.86	-

Conducted by – Coimbatore, Dharwad, Raichur

Table: 110. Ent 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for Sucking Pest tolerant genotypes at South Zone during 2024-25. (Morphological and Biological Evaluation) (Pot condition)

Entry Name	Length of Trichomes(µm)						Trichome density(cm^2)			Protein (mg/g of tissue)			Tannin (mg/100g dry weight)		
	Midrib			Lamina											
	CBE	DH	RC	CBE	DH	RC	CBE	DH	RC	CBE	DH	RC	CBE	DH	RC
AKH13	-	-	-	-	-	-	-	-	-	-	-	-	-	1.55	-
CNH-1155	-	-	-	-	-	-	-	-	-	-	-	-	-	0.97	-
CNH-1156	-	-	-	-	-	-	-	-	-	-	-	-	-	0.41	-
CNH-1157	-	-	-	-	-	-	-	-	-	-	-	-	-	1.79	-
RHC-1409	-	-	-	-	-	-	-	-	-	-	-	-	-	0.77	-
RCH1651	-	-	-	-	-	-	-	-	-	-	-	-	-	0.52	-
Suvin/ DCH 32	-	-	-	-	-	-	-	-	-	-	-	-	-	2.90	-
Suraj	-	-	-	-	-	-	-	-	-	-	-	-	-	0.63	-
NDLH 1938	-	-	-	-	-	-	-	-	-	-	-	-	-	0.75	-
GBHV-257	-	-	-	-	-	-	-	-	-	-	-	-	-	0.81	-
GTHV 13/28	-	-	-	-	-	-	-	-	-	-	-	-	-	0.73	-
GSHV-266	-	-	-	-	-	-	-	-	-	-	-	-	-	0.77	-
GSHV-269	-	-	-	-	-	-	-	-	-	-	-	-	-	0.58	-

Conducted by - Coimbatore Dharwad, Raichur

Table: 111. Ent 1 c. Evaluation of promising entries from Ent. (1b) for creation of repository for Sucking Pest tolerant genotypes at South Zone during 2024-25. (Morphological and Biological Evaluation) (Pot condition)

Entry Name	Total phenol(mg/g)			Total Sugars (mg/g of tissue)			Flevenol (mg/g of tissue)			Reducing sugar (mg/g of tissue)			Gossypol (%)		
	CBE	DH	RC	CBE	DH	RC	CBE	DH	RC	CBE	DH	RC	CBE	DH	RC
AKH13	-	5.16	-	-	33.76	-	-	-	-	-	19.94	-	-	-	1.40
CNH-1155	-	3.38	-	-	19.09	-	-	-	-	-	12.85	-	-	-	1.91
CNH-1156	-	4.87	-	-	18.41	-	-	-	-	-	12.36	-	-	-	0.97
CNH-1157	-	3.66	-	-	18.86	-	-	-	-	-	24.08	-	-	-	0.82
RHC-1409	-	2.73	-	-	31.73	-	-	-	-	-	18.84	-	-	-	1.97
RCH1651	-	1.49	-	-	32.12	-	-	-	-	-	10.36	-	-	-	1.69
Suvin/ DCH 32	-	2.35	-	-	22.01	-	-	-	-	-	15.24	-	-	-	0.80
Suraj	-	1.39	-	-	17.38	-	-	-	-	-	29.67	-	-	-	0.94
NDLH 1938	-	2.01	-	-	42.58	-	-	-	-	-	10.84	-	-	-	0.89
GBHV-257	-	2.46	-	-	15.38	-	-	-	-	-	19.80	-	-	-	1.19
GTHV 13/28	-	3.50	-	-	23.32	-	-	-	-	-	16.17	-	-	-	1.41
GSHV-266	-	1.97	-	-	23.30	-	-	-	-	-	19.92	-	-	-	1.20
GSHV-269	-	1.77	-	-	25.71	-	-	-	-	-	18.75	-	-	-	1.24

Conducted by - Coimbatore Dharwad, & Raichur

Table: 112.Ent 2: Seasonal dynamics of key pests of cotton (Sucking Pests & Natural Enemies) under unprotected condition in North Zone during 2024-25 in RCH 650 BG- II

SMW	Sucking Pests														
	Jassid/ 3 leaves					Whitefly/ 3 leaves					Thrips/ 3 leaves				
	BT	FA	HI	SR	SG	BT	FA	HI	SR	SG	BT	FA	HI	SR	SG
22	-	-	-	-	0.00	-	-	-	-	1.01	-	-	-	-	0.00
23	-	-	0.40	-	0.00	-	-	0.47	-	2.03	-	-	0.87	-	6.03
24	0.20	0.00	0.87	-	0.00	5.40	0.90	1.40	-	3.92	15.40	2.00	0.87	-	9.43
25	0.60	0.10	0.47	0.00	0.00	6.60	2.80	20.47	4.20	2.67	16.30	6.90	5.20	8.13	25.84
26	0.60	0.40	5.33	0.67	0.00	8.30	32.40	7.47	3.87	6.89	21.80	67.80	11.27	4.13	29.09
27	0.30	1.20	6.33	4.67	0.33	8.20	18.00	9.13	9.93	8.00	27.90	61.00	11.87	13.20	37.90
28	2.00	4.30	6.87	11.07	0.00	29.40	47.40	18.53	10.93	14.43	17.40	91.40	27.07	56.60	4.67
29	0.40	3.10	3.80	5.20	0.00	20.10	68.00	14.93	26.47	22.54	12.30	213.00	24.07	23.60	10.86
30	0.40	0.60	5.07	6.40	1.00	11.00	64.70	24.93	19.40	14.63	80.30	83.70	42.33	56.93	14.67
31	2.10	-	3.33	3.13	3.89	31.10	-	21.47	41.67	46.00	35.90	-	33.00	30.13	15.11
32	14.40	4.00	2.47	3.07	2.56	16.90	21.80	12.47	24.73	41.00	21.40	0.00	27.20	23.40	9.11
33	7.00	2.00	3.53	3.93	4.33	7.20	9.10	11.40	17.33	36.00	7.40	2.80	31.73	20.67	12.56
34	7.90	2.90	4.33	6.27	2.33	7.30	11.60	19.47	16.93	44.00	5.00	10.10	33.20	16.47	41.56
35	12.70	4.10	4.33	6.93	2.33	44.10	6.60	13.87	12.87	39.00	9.60	11.70	11.47	10.60	32.76
36	9.30	4.50	2.07	5.47	1.67	12.90	9.00	10.80	14.27	49.00	7.40	8.70	5.67	4.00	29.49
37	8.50	3.30	1.60	3.40	2.11	23.40	5.70	7.60	15.40	39.00	8.70	1.60	3.47	2.27	2.78
38	9.60	1.00	1.87	2.40	0.00	26.60	8.10	11.00	11.80	46.00	4.60	0.70	2.00	0.00	0.00

39	3.50	1.40	1.53	4.93	1.04	43.60	3.80	10.13	16.47	32.00	0.40	0.00	1.27	0.00	2.60
40	0.50	0.10	1.67	3.27	4.67	24.00	2.10	23.60	15.07	31.00	0.30	0.00	2.13	0.00	3.60
41	1.20	0.10	0.93	0.60	1.45	24.40	2.20	9.53	6.27	7.40	0.60	0.00	1.53	0.00	5.80
42	1.00	-	0.53	0.67	1.05	17.80	-	4.80	3.33	9.36	0.40	-	0.67	0.00	0.00
43	-	-	0.20	0.27	1.13	-	-	2.27	4.47	13.47	-	-	0.27	0.00	0.00
44	-	-	-	-	2.56	-	-	-	-	10.22	-	-	-	-	2.67
45	-	-	-	-	2.10	-	-	-	-	14.25	-	-	-	-	5.56
46	-	-	-	-	1.45	-	-	-	-	12.90	-	-	-	-	3.22

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar* Natural Enemies include coccinellids, chrysopids, syrphids and spider

Table: 113. Ent 2: Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in North Zone during 2024-25 in RCH 650 BG- II.

SMW	Natural Enemies/plant*					No. of larvae *H. armigera* /5plants									
	BT	FA	HI	SR	SG	BT**		FA		HI**		SR		SG	
						Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
22	-	-	-	-	0.00	-	-	-	-						0.00
23	-	-	0.00	-	0.00	-	-	-	-						0.00
24	0.00	0.00	0.00	-	0.00	-	-	-	-	-	-				0.00
25	0.20	0.30	0.13	0.00	0.00	-	-	-	-	-	-	-	-		0.00
26	0.40	0.30	0.27	0.00	0.00	-	-	-	-	-	-	-	-		0.00
27	1.20	0.60	0.40	0.20	0.00	-	-	-	-	-	-	-	-		0.00
28	0.30	2.70	0.67	1.00	0.22	-	-	-	-	-	-	-	-		0.00
29	1.00	25.50	0.27	2.53	0.44	-	-	-	-	-	-	-	-		0.00
30	0.40	17.40	1.07	7.80	0.56	-	-	-	-	-	-	-	-		0.00
31	1.20	-	0.80	2.87	0.67	-	-	-	-	-	0.00	-	-		0.00
32	0.30	9.60	0.80	3.53	0.89	-	-	-	-	-	0.00	-	-		0.00
33	0.60	11.40	2.00	2.33	0.56	-	-	-	-	-	0.00	-	-		0.00
34	0.90	8.30	1.33	2.53	1.33	-	-	-	-	-	0.00	0.00	0.00		0.00
35	0.80	10.10	1.87	2.67	1.33	-	-	-	-	-	0.00	0.00	0.00		0.00
36	1.20	6.70	0.53	1.40	1.08	-	-	-	-	-	0.00	0.00	0.00		0.00
37	0.30	8.80	1.07	1.40	1.41	-	-	-	-	-	0.00	0.00	0.00		0.00
38	1.10	9.30	0.53	1.20	1.97	-	-	-	-	-	0.00	0.00	0.00		0.00
39	0.20	5.00	0.40	0.87	1.19	-	-	-	-	-	0.00	0.00	0.00		0.00
40	1.20	4.80	0.27	1.20	0.86	-	-	-	-	-	0.00	0.00	0.00		0.00
41	1.20	2.80	0.13	0.33	0.64	-	-	-	-	-	0.00	0.00	0.00		0.00
42	1.00	-	0.53	0.73	0.75	-	-	-	-	-	0.00	0.00	0.00		0.00
43	-	-	0.27	0.27	0.64	-	-	-	-	-	0.00	0.00	0.00		0.00
44	-	-	-	-	0.41	-	-	-	-						0.00
45	-	-	-	-	0.08	-	-	-	-						0.00
46	-	-	-	-	0.00	-	-	-	-						0.00

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar* Natural Enemies include coccinellids, chrysopids, syrphids and spider , **-number per plant.

Table: 114. Ent 2: Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in North Zone during 2024-25 in RCH 650 BG- II.

SMW	No. of Larvae /5plants									
	Earias spp									
	BT		FA		HI**		SR		SG	
	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
22	-	-	-	-						0.00
23	-	-	-	-						0.00
24	-	-	-	-	-	-				0.00
25	-	-	-	-	-	-	-	-		0.00
26	-	-	-	-	-	-	-	-		0.00
27	-	-	-	-	-	-	-	-		0.00
28	-	-	-	-	-	-	-	-		0.00
29	-	-	-	-	-	-	-	-		1.12
30	-	-	-	-	-	-	-	-		0.00
31	-	-	-	-	-	0.00	-	-		1.32
32	-	-	-	-	-	0.00	-	-		0.00
33	-	-	-	-	-	0.00	-	-		0.67
34	-	-	-	-	-	0.00	0.00	0.00		1.24
35	-	-	-	-	-	0.00	0.00	0.00		0.00
36	-	-	-	-	-	0.00	0.00	0.00		1.21
37	-	-	-	-	-	0.00	0.00	0.00		0.00
38	-	-	-	-	-	0.00	0.00	0.00		0.99
39	-	-	-	-	-	0.00	0.00	0.00		0.00
40	-	-	-	-	-	0.00	0.00	0.00		0.42
41	-	-	-	-	-	0.00	0.00	0.00		0.00
42	-	-	-	-	-	0.00	0.00	0.00		0.37
43	-	-	-	-	-	0.00	0.00	0.00		0.00
44	-	-	-	-						1.05
45	-	-	-	-						1.32
46	-	-	-	-						0.32

BT- Bathinda**; FA**- Faridkot**; HI –** Hisar**; SR**- Sirsa**; SG**- Sriganganagar, **-number per plant

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able: 115. Ent 2: Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in North Zone during 2024-25 in RCH 650 BG-II.

SMW	No. of Larvae /5plants									
	S. litura									
	BT		FA		HI**		SR		SG	
	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
22	-	-	-	-		-	-	-	-	0.00
23	-	-	-	-		-	-	-	-	0.00
24	-	-	-	-	-	-			-	0.00
25	-	-	-	-	-	-	-	-	-	0.00
26	-	-	-	-	-	-	-	-	-	0.00
27	-	-	-	-	-	-	-	-	-	0.00
28	-	-	-	-	-	-	-	-	-	0.00
29	-	-	-	-	-	-	-	-	-	1.00
30	-	-	-	-	-	-	-	-	-	0.00
31	-	-	-	-	-	0.00	-	-	-	3.00
32	-	-	-	-	-	0.00	-	-	-	0.00
33	-	-	-	-	-	0.00	-	-	-	2.00
34	-	-	-	-	-	0.00	0.00	0.00	-	0.00
35	-	-	-	-	-	0.00	0.00	0.00	-	0.00
36	-	-	-	-	-	0.00	0.00	0.00	-	1.00
37	-	-	-	-	-	0.00	0.00	0.00	-	0.00
38	-	-	-	-	-	0.00	0.00	0.00	-	0.00
39	-	-	-	-	-	0.00	0.00	0.00	-	2.00
40	-	-	-	-	-	0.00	0.00	0.00	-	0.00
41	-	-	-	-	-	0.00	0.00	0.00	-	0.00
42	-	-	-	-	-	0.00	0.00	0.00	-	3.00
43	-	-	-	-	-	0.00	0.00	0.00	-	0.00
44	-	-	-	-	-	-	-	-	-	0.00
45	-	-	-	-	-	-	-	-	-	2.00
46	-	-	-	-	-	-	-	-	-	0.00

BT- Bathinda**; FA**- Faridkot**; HI –** Hisar**; SR**- Sirsa**; SG**- Sriganganagar, **-number per plant

Table: 116. Ent 2: Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in North Zone during 2024-25 in RCH 650 BG- II.

SMW	Fruiting Body Damage (%) **					Green Boll Damage (%) Due to ABW/SBW/TC					Rosette flowers (%) Due to PBW				
	BT	FA	HI	SR	SG	BT	FA	HI	SR	SG	BT	FA	HI	SR	SG
22	-	-	-	-	0.00	-	-	-	-	-	-	-		-	-
23	-	-	-	-	0.00	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	0.00	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-	0.00
26	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-	0.00
27	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-	7.00
28	-	-	-	0.00	0.00	-	-	-	0.00	0.00	-	-	-	0.00	6.00
29	-	-	-	0.00	0.00	-	-	-	0.00	0.00	-	-	-	0.00	8.00
30	-	-	-	0.00	0.00	-	-	-	0.00	0.00	-	-	-	0.00	0.00
31	-	-	0.00	0.00	0.00	-	-	0.00	0.00	0.00	-	-	-	0.00	2.00
32	-	-	0.00	0.00	0.00	-	-	0.00	0.00	0.00	-	-	-	0.00	2.00
33	-	-	0.00	0.00	0.00	-	-	0.00	0.00	0.00	-	-	-	0.00	4.00
34	-	-	0.00	0.00	0.00	-	-	0.00	0.00	0.00	-	-	-	0.00	6.00
35	-	-	2.00	0.00	0.00	-	-	0.00	0.00	0.00	-	-	-	0.00	4.00
36	6.00	-	8.00	0.00	0.00	-	-	0.00	0.00	1.03	-	-	-	0.00	4.00
37	6.66	3.00	6.00	0.00	0.00	-	-	0.00	0.00	0.00	-	-	-	0.00	5.00
38	5.33	-	8.00	0.00	0.00	-	-	0.00	0.00	0.00	-	-	-	0.00	9.00
39	8.00	-	4.00	0.00	0.00	-	-	0.00	0.00	1.16	-	-	-	0.00	8.00
40	10.00	-	6.00	0.00	0.00	-	-	0.00	0.00	0.00	-	-	-	0.00	6.00
41	10.66	-	10.00	0.00	0.00	-	-	0.00	0.00	0.00	-	-	-	0.00	5.00
42	-	-	16.00	0.00	0.00	-	-	0.00	0.00	0.00	-	-	-	0.00	3.00
43	-	-	20.00	0.00	0.00	-	-	0.00	0.00	1.73	-	-	-	0.00	4.00
44	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-	3.00
45	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-	5.00
46	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-	6.00

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar, ** Fruiting Body damage includes damage in squares, flowers and boll

Table: 117 .Ent 2: Seasonal dynamics of key pests of cotton (Sucking Pests & Natural Enemies) under unprotected condition in North Zone during 2024-25 in HS-6.

SMW	Sucking Pests														
	Jassid/ 3 leaves					Whitefly/ 3 leaves					Thrips/ 3 leaves				
	BT	FA	HI	SR	SG	BT	FA	HI	SR	SG	BT	FA	HI	SR	SG
22	-	-			0.00	-	-			0.00	-	-			0.00
23	-	-	0.47		0.00	-	-	0.53		0.09	-	-	0.47		1.56
24	0.20	0.00	0.27		0.04	5.40	1.50	1.27		0.17	15.40	0.30	0.47		11.32
25	0.40	0.10	0.47	0.13	0.16	6.20	2.90	21.53	9.87	5.32	19.20	2.50	7.87	10.53	16.84
26	0.50	0.20	4.07	0.80	0.49	7.50	31.10	8.07	12.40	5.22	24.70	53.60	10.80	3.73	15.94
27	1.30	2.40	7.13	5.87	1.16	5.80	22.40	13.73	15.13	6.80	31.00	55.90	13.87	15.87	7.65
28	1.10	1.90	6.20	11.20	0.60	14.70	46.20	22.73	21.47	11.13	11.20	80.60	28.13	51.13	13.54
29	1.60	3.10	4.20	9.87	1.16	47.20	78.20	19.67	70.07	11.57	15.30	165.20	30.67	27.73	24.54
30	0.30	0.30	5.47	3.93	1.38	12.80	55.60	28.80	26.80	10.24	71.70	88.20	42.20	59.33	23.43
31	2.00	-	3.00	5.00	3.07	30.50	-	22.73	61.00	21.02	30.70	-	33.33	24.40	12.99
32	11.60	2.70	3.33	5.07	1.60	12.80	27.10	21.53	25.00	25.02	16.00	3.70	35.27	18.80	9.77
33	5.50	4.00	2.73	6.13	1.94	15.70	8.70	15.80	21.67	15.57	5.00	11.00	29.53	19.73	11.77
34	8.10	2.00	4.53	9.27	1.05	6.60	7.90	19.40	33.07	11.57	5.10	4.00	31.73	13.53	9.43
35	11.40	4.20	3.53	6.60	2.94	53.00	5.10	17.27	13.80	17.69	10.40	13.60	8.73	13.93	7.88
36	6.00	2.20	2.53	4.73	1.94	14.10	7.10	15.93	14.20	9.02	5.00	8.90	8.13	3.53	6.54
37	8.80	3.10	2.13	5.53	1.94	24.30	5.70	10.93	19.13	7.43	7.40	3.90	6.53	2.67	6.71
38	5.40	1.30	1.73	3.80	1.05	20.80	4.10	11.47	19.40	10.06	6.80	3.90	1.87	0.00	4.21
39	2.50	0.10	1.67	4.87	1.83	24.50	2.50	32.47	25.07	3.64	6.40	0.00	2.00	0.00	5.77
40	0.70	0.50	1.20	4.27	1.83	15.70	2.30	15.47	22.67	8.96	4.50	0.00	1.67	0.00	4.21
41	0.60	0.30	1.00	1.13	2.49	14.40	2.30	11.73	16.13	11.69	3.20	0.00	1.00	0.00	6.42
42	0.40	-	0.33	2.13	2.60	12.60	-	3.60	10.47	10.24	2.60	-	0.33	0.00	10.99
43	-	-	0.13	2.33	2.94	-	-	1.73	6.07	21.02	-	-	0.13	0.00	11.43
44	-	-			3.38	-	-			25.02	-	-			8.99
45	-	-			2.72	-	-			15.57	-	-			10.38
46	-	-			0.16	-	-			11.57	-	-			7.32

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar,

Table: 118.Ent 2: Seasonal dynamics of key pests of cotton (Sucking Pests & Natural Enemies) under unprotected condition in North Zone during 2024-25 in HS-6.

SMW	Natural Enemies/plant*					No. of larvae *H. armigera* /5plants									
	BT	FA	HI	SR	SG	BT		FA		HI**		SR		SG	
						Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
22	-	-			0.21	-	-	-	-						0.00
23	-	-	0.00		0.18	-	-	-	-						0.00
24	0.00	0.00	0.00		0.16	-	-	-	-	-	-				0.00
25	0.20	0.00	0.27	0.00	0.27	-	-	-	-	-	-	-	-		0.00
26	0.40	0.40	1.07	0.00	0.37	-	-	-	-	-	-	-	-		0.00
27	1.20	0.70	0.67	0.87	0.42	-	-	-	-	-	-	-	-		0.00
28	0.50	2.70	0.80	0.73	0.53	-	-	-	-	-	-	-	-		0.00
29	1.00	22.90	0.53	6.53	0.60	-	-	-	-	-	-	-	-		0.00
30	0.10	17.70	0.93	9.27	0.64	-	-	-	-	-	-	-	-		0.00
31	0.30	-	1.47	5.67	0.68	-	-	-	-	-	0.00	-	-		0.00
32	0.20	7.20	1.07	4.67	0.75	-	-	-	-	-	0.00	-	-		0.00
33	1.10	8.70	0.93	1.93	0.64	-	-	-	-	-	0.00	-	-		0.00
34	0.50	7.30	1.07	2.60	0.90	-	-	-	-	-	0.00	0.00	0.00		0.00
35	1.20	8.00	1.20	2.13	0.90	-	-	-	-	-	0.00	0.00	0.00		0.00
36	0.20	8.40	1.07	1.40	0.81	-	-	-	-	-	0.00	0.00	0.00		0.00
37	1.00	8.20	1.07	2.53	0.92	-	-	-	-	-	0.00	0.00	0.00		0.00
38	1.20	5.90	0.80	2.00	1.11	-	-	-	-	-	0.00	0.00	0.00		0.00
39	0.50	4.20	0.40	1.40	0.85	-	-	-	-	-	0.00	0.00	0.00		0.00
40	1.20	3.60	0.40	1.27	0.74	-	-	-	-	-	0.00	0.00	0.00		0.00
41	0.80	2.80	0.40	0.67	0.67	-	-	-	-	-	0.00	0.00	0.00		0.00
42	0.60	-	0.27	0.80	0.70	-	-	-	-	-	0.00	0.00	0.00		0.00
43	-	-	0.27	0.73	0.67	-	-	-	-	-	0.00	0.00	0.00		0.00
44	-	-			0.55	-	-	-	-						0.00
45	-	-			0.59	-	-	-	-						0.00
46	-	-			0.65	-	-	-	-						0.00

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar, * Natural Enemies include coccinellids, chrysopids, syrphids and spider.**-number per plant

Table: 119. Ent 2: Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in North Zone during 2024-25 in HS-6.

SMW	No. of Larvae /5plants									
	Earias spp									
	BT**		FA#		HI**		SR		SG	
	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
22	-	-	-	-						0.00
23	-	-	-	-						0.00
24	-	-	-	-	-	-				0.00
25	-	-	-	-	-	-	-	-		0.21
26	-	-	-	-	-	-	-	-		0.53
27	-	-	-	-	-	-	-	-		0.37
28	-	-	-	-	-	-	-	-		0.59
29	-	-	-	-	-	-	-	-		1.21
30	-	-	-	-	-	-	-	-		1.09
31	-	-	-	-	-	0.00	-	-		0.91
32	-	-	-	-	-	0.00	-	-		0.43
33	-	-	-	-	-	0.00	-	-		0.38
34	-	-	-	-	-	0.00	0.00	0.00		1.68
35	-	-	-	-	-	0.00	0.00	0.00		1.08
36	-	0.60	-	0.10	-	0.00	0.00	0.00		0.66
37	-	1.00	-	0.20	-	0.20	0.00	0.33		0.49
38	-	-	-	0.40	-	0.40	0.00	0.53		1.21
39	-	-	-	0.30	-	0.00	0.00	0.47		1.58
40	-	-	-	0.20	-	0.20	0.00	0.40		1.11
41	-	-	-	0.30	-	0.20	0.00	0.67		0.29
42	-	-	-	-	-	0.40	0.00	0.93		0.17
43	-	-	-	-	-	0.40	0.00	0.33		0.17
44	-	-	-	-						0.22
45	-	-	-	-						0.20
46	-	-	-	-						0.17

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG-** Sriganganagar, **-number per plant, #-number per ten plants

Table: 120. Ent 2: Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in North Zone during 2024-25 in HS-6.

SMW	No. of Larvae /5plants									
	S. litura									
	BT		FA		HI		SR		SG	
	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
22	-	-	-	-						0.00
23	-	-	-	-						0.00
24	-	-	-	-	-	-				0.00
25	-	-	-	-	-	-	-	-		0.00
26	-	-	-	-	-	-	-	-		0.00
27	-	-	-	-	-	-	-	-		0.00
28	-	-	-	-	-	-	-	-		0.00
29	-	-	-	-	-	-	-	-		1.00
30	-	-	-	-	-	-	-	-		0.00
31	-	-	-	-	-	0.00	-	-		3.00
32	-	-	-	-	-	0.00	-	-		0.00
33	-	-	-	-	-	0.00	-	-		2.00
34	-	-	-	-	-	0.00	0.00	0.00		0.00
35	-	-	-	-	-	0.00	0.00	0.00		0.00
36	-	-	-	-	-	0.00	0.00	0.00		1.00
37	-	-	-	-	-	0.00	0.00	0.00		0.00
38	-	-	-	-	-	0.00	0.00	0.00		0.00
39	-	-	-	-	-	0.00	0.00	0.00		2.00
40	-	-	-	-	-	0.00	0.00	0.00		0.00
41	-	-	-	-	-	0.00	0.00	0.00		0.00
42	-	-	-	-	-	0.00	0.00	0.00		3.00
43	-	-	-	-	-	0.00	0.00	0.00		0.00
44	-	-	-	-						0.00
45	-	-	-	-						2.00
46	-	-	-	-						0.00

BT- Bathinda**; FA**- Faridkot**; HI –** Hisar**; SR**- Sirsa**; SG**- Sriganganagar

Table: 121. Ent 2: Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in North Zone during 2024-25 in HS-6.

SMW	Fruiting Body Damage (%) **					Green Boll Damage (%) Due to ABW/SBW/TC					PBW Rosette flowers (%) Due to PBW				
	BT	FA	HI	SR	SG	BT	FA	HI	SR	SG	BT	FA	HI	SR	SG
22	-	-				-	-				-	-			
23	-	-				-	-				-	-	-		
24	-	-	-			-	-	-			-	-	-		
25	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-	0.00
26	-	-	-	-		-	-	-	-	0.00	-	-	-	-	0.00
27	-	-	-	-		-	-	-	-	0.00	-	-	-	-	0.00
28	-	-	-	0.00		-	-	-	0.00	0.00	-	-	-	0.00	11.00
29	-	-	-	0.00		-	-	-	0.00	0.00	-	-	-	0.00	2.00
30	-	-	-	0.00		-	-	-	0.00	0.00	-	-	-	0.00	7.00
31	-	-	0.00	0.00		-	-	0.00	0.00	0.00	-	-	-	0.00	0.00
32	-	-	0.00	0.00		-	-	0.00	0.00	0.00	-	-	-	0.00	6.00
33	-	-	0.00	0.00		-	-	0.00	0.00	2.00	-	-	-	0.00	5.00
34	-	-	0.00	1.49		-	-	0.00	0.00	5.00	-	-	-	0.00	4.00
35	-	5.56	2.00	0.00		-	-	0.00	0.00	14.00	-	-	-	0.00	4.00
36	-	2.38	4.00	0.00		-	-	2.00	0.00	17.00	-	-	-	0.00	4.00
37	12.66	7.14	6.00	3.09		-	-	2.00	8.74	9.00	-	-	-	0.00	4.00
38	14.66	5.36	12.00	5.21		-	-	4.00	9.09	14.00	-	-	-	0.00	8.00
39	14.00	6.06	6.00	10.22		-	-	2.00	12.62	13.00	-	-	-	0.00	7.00
40	12.66	5.62	22.00	6.06		-	-	6.00	7.43	9.00	-	-	-	0.00	9.00
41	-	3.80	10.00	16.76		-	-	6.00	29.11	9.00	-	-	-	0.00	9.00
42	-	-	36.00	13.43		-	-	6.00	24.17	7.00	-	-	-	0.00	4.00
43	-	-	40.00	6.12		-	-	8.00	25.56	5.00	-	-	-	0.00	6.00
44	-	-				-	-			7.00	-	-			5.00
45	-	-				-	-			6.00	-	-			5.00
46	-	-				-	-			5.00	-	-			11.00

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG-** Sriganganagar, ** Fruiting Body damage includes damage in squares, flowers

Table: 122 .Ent 2: Seasonal dynamics of key pests of cotton (Sucking Pests & Natural Enemies) under unprotected condition in North Zone during 2024-25 in GA.

SMW	Sucking Pests														
	Jassid/ 3 leaves					Whitefly/ 3 leaves					Thrips/ 3 leaves				
	BT	FA	HI	SR	SG	BT	FA	HI	SR	SG	BT	FA	HI	SR	SG
22	-	-			0.00	-	-			0.18	-	-			0.00
23	-	-	0.20		0.00	-	-	0.40		1.32	-	-	0.40		2.94
24	0.50	0.20	0.40		0.04	6.00	1.00	0.87		2.62	13.30	0.80	0.20		11.87
25	0.70	0.20	0.60	0.20	0.13	7.20	0.70	13.40	6.67	5.54	18.20	4.70	5.20	5.87	32.94
26	0.70	0.50	3.20	0.27	0.13	8.10	27.50	8.20	5.87	9.76	25.50	48.00	7.87	2.00	27.09
27	0.40	1.60	7.07	6.13	0.22	7.70	24.70	15.73	11.00	8.09	31.90	54.90	14.47	13.20	41.93
28	2.60	3.20	6.27	9.40	0.89	15.00	76.70	22.87	23.80	14.42	16.70	86.80	30.20	33.13	35.69
29	0.90	2.10	4.07	6.53	2.33	51.10	120.90	18.67	31.73	20.53	10.90	140.20	29.33	24.67	29.11
30	0.40	0.60	5.00	5.20	8.89	9.00	47.00	28.87	16.27	17.53	91.80	51.80	42.80	26.40	58.89
31	2.00	-	2.60	3.60	7.33	33.40	-	18.20	43.07	39.53	29.30	-	27.33	14.27	15.44
32	8.20	1.70	3.33	3.67	6.27	9.60	16.30	16.73	19.40	22.76	11.20	3.30	30.07	15.33	9.44
33	3.50	1.70	3.67	5.27	4.33	10.30	7.20	14.93	29.93	23.09	5.40	18.20	31.47	22.33	10.33
34	7.30	2.00	3.60	7.20	3.33	7.20	9.10	16.93	22.20	20.20	6.70	11.00	30.40	9.67	8.44
35	11.00	3.40	2.33	6.93	1.56	55.80	5.00	18.73	12.87	15.76	10.50	13.80	9.00	8.00	7.33
36	7.20	2.00	1.80	4.07	3.78	12.60	3.00	15.27	11.00	20.20	6.10	6.40	7.67	4.07	4.00
37	8.60	2.60	2.40	2.33	4.33	25.20	3.10	10.33	17.73	15.76	8.00	1.50	5.33	0.67	6.12
38	7.60	1.60	1.87	1.87	1.67	19.80	2.70	10.07	16.27	39.20	7.80	1.00	2.13	0.00	5.56
39	3.00	0.60	1.40	4.13	2.44	27.30	2.10	9.87	22.40	27.20	7.60	0.00	1.73	0.00	4.00
40	0.80	0.30	1.13	4.93	0.33	18.50	1.70	14.60	23.53	25.76	6.40	0.00	1.73	0.00	5.84
41	1.20	0.30	1.13	1.60	1.44	15.50	1.80	11.80	6.33	16.20	4.40	0.10	1.93	0.00	3.22
42	0.60	-	0.47	2.27	0.18	12.20	-	5.40	8.67	25.42	2.80	-	0.73	0.00	2.16
43		-	0.23	1.00	0.26	-	-	2.43	6.87	26.20	-	-	0.30	0.00	2.25
44		-			1.69	-	-			13.53	-	-			2.03
45		-			1.23	-	-			14.42	-	-			3.47
46		-			0.58	-	-			11.53	-	-			4.81

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar, * Natural Enemies include coccinellids, chrysopids, syrphids and spider.

Table: 123. Ent 2: Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition to develop suitable forecasting model in North Zone during 2024-25 in GA.

SMW	Natural Enemies/plant*					No. of larvae *H. armigera* /5plants									
	BT	FA	HI	SR	SG	BT		FA		HI		SR		SG	
						Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
22	-	-			0.00	-	-	-	-						0.00
23	-	-	0.00		0.16	-	-	-	-						0.00
24	0.00	0.00	0.00		0.00	-	-	-	-	-	-				0.00
25	0.20	0.00	0.13	0.07	0.03	-	-	-	-	-	-	-	-		0.00
26	0.40	0.20	0.67	0.13	0.05	-	-	-	-	-	-	-	-		0.00
27	1.20	0.70	0.93	0.80	0.04	-	-	-	-	-	-	-	-		0.00
28	1.10	3.40	0.80	0.93	0.22	-	-	-	-	-	-	-	-		0.00
29	0.70	24.60	0.40	4.07	0.44	-	-	-	-	-	-	-	-		0.00
30	1.00	6.70	0.80	5.07	0.56	-	-	-	-	-	-	-	-		0.00
31	1.20	-	1.20	4.60	0.67	-	-	-	-	-	0.00	-	-		0.00
32	2.00	4.70	1.07	5.47	0.89	-	-	-	-	-	0.00	-	-		0.00
33	0.80	5.30	1.07	3.07	0.56	-	-	-	-	-	0.00	-	-		0.00
34	1.00	4.90	0.40	2.20	1.33	-	-	-	-	-	0.00	0.00	0.00		0.00
35	0.80	4.20	0.67	2.27	1.33	-	-	-	-	-	0.00	0.00	0.00		0.00
36	0.20	2.20	0.67	2.20	1.08	-	-	-	-	-	0.00	0.00	0.00		0.00
37	0.40	5.10	0.80	4.13	1.41	-	-	-	-	-	0.00	0.00	0.00		0.00
38	1.20	6.70	0.40	0.73	1.97	-	-	-	-	-	0.00	0.00	0.00		0.00
39	0.20	4.20	0.53	2.20	1.19	-	-	-	-	-	0.00	0.00	0.00		0.00
40	1.00	0.80	0.40	1.47	0.86	-	-	-	-	-	0.00	0.00	0.00		0.00
41	0.80	2.20	0.13	1.27	0.64	-	-	-	-	-	0.00	0.00	0.00		0.00
42	0.40	-	0.13	0.33	0.75	-	-	-	-	-	0.00	0.00	0.00		0.00
43	-	-	0.13	0.40	0.64	-	-	-	-	-	0.00	0.00	0.00		0.00
44	-	-			0.30	-	-	-	-						0.00
45	-	-			0.40	-	-	-	-						0.00
46	-	-			0.60	-	-	-	-						0.00

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar, * Natural Enemies include coccinellids, chrysopids, syrphids and spide

Table: 124. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in North Zone during 2024-25 in GA.

SMW	No. of Larvae /5plants									
	Earias spp									
	BT**		FA		HI**		SR		SG	
	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
23										0.00
24	-	-	-	-	-	-				0.00
25	-	-	-	-	-	-	-	-		0.00
26	-	-	-	-	-	-	-	-		0.00
27	-	-	-	-	-	-	-	-		0.11
28	-	-	-	-	-	-	-	-		0.00
29	-	-	-	-	-	-	-	-		0.54
30	-	-	-	-	-	-	-	-		1.21
31	-	-	-	-	-	0.00	-	-		1.95
32	-	-	-	-	-	0.00	-	-		1.34
33	-	-	-	-	-	0.00	-	-		2.76
34	-	-	-	-	-	0.00	0.00	0.00		0.78
35	-	-	-	-	-	0.00	0.00	0.00		2.05
36	-	0.40	-	-	-	0.00	0.00	0.00		1.24
37	-	0.80	-	-	-	0.20	0.00	0.00		2.16
38	-	-	-	-	-	0.20	0.00	0.00		0.93
39	-	-	-	-	-	0.00	0.00	0.80		1.36
40	-	-	-	-	-	0.40	0.00	0.60		0.79
41	-	-	-	-	-	0.40	0.00	0.73		0.43
42	-	-	-	-	-	0.60	0.00	0.53		0.31
43	-	-	-	-	-	0.60	0.00	0.40		0.63
44	-	-	-	-						0.21
45	-	-	-	-						0.92
46	-	-	-	-						0.00

BT- Bathinda**; FA**- Faridkot**; HI –** Hisar**; SR**- Sirsa**; SG**- Sriganganagar, **-number per plant.

Table: 125. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in North Zone during 2024-25 in GA.

SMW	No. of Larvae /5plants									
	S. litura									
	BT		FA		HI		SR		SG	
	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
22	-	-	-	-						0.00
23	-	-	-	-						0.00
24	-	-	-	-	-	-				0.00
25	-	-	-	-	-	-	-	-		0.00
26	-	-	-	-	-	-	-	-		0.00
27	-	-	-	-	-	-	-	-		0.00
28	-	-	-	-	-	-	-	-		0.00
29	-	-	-	-	-	-	-	-		1.00
30	-	-	-	-	-	-	-	-		0.00
31	-	-	-	-	-	0.00	-	-		3.00
32	-	-	-	-	-	0.00	-	-		0.00
33	-	-	-	-	-	0.00	-	-		2.00
34	-	-	-	-	-	0.00	0.00	0.00		0.00
35	-	-	-	-	-	0.00	0.00	0.00		0.00
36	-	-	-	-	-	0.00	0.00	0.00		1.00
37	-	-	-	-	-	0.00	0.00	0.00		0.00
38	-	-	-	-	-	0.00	0.00	0.00		0.00
39	-	-	-	-	-	0.00	0.00	0.00		2.00
40	-	-	-	-	-	0.00	0.00	0.00		0.00
41	-	-	-	-	-	0.00	0.00	0.00		0.00
42	-	-	-	-	-	0.00	0.00	0.00		3.00
43	-	-	-	-	-	0.00	0.00	0.00		0.00
44	-	-	-	-						0.00
45	-	-	-	-						2.00
46	-	-	-	-						0.00

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar

Table: 126. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprot ected condition in North Zone during 2024-25 in GA.

SMW	Fruiting Body Damage (%) **					Green Boll Damage (%) Due to ABW/SBW/TC					PBW Rosette flowers (%) Due to PBW				
	BT	FA	HI	SR	SG	BT	FA	HI	SR	SG	BT	FA	HI	SR	SG
22	-	-			-	-	-				-	-			
23	-	-			-	-	-				-	-	-		
24	-	-	-		-	-	-	-			-	-	-		
25	-	-	-	-	-	-	-	-	-	0.00	-	-	-	-	0.00
26	-	-	-	-	-	-	-	-	-	0.00	-	-	-	-	0.00
27	-	-	-	-	-	-	-	-	-	0.00	-	-	-	-	7.00
28	-	-	-	0.00	-	-	-	-	0.00	0.00	-	-	-	0.00	6.00
29	-	-	-	0.00	-	-	-	-	0.00	0.00	-	-	-	0.00	6.00
30	-	-	-	0.00	-	-	-	-	0.00	0.00	-	-	-	0.00	0.00
31	-	-	0.00	0.00	-	-	-	0.00	0.00	0.00	-	-	-	0.00	2.00
32	-	-	0.00	0.00	-	-	-	0.00	0.00	3.00	-	-	-	0.00	5.00
33	-	-	0.00	0.00	-	-	-	0.00	0.00	2.00	-	-	-	0.00	4.00
34	-	-	0.00	0.00	-	-	-	0.00	0.00	0.00	-	-	-	0.00	3.00
35	-	-	4.00	0.00	-	-	-	0.00	0.00	13.00	-	-	-	0.00	4.00
36	-	-	2.00	0.00	-	-	-	2.00	0.00	9.00	-	-	-	0.00	3.00
37	-	-	8.00	1.47	-	-	-	4.00	1.59	18.00	-	-	-	0.00	3.00
38	10.00	-	6.00	0.00	-	-	-	4.00	0.00	16.00	-	-	-	0.00	5.00
39	14.00	-	4.00	7.43	-	-	-	2.00	8.24	14.00	-	-	-	0.00	4.00
40	13.33	-	16.00	5.62	-	-	-	6.00	7.46	9.00	-	-	-	0.00	7.00
41	12.00	-	16.00	19.00	-	-	-	4.00	22.94	9.00	-	-	-	0.00	6.00
42	-	-	30.00	10.22	-	-	-	10.00	19.44	18.00	-	-	-	0.00	8.00
43	-	-	34.00	4.59	-	-	-	10.00	20.00	8.00	-	-	-	0.00	5.00
44	-	-			-	-	-			11.00	-	-			5.00
45	-	-			-	-	-			9.00	-	-			8.00
46	-	-			-	-	-			4.00	-	-			8.00

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar, ** Fruiting Body damage includes damage in squares, flowers

Table: 127.Ent 2: Seasonal dynamics of key pests of cotton (Sucking Pests & Natural Enemies) under unprotected condition in North Zone during 2024-25 in RS 2013.

SMW	Sucking Pests														
	Jassid/ 3 leaves					Whitefly/ 3 leaves					Thrips/ 3 leaves				
	BT	FA	HI	SR	SG	BT	FA	HI	SR	SG	BT	FA	HI	SR	SG
22	-	-			0.00	-	-			1.84	-	-			0.00
23	-	-	0.27		0.00	-	-	0.53		2.43	-	-	0.33		2.44
24	0.60	0.10	0.60		0.04	6.80	2.70	1.33		2.67	15.60	0.30	0.60		5.38
25	0.40	0.10	0.47	0.27	0.05	5.60	3.20	15.67	7.87	2.40	19.80	7.70	6.07	6.33	7.49
26	0.70	0.00	5.13	0.20	1.13	8.40	38.70	8.80	5.87	1.23	24.80	56.90	13.47	2.67	8.78
27	1.80	1.50	6.33	5.13	7.58	8.50	16.30	9.13	6.07	5.45	33.50	56.50	11.87	11.13	10.37
28	1.90	1.90	6.87	9.07	2.22	18.10	50.60	20.80	17.87	8.67	18.80	82.30	27.67	35.87	4.45
29	1.80	2.70	4.47	6.60	3.22	55.80	107.30	17.93	39.27	13.22	12.10	122.30	28.47	55.60	7.67
30	0.50	0.50	5.33	4.67	7.32	5.50	59.70	23.40	15.67	8.67	78.40	76.00	41.87	47.40	17.56
31	1.30	-	3.20	4.47	8.62	21.00	-	20.20	34.27	11.78	32.70	-	31.27	23.53	30.89
32	11.40	3.20	2.40	3.33	9.89	9.90	21.10	14.00	14.07	14.56	15.10	0.10	26.80	19.80	16.22
33	4.70	1.50	3.27	4.93	5.67	15.40	7.40	16.33	25.80	29.22	7.00	7.90	32.33	21.27	14.00
34	9.10	2.10	3.60	5.73	2.78	6.60	10.20	18.87	25.80	14.11	5.30	11.40	32.53	11.13	3.67
35	12.50	3.90	3.53	3.93	3.67	59.90	6.00	13.60	14.00	13.00	9.80	12.20	9.13	8.87	3.45
36	6.80	2.60	2.07	4.60	1.89	15.70	7.50	14.80	15.93	6.78	5.70	6.40	9.27	5.67	3.11
37	8.90	2.80	1.93	3.27	1.33	23.40	4.90	12.33	16.60	47.56	9.80	4.70	5.87	1.33	3.22
38	6.60	0.90	1.93	1.60	1.00	19.80	4.20	11.80	14.80	42.00	8.80	0.40	2.60	0.00	2.11
39	1.60	0.60	1.13	4.00	3.45	24.30	3.20	14.40	22.27	39.11	8.60	0.00	1.93	0.00	3.56
40	0.50	0.10	1.27	3.93	3.45	18.50	2.60	16.80	19.20	26.22	6.40	0.00	1.40	0.00	2.45
41	0.40	0.20	1.00	2.40	1.22	16.40	2.30	12.33	5.53	31.89	4.80	0.10	0.93	0.00	6.45
42	0.20	-	0.60	2.33	1.00	13.30	-	4.20	8.53	21.00	2.80	-	0.60	0.00	4.11
43	-	-	0.13	3.00	2.04	-	-	1.93	7.27	1.96	-	-	0.13	0.00	1.10
44	-	-			2.81	-	-	-	-	3.92	-	-	-	-	1.06
45	-	-			0.54	-	-	-	-	8.03	-	-	-	-	0.89
46	-	-			0.74	-	-	-	-	4.78	-	-	-	-	1.40

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar

Table: 128. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in North Zone during 2024-25 in RS-2013.

SMW	Natural Enemies/plant*					No. of larvae *H. armigera*/5plants									
	BT	FA	HI	SR	SG	BT		FA		HI		SR		SG	
						Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
22		-			0.00	-	-	-	-						0.00
23		-	0.00		0.16	-	-	-	-						0.00
24	0.00	0.00	0.00		0.00	-	-	-	-	-	-				0.00
25	0.20	0.00	0.27	0.00	0.48	-	-	-	-	-	-	-	-		0.00
26	0.50	1.40	0.67	0.07	0.79	-	-	-	-	-	-	-	-		0.00
27	1.20	0.50	0.40	0.87	0.93	-	-	-	-	-	-	-	-		0.00
28	0.60	3.20	1.07	1.60	1.22	-	-	-	-	-	-	-	-		0.00
29	1.00	22.50	0.53	4.13	1.44	-	-	-	-	-	-	-	-		0.00
30	0.40	14.30	0.67	6.53	1.56	-	-	-	-	-	-	-	-		0.00
31	0.50	-	0.93	4.40	1.67	-	-	-	-	-	0.00	-	-		0.00
32	1.10	3.70	1.20	6.60	1.89	-	-	-	-	-	0.00	-	-		0.00
33	0.30	6.40	1.47	2.20	1.56	-	-	-	-	-	0.00	-	-		0.00
34	1.00	6.69	0.53	2.07	2.33	-	-	-	-	-	0.00	0.00	0.00		0.00
35	1.20	8.80	0.93	2.87	2.33	-	-	-	-	-	0.00	0.00	0.00		0.00
36	0.80	8.00	0.80	3.13	2.08	-	-	-	-	-	0.00	0.00	0.00		0.00
37	1.10	7.80	0.80	2.47	2.41	-	-	-	-	-	0.00	0.00	0.00		0.00
38	0.60	6.70	0.40	0.67	2.97	-	-	-	-	-	0.00	0.00	0.00		0.00
39	1.00	3.40	0.67	2.20	2.19	-	-	-	-	-	0.00	0.00	0.00		0.00
40	1.20	2.40	0.27	1.60	1.86	-	-	-	-	-	0.00	0.00	0.00		0.00
41	0.80	1.70	0.20	0.53	1.64	-	-	-	-	-	0.00	0.00	0.00		0.00
42	0.40	-	0.27	0.47	1.75	-	-	-	-	-	0.00	0.00	0.00		0.00
43		-	0.13	0.53	1.64	-	-	-	-	-	0.00	0.00	0.00		0.00
44		-			1.30	-	-	-	-						0.00
45		-			1.40	-	-	-	-						0.00
46		-			1.60	-	-	-	-						0.00

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar * Natural Enemies include coccinellids, chrysopids, syrphids and spider.

Table: 129. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in North Zone during 2024-25 in RS-2013.

SMW	No. of Larvae /5plants									
	Earias spp									
	BT**		FA		HI**		SR		SG	
	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
22	-	-	-	-						0.00
23	-	-	-	-						1.09
24	-	-	-	-	-	-				0.00
25	-	-	-	-	-	-	-	-		1.03
26	-	-	-	-	-	-	-	-		3.03
27	-	-	-	-	-	-	-	-		1.03
28	-	-	-	-	-	-	-	-		3.43
29	-	-	-	-	-	-	-	-		4.30
30	-	-	-	-	-	-	-	-		3.66
31	-	-	-	-	-	0.00	-	-		5.40
32	-	-	-	-	-	0.00	-	-		4.70
33	-	-	-	-	-	0.00	-	-		3.97
34	-	-	-	-	-	0.00	0.00	0.00		1.03
35	-	-	-	-	-	0.00	0.00	0.00		1.03
36	-	1.20	-	-	-	0.20	0.00	0.00		4.03
37	-	0.80	-	-	-	0.40	0.00	0.00		1.03
38	-	-	-	-	-	0.20	0.00	0.40		3.03
39	-	-	-	-	-	0.20	0.00	0.40		3.46
40	-	-	-	-	-	0.60	0.00	0.53		1.03
41	-	-	-	-	-	0.40	0.00	0.27		1.03
42	-	-	-	-	-	0.60	0.00	0.33		5.03
43	-	-	-	-	-	0.40	0.00	0.33		3.40
44	-	-	-	-						1.03
45	-	-	-	-						3.81
46	-	-	-	-						4.01

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG-** Sriganganagar, **-number per plant

Table: 130. Ent 2: Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in North Zone during 2024-25 in RS-2013.

SMW	No. of Larvae /5plants									
	S. litura									
	BT		FA		HI		SR		SG	
	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
22	-	-	-	-	-	-	-	-	-	0.00
23	-	-	-	-	-	-	-	-	-	0.00
24	-	-	-	-	-	-			-	0.00
25	-	-	-	-	-	-	-	-	-	0.00
26	-	-	-	-	-	-	-	-	-	0.00
27	-	-	-	-	-	-	-	-	-	0.00
28	-	-	-	-	-	-	-	-	-	0.00
29	-	-	-	-	-	-	-	-	-	0.00
30	-	-	-	-	-	-	-	-	-	0.00
31	-	-	-	-	-	0.00	-	-	-	0.00
32	-	-	-	-	-	0.00	-	-	-	0.00
33	-	-	-	-	-	0.00	-	-	-	0.00
34	-	-	-	-	-	0.00	0.00	0.00	-	0.00
35	-	-	-	-	-	0.00	0.00	0.00	-	0.00
36	-	-	-	-	-	0.00	0.00	0.00	-	0.00
37	-	-	-	-	-	0.00	0.00	0.00	-	0.00
38	-	-	-	-	-	0.00	0.00	0.00	-	0.00
39	-	-	-	-	-	0.00	0.00	0.00	-	0.00
40	-	-	-	-	-	0.00	0.00	0.00	-	0.00
41	-	-	-	-	-	0.00	0.00	0.00	-	0.00
42	-	-	-	-	-	0.00	0.00	0.00	-	0.00
43	-	-	-	-	-	0.00	0.00	0.00	-	0.00
44	-	-	-	-	-	-	-	-	-	0.00
45	-	-	-	-	-	-	-	-	-	0.00
46	-	-	-	-	-	-	-	-	-	0.00

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar

Table: 131. Ent 2: Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in North Zone during 2024-25 in RS-2013.

SMW	Fruiting Body Damage (%) **					Green Boll Damage (%) Due to ABW/SBW/TC					Rosette flowers (%) Due to PBW				
	BT	FA	HI	SR	SG	BT	FA	HI	SR	SG	BT	FA	HI	SR	SG
24	-	-	-		-	-	-	-			-	-	-		
25	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-	0.00
26	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-	8.00
27	-	-	-	-	0.00	-	-	-	-	0.00	-	-	-	-	7.00
28	-	-	-	0.00	-	-	-	-	0.00	0.00	-	-	-	0.00	9.00
29	-	-	-	0.00	-	-	-	-	0.00	0.00	-	-	-	0.00	0.00
30	-	-	-	0.00	-	-	-	-	0.00	0.00	-	-	-	0.00	0.00
31	-	-	0.00	0.00	-	-	-	0.00	0.00	0.00	-	-	-	0.00	0.00
32	-	-	0.00	0.00	-	-	-	0.00	0.00	0.00	-	-	-	0.00	5.00
33	-	-	0.00	0.00	-	-	-	0.00	0.00	4.00	-	-	-	0.00	3.00
34	-	-	0.00	0.00	-	-	-	0.00	0.00	0.00	-	-	-	0.00	5.00
35	-	-	2.00	0.00	-	-	-	0.00	0.00	4.00	-	-	-	0.00	5.00
36	-	-	2.00	0.00	-	-	-	2.00	0.00	9.00	-	-	-	0.00	5.00
37	14.00	-	8.00	0.00	-	-	-	4.00	0.00	11.00	-	-	-	0.00	4.00
38	14.66	-	14.00	1.86	-	-	-	2.00	2.83	12.00	-	-	-	0.00	4.00
39	11.33	-	6.00	3.97	-	-	-	2.00	4.55	16.00	-	-	-	0.00	5.00
40	12.66	-	16.00	9.38	-	-	-	6.00	13.79	12.00	-	-	-	0.00	8.00
41	-	-	12.00	7.74	-	-	-	6.00	14.10	9.00	-	-	-	0.00	7.00
42	-	-	28.00	9.00	-	-	-	8.00	13.56	7.00	-	-	-	0.00	4.00
43	-	-	26.00	3.67	-	-	-	4.00	9.51	5.00	-	-	-	0.00	3.00
44	-	-			-	-	-			9.00	-	-			2.00
45	-	-			-	-	-			4.00	-	-			9.00
46	-	-			-	-	-			3.00	-	-			7.00

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar, ** Fruiting Body damage includes damage in squares, flowers

Table: 132. Ent 2: Seasonal dynamics of key pests of cotton in relation to climatic conditions in North Zone during 2024-25.

Variety/hybrid	Green Boll Damage (%) Due to PBW through 50 Green boll destructive sampling					PBW Larval recovery (Nos.) through 50 Green boll destructive sampling				
	BT	FA	HI	SR	SG	BT	FA	HI	SR	SG
RCH-650 BG-II	0.00	15.00	3.00	21.00	20.50	0.00	7.78	0.75	12.50	8.25
HS-6	0.00	15.00	3.50	27.00	14.25	0.00	14.89	0.75	20.00	3.25
GA	0.00	-	4.00	25.00	17.50	0.00	13.78	0.50	22.00	3.50
RS 2013	0.00	-	4.00	26.00	19.00	0.00	12.44	0.50	17.00	5.25

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar

Table: 133.Ent 2: Seasonal dynamics of key pests of cotton (Open Boll and Locule damage) under unprotected condition in North Zone during 2024-25. (RCH-650 BG-II, HS-6, GA & RS 2013)

At Harvest	Open Boll damage (%)					Open Locule damage (%)				
	BT	FA	HI	SR	SG	BT	FA	HI	SR	SG
RCH-650 BG-II	0.00	-	2.48	11.06	30.00	0.00	13.40	1.38	6.06	3.30
HS-6	0.00	-	3.87	27.74	20.00	0.00	11.25	2.54	18.24	0.00
GA	0.00	-	2.77	23.13	25.00	0.00	-	1.55	18.14	1.32
RS 2013	0.00	-	2.45	25.85	25.00	0.00	-	2.17	17.83	1.85

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar

Table: 134.Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in North Zone during 2024-25 – Weekly Trap Catches

SMW	*Helicoverpa armigera*					*Pectinophora gossypiella*				
	BT	FA	HI	SR	SG	BT	FA	HI	SR	SG
22	-	-	10.80	-	-	-	-	0.20	-	-
23	-	-	5.80	-	-	-	-	2.20	-	-
24	-	23.00	2.60	-	-	-	0.00	0.00	-	-
25	-	28.00	1.20	0.14	0.00	-	2.00	1.00	1.29	4.00
26	-	43.00	0.40	3.57	0.00	-	6.00	2.80	4.00	24.21
27	-	66.00	5.60	10.00	4.00	-	5.00	4.20	5.00	28.42
28	-	89.00	14.20	6.29	0.00	-	10.00	26.20	25.29	24.76
29	-	42.00	2.40	0.00	7.00	-	6.00	22.60	18.57	7.00
30	-	11.00	2.60	0.14	0.00	-	32.00	2.60	17.00	5.00
31	-	18.00	4.60	1.00	12.00	-	4.00	3.40	13.57	12.00
32	-	1.00	3.40	18.43	0.00	-	0.00	1.00	11.86	9.00
33	-	1.00	7.00	11.43	4.00	-	1.00	0.60	15.14	26.49
34	-	8.00	2.20	1.71	0.00	-	2.00	3.60	21.43	31.37
35	-	0.00	2.40	5.71	6.00	-	0.00	4.20	12.57	13.93
36	-	6.00	1.80	2.00	0.00	-	0.00	8.40	84.14	9.59
37	-	0.00	2.20	1.29	3.00	-	1.00	19.00	113.43	12.00
38	-	2.00	3.80	3.00	1.00	-	5.00	57.60	133.71	9.00
39	-	2.00	2.20	0.86	0.00	-	9.00	72.60	218.29	7.00
40	-	0.00	36.00	4.00	2.00	-	0.00	24.80	228.57	9.00
41	-	1.00	5.60	14.29	5.00	-	0.00	67.80	236.00	11.00
42	-	-	3.80	10.57	0.00	-	-	104.60	374.86	9.00
43	-	-	5.20	4.43	0.00	-	-	80.60	387.57	7.00
44	-	-		4.29	2.00	-	-		238.57	8.00
45	-	-	-	-	2.00	-	-	-	-	6.00
46	-	-	-	-	0.00	-	-	-	-	7.00

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar

Table: 135.Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in North Zone during 2024-25 – Weekly Trap Catches

SMW	*Earias insulana*					*Spodoptera litura*				
	BT	**FA**	**HI**	**SR**	**SG**	**BT**	**FA**	**HI**	**SR**	**SG**
22	-	-	0.00			-	-	32.00		
23	-	-	0.00			-	-	24.00		
24	-	0.00	0.80			-	42.00	13.60		
25	-	0.00	0.20	0.00	0.00	-	56.00	74.80	0.00	0.00
26	-	0.00	0.00	0.00	0.00	-	72.00	15.80	0.29	0.00
27	-	3.00	0.40	0.00	0.00	-	87.00	72.60	0.57	0.00
28	-	1.00	0.40	0.00	0.00	-	115.00	119.40	0.43	7.00
29	-	4.00	0.60	0.00	0.00	-	58.00	111.20	0.00	15.00
30	-	3.00	0.60	0.00	2.00	-	48.00	87.40	0.00	12.00
31	-	3.00	3.00	0.14	4.00	-	21.00	258.00	5.14	17.00
32	-	2.00	1.20	0.43	1.00	-	18.00	61.20	19.29	19.00
33	-	3.00	3.80	0.71	3.00	-	8.00	111.20	9.00	6.00
34	-	2.00	2.80	0.86	5.00	-	23.00	85.20	2.29	6.00
35	-	10.00	3.00	0.43	11.02	-	95.00	128.60	11.14	13.52
36	-	3.00	0.80	0.57	12.70	-	78.00	58.20	1.43	36.86
37	-	4.00	5.60	4.43	9.04	-	63.00	94.80	10.57	45.90
38	-	17.00	27.60	4.00	11.94	-	34.00	64.40	12.57	3.98
39	-	29.00	103.40	0.71	9.47	-	6.00	27.60	0.00	31.00
40	-	8.00	83.80	0.14	5.38	-	9.00	34.80	0.00	33.70
41	-	7.00	42.40	4.71	11.65	-	8.00	74.60	16.86	15.00
42	-	-	18.40	3.57	9.36	-	-	39.20	16.29	13.31
43	-	-	24.00	18.43	11.52	-	-	58.40	26.00	32.57
44	-	-		14.14	6.83	-	-		35.43	15.00
45	-	-			8.05	-	-			16.00
46	-	-			6.04	-	-			12.00

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar

Table: 136.Ent 2: Seasonal dynamics of key pests of cotton (Abiotic factors) under unprotected condition in North Zone during 2024-25

SMW	Temperature(^{O}C)									
	BT		FA		HI		SR		SG	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
22	-	-	-	-	25.90	45.60	-	-	-	-
23	-	-	-	-	25.70	41.60	-	-	-	-
24	26.91	43.66	27.14	42.79	28.20	43.70	-	-	-	-
25	26.43	38.66	27.27	39.09	28.40	40.50	28.89	43.70	28.67	39.07
26	27.69	39.29	28.40	37.63	27.80	37.80	29.10	39.03	31.41	41.53
27	26.31	35.16	26.87	35.14	27.20	33.90	27.41	35.84	29.51	39.17
28	26.17	37.34	26.43	35.36	27.50	36.20	27.81	37.07	29.19	38.30
29	28.86	38.97	29.76	37.29	28.70	37.80	28.84	38.80	29.77	39.84
30	27.54	37.60	28.83	37.20	28.80	37.60	27.89	39.19	29.63	38.56
31	27.14	34.29	27.14	35.29	28.00	35.50	27.90	32.94	29.19	35.97
32	26.77	34.49	26.86	33.54	26.70	33.40	26.74	35.00	28.97	33.37
33	26.77	34.26	27.00	34.34	27.30	33.50	27.01	36.04	27.40	34.53
34	26.09	35.97	26.67	34.53	27.20	34.50	26.76	36.21	27.80	35.10
35	25.23	33.40	24.93	32.91	26.20	33.00	26.16	34.44	26.89	32.69
36	25.37	32.80	24.51	33.07	25.70	31.70	25.40	34.54	27.10	33.99
37	25.06	35.91	24.67	34.06	25.00	33.90	24.81	34.49	27.04	35.06
38	24.31	34.43	23.73	33.43	24.40	34.10	24.00	36.01	27.31	36.04
39	25.20	34.74	24.69	33.46	25.20	35.00	24.54	35.74	27.49	35.61
40	23.43	35.34	22.30	34.56	23.00	37.10	22.43	36.69	27.46	38.00
41	19.91	34.29	18.66	33.56	18.80	34.50	20.27	34.50	25.97	35.79
42	18.77	35.26	-	-	17.70	35.90	17.29	35.90	24.80	36.63
43	-	-	-	-	18.00	34.10	17.81	34.51	21.97	34.69
44	-	-	-	-	-	-	17.97	35.06	21.21	33.50
45	-	-	-	-	-	-	15.19	32.10	18.86	32.81
46	-	-	-	-	-	-	14.07	27.51	17.86	26.67

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar,

Table: 137.Ent 2: Seasonal dynamics of key pests of cotton (Abiotic factors) under unprotected condition in North Zone during 2024-25.

SMW	Relative Humidity (%)									
	BT		FA		HI		SR		SG	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
22	-	-	-	-	41.60	14.70	-	-	-	-
23	-	-	-	-	52.20	21.70	-	-	-	-
24	48.71	19.86	48.00	20.14	41.50	18.80	-	-	-	-
25	55.43	29.14	62.29	34.86	66.00	39.90	65.86	28.57	70.57	57.57
26	57.71	37.71	71.75	48.50	79.00	54.30	67.29	46.29	69.14	56.29
27	69.14	46.43	82.71	61.86	87.90	70.90	83.43	56.00	75.00	63.14
28	68.86	44.00	79.14	56.43	82.60	56.40	74.57	54.29	63.86	62.86
29	63.86	42.00	78.71	55.71	84.80	59.50	68.29	51.14	61.00	68.00
30	73.57	45.57	79.86	58.57	82.90	56.30	69.86	48.43	67.71	69.43
31	78.71	63.14	85.14	64.86	87.30	68.40	79.00	57.71	72.71	64.71
32	79.29	56.57	86.57	67.57	92.90	75.20	78.57	63.29	70.00	76.29
33	75.29	60.71	87.71	71.29	93.30	69.70	74.14	60.71	72.86	65.29
34	79.43	57.86	85.71	65.57	87.30	65.80	66.00	59.57	70.71	72.43
35	80.86	62.57	89.00	70.71	93.60	71.80	78.71	67.57	80.43	85.86
36	80.14	66.71	91.00	63.86	93.40	83.30	76.00	63.86	82.86	74.43
37	78.57	60.57	86.43	63.00	92.30	63.30	77.86	62.86	73.29	64.43
38	81.29	60.57	88.29	61.14	92.10	60.30	79.14	61.43	63.86	69.00
39	80.86	61.57	88.29	65.57	89.00	55.50	76.57	59.71	69.86	70.00
40	84.14	64.00	85.14	53.00	89.80	38.20	65.43	45.00	68.29	51.29
41	84.57	54.86	86.14	43.29	88.60	31.80	68.86	39.43	73.14	59.57
42	86.86	58.14	-	-	83.60	28.10	63.29	31.86	64.43	54.71
43	-	-	-	-	89.30	32.70	73.43	36.71	69.57	49.29
44	-	-	-	-			77.57	37.00	70.86	46.14
45	-	-	-	-	-	-	78.29	44.43	88.14	70.43
46	-	-	-	-	-	-	81.14	44.86	89.57	72.00
47	-	-	-	-	-	-	82.29	35.57	-	-
48	-	-	-	-	-	-	80.86	40.14	-	-
49	-	-	-	-	-	-	81.71	38.14	-	-
50	-	-	-	-	-	-	76.00	40.00	-	-
51	-	-	-	-	-	-	81.00	50.00	-	-
52	-	-	-	-	-	-	85.56	74.33	-	-

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar, **AM**-Moring, **PM**-Evening

Table: 138. Ent 2: Seasonal dynamics of key pests of cotton (Abiotic factors) under unprotected condition in North Zone during 2024-25.

SMW	Rainfall in mm				
	BT	FA	HI	SR	SG
22	-	-	9.00	-	-
23	-	-	2.20	-	-
24	0.00	0.00	0.00	-	-
25	13.60	7.80	25.20	7.43	36.50
26	0.80	6.40	52.40	0.00	13.50
27	70.40	41.00	43.40	11.21	96.70
28	5.60	12.60	0.00	0.00	0.00
29	0.00	0.00	1.20	2.43	0.00
30	0.00	0.00	8.00	1.50	26.80
31	65.60	58.00	71.00	3.00	72.90
32	0.00	12.70	143.80	0.71	0.00
33	1.00	67.40	23.40	4.03	23.60
34	37.00	21.60	9.00	0.60	10.90
35	49.20	17.40	29.20	3.94	32.70
36	20.20	35.50	46.10	0.00	78.80
37	0.00	9.60	19.60	0.00	2.70
38	0.00	14.40	0.00	0.00	0.00
39	0.00	0.00	0.00	0.00	9.20
40	0.00	0.00	0.00	0.00	0.00
41	0.00	0.00	0.00	0.00	0.00
42	0.00	-	0.00	0.00	0.00
43	-	-	0.00	0.00	0.00
44	-	-	-	0.00	0.00
45	-	-	-	0.00	0.00
46	-	-	-	0.00	0.00
47	-	-	-	0.00	-
48	-	-	-	0.00	-
49	-	-	-	0.00	-
50	-	-	-	0.00	-
51	-	-	-	0.00	-
52	-	-	-	2.66	-

BT- Bathinda**; FA**- Faridkot**; HI** – Hisar**; SR**- Sirsa**; SG**- Sriganganagar

Central zone

Table:139.Ent 2: Seasonal dynamics of key pests of cotton (Sucking Pests) under unprotected condition in Central Zone during 2024-25 in RCH 2 BG II / Ajeet -155 BGII*

SMW	Sucking Pests																	
	Aphids/ 3 leaves									Jassid/ 3 leaves								
	BA	JU	SU	BH	AK	NA*	RA*	KH	BW	BA	JU	SU	BH	AK	NA*	RA*	KH	BW
27	-	-	-	-	-		8.40		-	-	-	-	-	-		1.32		-
28	-	-	-	-	-		6.65		-	-	-	-	-	-		1.16		-
29	-	-	-	-	-	5.31	3.80		-	-	-	-	-	-	0.49	0.85		-
30	-	0.20	0.00			8.00	35.80	16.35	-	0.67	0.40	0.20			2.40	1.52	1.00	-
31	-	0.40	0.60			12.91	42.60	16.50	-	3.33	0.80	0.40			4.18	1.40	2.00	-
32	-	0.40	1.20	0.00		5.38	45.08	18.60	-	5.67	1.20	0.80	0.80		6.40	2.15	1.00	-
33	-	0.60	2.70	0.20		4.18	53.40	13.50	-	9.67	1.60	1.20	1.20		7.40	3.50	5.00	-
34	-	0.80	3.30	0.00	4.57	2.31	21.50	13.20	-	12.33	2.20	2.10	1.50	2.73	7.20	0.85	2.00	-
35	-	0.80	4.00	0.20	1.10	0.00	28.90	15.60	-	15.67	0.50	3.40	1.70	4.70	5.20	2.68	0.00	-
36	-	2.40	5.10	0.30	0.00	0.00	19.50	15.60	-	13.00	2.80	3.60	2.60	6.30	8.20	1.90	2.00	-
37	-	3.40	5.50	0.40	0.10	2.91	35.40	13.50	-	11.33	3.20	5.20	3.00	10.20	7.40	4.60	2.00	-
38	-	6.80	7.90	0.40	0.23	3.47	44.62	19.00	-	11.00	4.60	5.20	3.40	7.73	5.20	6.50	1.80	-
39	-	1.40	13.50	0.50	0.00	4.40	17.68	16.50	-	10.67	1.00	6.10	3.60	9.27	4.40	3.20	0.00	-
40	-	8.40	17.90	0.60	0.00	0.00	35.40	16.50	-	9.33	5.20	7.20	4.80	4.30	4.00	2.60	2.00	-
41	-	13.20	22.00	0.70	0.00	0.00	28.45	15.36	-	9.00	6.80	8.60	5.70	3.83	3.40	1.60	3.00	-
42	-	17.60	27.30	1.20	0.00	2.22	30.74	13.60	-	8.33	8.20	9.40	8.90	2.47	3.22	3.80	4.00	-
43	-	21.20	29.20	1.80	0.33	3.80	34.24	19.00	-	6.33	9.20	10.90	10.20	1.13	3.40	2.32	5.00	-
44	-	26.40	33.70	2.40	0.57	4.20	38.45	36.30	-	6.00	11.60	13.40	6.70	1.97	4.18	3.05	2.00	-
45	-	28.80	41.90	9.40	0.43	4.00	67.54	35.60	-	5.33	14.60	12.40	5.80	2.37	3.80	1.20	1.60	-
46	-	30.00	45.80	10.40	3.60	6.80	77.00	35.60	-	4.00	15.60	9.70	4.30	3.43	3.38	2.45	2.20	-
47	-	32.40	51.30	17.80	9.03	10.20	70.00	36.90	-	3.00	14.30	6.70	3.20	4.07	2.40	2.20	1.50	-
48	-	36.40	53.50	19.60	18.63	11.40	80.00	9.60	-	1.00	11.40	6.30	2.40	3.10	0.80	2.50	0.40	-
49	-	35.40	55.80	22.40	21.87	34.80	87.00	13.00	-	0.67	8.80	5.80	2.20	1.03	0.60	2.64	3.00	-
50	-	37.60	54.30	25.80	26.13	68.80	98.00	-	-	0.33	4.40	3.20	1.60	2.07	0.20	2.25		-
51	-	40.20	57.70	24.20	17.17	78.80	103.00	-	-	-	3.20	2.30	1.30	1.90	0.00	2.00		-
52	-	41.60	49.50	30.20	28.50	86.20	110.00	-	-	-	0.80	1.00	1.00	1.73	0.00	1.80		-
01	-		45.00		19.17			-	-	-		0.00		1.00				-
02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna, *- **Ajeet -155 BG-II sown**

Table: 140. Ent 2: Seasonal dynamics of key pests of cotton (Sucking Pests) under unprotected condition Central Zone during 2024-25 in RCH 2 BG II/ Ajeet -155 BG II*

SMW	Sucking Pests															
	Whitefly/ 3 leaves									Thrips/ 3 leaves						
	BA	JU	SU	BH	AK	NA*	RA*	KH	BW	BA	JU	SU	BH	AK	NA*	RA*
27	-	-	-	-	-		0.00		-		-	-	-	-		2.35
28	-	-	-	-	-		0.00		-	-	-	-	-	-		1.90
29	-	-	-	-	-	0.00	0.00		-	-	-	-	-	-	0.00	1.00
30		0.40	0.20			0.00	0.12	23.00	-	-	0.20	2.60			0.73	45.15
31		0.20	0.20			0.00	0.52	26.50	-	-	0.40	6.30			5.20	42.28
32		0.60	0.40	0.00		0.18	0.36	23.50	-	-	0.80	7.40	0.40		14.80	31.46
33	0.33	1.00	0.60	0.00		0.20	2.44	26.30	-	-	1.60	14.20	1.10		26.78	42.20
34	1.00	1.40	1.20	0.00	5.80	0.49	0.8	25.60	-	-	2.20	16.30	1.70	7.67	23.20	22.52
35	2.00	1.00	1.80	0.00	4.33	1.38	0.52	4.00	-	-	0.80	22.40	2.40	12.40	17.38	2.60
36	3.33	2.40	2.00	0.30	8.63	3.02	0.45	16.60	-	-	3.80	28.50	5.70	8.67	43.60	4.60
37	5.33	3.40	2.20	0.60	5.77	8.18	0.25	13.50	-	-	4.60	32.60	13.70	6.27	37.33	2.75
38	8.00	12.40	2.70	0.70	9.33	6.91	0.48	13.20	-	-	5.20	35.20	14.80	8.33	41.33	1.80
39	12.67	0.80	3.10	0.90	11.47	4.18	0.22	13.50	-	-	1.60	37.40	16.20	5.97	49.60	1.05
40	14.33	16.80	3.60	1.10	6.63	5.80	1.84	13.20	-	-	10.20	32.40	17.40	3.30	25.58	1.28
41	13.67	22.40	3.50	1.00	8.63	4.20	0.48	15.60	-	-	11.40	35.60	20.20	2.37	16.02	0.40
42	10.67	26.80	4.20	1.20	4.60	6.91	2.08	12.60	-	-	12.80	31.30	15.80	4.03	15.33	2.40
43	8.00	31.20	4.30	1.40	3.23	5.20	1.64	13.60	-	-	14.60	28.40	11.40	2.97	8.40	1.30
44	6.33	30.00	5.10	1.50	3.07	4.60	4.36	9.80	-	-	13.00	30.40	10.20	3.83	5.20	1.20
45	6.67	28.40	5.50	1.70	2.33	4.91	7.32	5.60	-	-	10.00	26.80	7.80	1.43	5.00	1.20
46	5.33	21.40	5.70	2.00	4.47	6.20	9.04	1.60	-	-	8.80	23.40	4.70	4.80	4.20	1.00
47	2.33	16.20	5.80	2.10	6.10	5.18	10.08	1.00	-	-	6.20	14.20	4.30	5.43	2.60	1.05
48	4.00	11.00	6.10	1.90	6.07	4.60	10.12	13.32	-	-	1.40	6.90	3.60	3.10	2.20	0.80
49	6.00	9.60	5.50	1.50	5.33	2.80	11.20	12.30	-	-	0.00	2.30	2.80	0.00	0.60	0.50
50	6.67	6.40	4.60	1.20	2.17	0.00	12.20		-	-	0.00	0.00	2.40	2.17	0.00	0.20
51		3.20	3.60	1.00	3.13	0.00	13.50		-	-	0.00	0.00	2.20	3.03	0.00	0.48
52		1.00	2.10	1.00	1.40	0.00	14.20		-	-	0.00	0.00	1.80	1.90	0.00	0.56

BA- Banswara**, JU-** Junagadh**, SU-** Surat**, BH-** Bharuch**, AK-** Akola**, NA-** Nanded**, RA-** Rahuri, **KH-** Khandwa, **BW-** Bhawanipatna. *- **Ajeet -155 BG-II sown**

Table: 141. Ent 2: Seasonal dynamics of key pests of cotton (Sucking Pests) under unprotected condition Central Zone during 2024-25 in RCH 2 BG II/ Ajeet -155 BG II*

SMW	Natural Enemies/plant**								
	BA	JU#	SU	BH	AK	NA*	RA*	KH	BW
27	-	-	-	-	-		0.36	-	-
28	-	-	-	-	-		0.68	-	-
29	-	-	-	-	-	0.40	0.48	-	-
30	-	0.00	0.00	-	-	1.00	1.76	1.30	-
31	-	0.10	0.20	-	-	2.00	2.64	0.00	-
32	-	0.40	0.20	0.00	-	2.40	3.32	0.30	-
33	-	0.60	0.30	0.10	-	3.40	3.16	3.60	-
34	0.20	0.40	0.40	0.20	1.40	3.00	1.52	3.20	-
35	0.20	0.80	0.40	0.20	1.90	2.20	1.80	1.30	-
36	0.30	1.00	0.60	0.30	0.63	4.80	1.68	4.60	-
37	0.30	1.40	0.80	0.50	1.10	5.00	1.20	2.00	-
38	0.30	1.60	1.00	0.60	1.07	5.20	1.36	6.60	-
39	0.40	1.40	1.20	0.80	2.03	5.60	0.76	3.30	-
40	0.40	1.60	1.60	1.00	1.80	3.00	0.92	0.32	-
41	0.30	1.80	2.00	1.10	0.90	2.20	0.60	2.30	-
42	0.40	2.20	2.20	1.20	0.57	2.40	1.52	3.30	-
43	0.30	2.40	2.40	1.10	0.87	1.80	0.72	1.60	-
44	0.30	2.80	2.60	1.30	0.80	1.60	1.16	1.90	-
45	0.30	2.60	2.60	1.40	0.93	1.40	2.56	0.30	-
46	0.20	2.60	2.20	1.40	2.30	2.00	2.44	0.60	-
47	0.30	3.20	2.40	1.50	2.23	1.60	2.56	0.90	-
48	0.30	3.00	3.00	1.70	1.70	1.80	2.68	0.90	-
49	0.30	3.60	2.80	1.80	1.43	2.40	3.96	0.80	-
50	0.20	2.20	3.20	2.00	0.67	6.20	4.20		-
51		1.80	3.20	2.10	1.90	7.00	5.08		-
52		0.80	3.00	2.40	2.43	7.80	4.60		-

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna, **Natural Enemies include coccinellids, chrysopids, syrphids and spider. *- **Ajeet -155 BG-II sown**, #- per five plants.

Table: 142. Ent 2: Seasonal dynamics of key pests of cotton (Natural Enemies &Bollworms) under unprotected condition in Central Zone during 2024-25 in RCH 2 BG II/ Ajeet -155 BG II*

SMW	No. of Larval Recovery/5plants													
	H.armigera													
	JU		SU##		BH##		AK		NA*##		RA*##		KH	
	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
27											0.00	0.00		
28											0.00	0.00		
29									0.00	0.00	0.00	0.00		
30	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.00	0.30
31	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.20	0.50
32	0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.30	0.60
33	0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.30
34	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.30	0.30
35	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.40	0.30
36	0.00	0.00	0.00	0.00	0.00	0.00		0.13	0.00	0.00	0.00	0.00	0.50	0.20
37	0.00	0.00	0.00	0.00	0.00	0.00		0.20	0.00	0.00	0.00	0.00	0.60	0.00
38	0.00	0.00	0.00	0.00	0.00	0.00		0.10	0.00	0.20	0.00	0.10	0.30	0.00
39	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.40	0.20	0.00	0.10	0.20	0.30
40	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.20	0.20	0.00	0.00	0.30	0.00
41	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.40	0.00	0.00	0.30	0.00
42	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.33	0.00	0.00	0.20	0.00
43	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.20	0.00	0.00	0.30	0.00
44	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.20	0.00	0.00	0.20	0.00
45	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.13	0.00	0.00	0.30	0.30
46	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.30	0.00
47	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.30
48	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
49	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		
51	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		
52	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		
01			0.00	0.00				0.00						
02														
03														

JU- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, *- **Ajeet -155 BG-II sown**, ##-number per plant

Table: 143. Ent 2: Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in Central Zone during 2024-25 in RCH 2 BG II/ Ajeet -155 BG II*

SMW	No. of Larvae/5plants															
	Earias spp.															
	JU		SU##		BH##		AK		NA*##		RA*##		KH		BW	
	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
27											0.00	0.00				
28											0.00	0.00				
29									0.00	0.00	0.00	0.00				
30		0.00	0.00	0.00					0.00	0.00	0.00	0.00		0.30		
31		0.00	0.00	0.00					0.00	0.00	0.00	0.00		0.10		
32		0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00		0.60		
33		0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00		0.50		
34		0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.30		
35		0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.00		
36		0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.00		
37		0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.00		
38		0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.00		
39		0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.30		
40		0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.50		
41		0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.60		
42		0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.60		
43		0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.60		
44		0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.80		
45		0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.90		
46		0.00	0.00	0.00	0.00	0.00		0.10	0.00	0.00	0.00	0.00		0.40		
47		0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.50		
48		0.00	0.00	0.00	0.00	0.00		0.20	0.00	0.00	0.00	0.00		0.00		
49		0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.00		
50		0.00	0.00	0.00	0.00	0.00		0.13	0.00	0.00	0.00	0.00				
51		0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00				
52		0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00				
01			0.00	0.00				0.00								
02																
03																

JU- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna. *- **Ajeet -155 BG-II sown**, ##-number per plant

Table:144.Ent 2: Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in Central Zone during 2024-25 in RCH 2 BG II/ Ajeet -155 BG II*

SMW	No. of Larvae/5plants											
	S. litura.											
	JU		SU##		BH##		AK		NA*##		RA*##	
	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
27	-	-	-	-	-	-	-	-			0.00	0.00
28	-	-	-	-	-	-	-	-			0.00	0.00
29	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00
30		0.00	0.00	0.00			-	-	0.00	0.00	0.00	0.00
31		0.00	0.00	0.00			-	-	0.00	0.00	0.00	0.00
32		0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00
33		0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00
34		0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00
35		0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00
36		0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.20	0.00	0.00
37		0.00	0.00	0.00	0.00	0.00	-	-	0.07	0.33	0.00	0.00
38		0.00	0.00	0.00	0.00	0.00	-	-	0.13	0.47	0.00	0.00
39		0.00	0.00	0.00	0.00	0.00	-	-	0.00	1.00	0.00	0.00
40		0.00	0.00	0.00	0.00	0.00	-	-	0.00	1.20	0.20	0.10
41		0.00	0.00	0.00	0.00	0.00	-	-	0.00	1.20	0.00	0.20
42		0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.53	0.00	0.00
43		0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.40	0.00	0.00
44		0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.33	0.00	0.00
45		0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.20	0.00	0.00
46		0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00
47		0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00
48		0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00
49		0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00
50		0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00
51		0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00
52		0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00
01			0.00	0.00			-	-				
02	-	-	-	-	-	-	-	-	-	-	-	-
03	-	-	-	-	-	-	-	-	-	-	-	-

JU- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, * Ajeet-155 BG II, ##-number per plant

Table: 145. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in Central Zone during 2024-25 in RCH 2 BG II/ Ajeet -155 BG II*.

SMW	Fruiting Body Damage (%) **				GBD (%) by ABW/ TC/SBW			GBD (%)/20 green boll destructive sampling		PBW Larvae/ 20 bolls destructive sampling			PBW Rosette flowers (%)		
	SU	BH	AK	NA*	SU	BH	AK	RA#	KH	JU	RA*#	KH	SU	BH	NA*
27															
28															
29				0.00											
30	0.00			0.00	0.00				0.00	0.00		0.30	0.00		
31	0.00			0.00	0.00				0.00	0.00		0.50	0.00		
32	0.00	0.00		0.00	0.00	0.00			0.00	0.00		0.60	0.00	0.00	
33	0.00	0.00		21.75	0.00	0.00			0.00	0.00		0.30	0.00	0.00	0.00
34	0.00	0.00		7.24	0.00	0.00	0.00		10.00	0.00		0.30	0.00	0.00	3.33
35	0.00	0.00		6.56	0.00	0.00	0.00		10.00	0.00		0.00	0.00	0.00	8.33
36	0.29	0.00		9.07	0.00	0.00	1.93		10.00	0.00		0.50	0.11	0.00	1.67
37	0.89	0.00		2.56	0.00	0.00	3.47		23.00	0.00		0.90	0.41	0.00	0.00
38	1.78	0.00		12.68	0.00	0.00	1.70		36.00	0.00		0.50	1.05	0.00	0.00
39	2.05	0.00		15.90	0.00	0.00	0.40	10.00	32.00	0.00	1.00	0.60	1.52	1.72	0.00
40	2.85	0.00		4.17	0.00	0.00	0.00	20.00	23.00	0.00	1.00	0.90	1.86	2.20	0.00
41	3.55	1.54		9.56	0.00	0.00	0.00	10.00	55.00	0.00	1.00	0.80	3.05	2.35	0.00
42	5.66	1.89		12.01	0.00	0.00	0.23	20.00	56.00	0.00	2.00	0.90	4.30	2.56	0.00
43	6.30	2.94		3.05	0.00	0.00	0.00	30.00	60.00	0.00	3.00	0.90	5.55	3.23	0.00
44	5.74	3.45		2.97	0.00	0.00	0.00	60.00	9.00	1.00	5.00	0.90	3.77	3.39	0.00
45	6.99	3.80		3.39	0.00	0.00	0.00	50.00	98.00	1.00	6.00	0.90	0.00	4.69	0.00
46	5.89	4.41		4.42	0.00	0.00	0.00	80.00	99.00	1.00	7.00	0.70	0.00	3.28	3.33
47	5.00	4.23		0.00	0.00	0.00	0.00	70.00	98.00	2.00	12.00	0.60	0.00	1.28	5.00
48	3.58	3.08		0.00	0.00	0.00	2.37	80.00	65.00	4.00	22.00	0.60	0.00	0.00	16.67
49	2.21	2.47		0.00	0.00	0.00	0.33	100.00	66.00	5.00	18.00	0.90	0.00	0.00	20.00
50	1.25	3.08		0.00	0.00	0.00	0.00	100.00		5.00	25.00		0.00	0.00	1.67
51	0.00	1.72		0.00	0.00	0.00	0.57	90.00		4.00	14.00		0.00	0.00	0.00
52	0.00	1.61		0.00	0.00	0.00	0.00	100.00		2.00	24.00		0.00	0.00	0.00
01	0.00				0.00		0.00						0.00		

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna,* At Nanded Ajeet-155 BG II ** Fruiting Body damage includes damage in squares, flowers and boll,#- GBD based on 10 green bolls

Table: 146 .Ent 2. Seasonal dynamics of key pests of cotton (Sucking Pests) under unprotected condition in Central Zone during 2024-25 in DCH 32/ Suvin.

SMW	Sucking Pests																
	Aphids/ 3 leaves								Jassids/ 3 leaves								
	JU	SU	BH	AK	NA	RA	KH	BW	BA	JU	SU	BH	AK	NA	RA	KH	BW
24									-								
25									-								
26									-								
27						7.60			-						3.16		
28						10.00			-						2.32		
29					2.71	8.35			0.67					1.02	1.45		
30	0.60	0.40			4.47	52.20		28.60	3.67	0.20	0.60			4.00	2.62		
31	1.00	0.80			8.11	108.00	13.60	17.40	7.00	1.40	1.50			6.33	2.48	1.30	
32	2.40	1.10	0.00		2.47	90.60	16.50	14.20	9.33	3.20	2.20	0.80		8.40	5.80	2.30	
33	3.20	1.60	0.00		2.42	76.60	21.30	10.60	14.67	5.40	3.60	1.20		9.20	6.35	0.30	
34	4.40	1.80	0.20	0.47	0.00	23.40	12.30	3.80	17.33	9.40	4.50	1.50	5.90	9.00	2.80	0.30	
35	3.60	2.60	0.30	0.00	0.00	29.25	16.60	1.20	18.67	8.55	3.40	1.70	18.23	7.42	6.48	4.60	6.00
36	3.00	3.40	0.50	0.00	0.00	21.60	13.60	0.80	19.00	7.20	4.20	2.60	10.20	11.58	4.60	3.60	9.50
37	7.80	6.80	0.70	0.00	1.22	28.60	16.50	0.60	15.33	12.30	6.80	3.00	3.50	9.40	7.90	2.60	10.60
38	10.60	7.40	0.70	0.00	1.38	37.40	13.60	1.75	14.67	15.35	8.10	3.40	8.67	7.62	10.50	3.60	16.50
39	1.20	8.60	0.90	0.00	1.91	9.80	23.60	0.40	13.33	2.00	9.60	3.60	9.20	7.18	6.30	2.30	19.20
40	14.40	11.60	0.80	0.00	0.00	17.80	25.60	0.20	11.67	20.65	10.50	4.80	8.83	6.20	5.00	2.60	14.45
41	17.60	12.80	1.20	0.00	0.00	11.00	32.00	0.00	11.00	24.70	12.30	6.70	14.30	5.18	4.10	2.80	14.20
42	20.80	16.80	1.30	0.00	0.00	33.20	36.60	0.60	9.67	25.20	14.60	11.70	13.17	5.09	8.40	4.60	12.36
43	25.20	26.80	2.90	0.60	0.00	15.20	36.30	0.90	8.33	29.75	15.40	8.90	2.90	5.50	6.52	2.30	10.45
44	29.40	31.60	3.40	0.53	0.00	19.20	32.30	0.00	7.33	33.30	17.60	7.20	1.07	6.60	6.65	6.50	8.24
45	31.95	34.10	4.20	0.20	0.00	36.80	36.60	0.00	6.67	30.00	18.80	6.40	1.40	6.20	3.50	4.60	6.84
46	43.60	36.80	4.70	0.93	0.00	47.26	21.30	0.00	5.00	27.30	19.60	5.70	18.70	5.80	4.45	5.90	6.28
47	45.20	41.20	6.80	0.47	2.80	52.40	13.60	0.00	3.67	24.50	14.20	4.80	12.50	5.00	4.10	3.50	6.20
48	46.80	41.80	8.10	4.60	4.60	63.40	13.30	0.00	2.00	22.00	15.40	4.10	10.30	3.20	4.30	3.60	5.24
49	48.80	43.60	9.00	7.50	8.20	67.20	13.60	0.00	1.33	17.40	10.20	3.30	13.53	1.80	4.04	2.60	4.82
50	52.40	44.80	11.20	12.23	23.38	70.50	3.60	0.00	0.67	14.75	6.80	2.20	14.37	1.40	3.65	4.60	4.60
51	53.80	42.40	11.70	9.50	41.60	73.40		0.00		11.80	4.50	1.90	0.83	0.80	3.20		4.20
52	56.75	36.70	13.20	11.93	50.20	77.20				8.75	3.20	1.40	6.67	0.40	1.90		4.20
01		31.40		4.37							0.00		2.63				
02																	

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna

Table: 147.Ent 2. Seasonal dynamics of key pests of cotton (Sucking Pests) under unprotected condition in Central Zone during 2024-25 in DCH 32/ Suvin.

SMW	Sucking Pests																	
	Whitefly/ 3 leaves									Thrips/ 3 leaves								
	BA	JU	SU	BH	AK	NA	RA	KH	BW	BA	JU	SU	BH	AK	NA	RA	KH	BW
24																		
25																		
26																		
27							0.00									1.20		
28							0.00									1.80		
29						0.00	0.00				0.60	6.40			0.00	3.00		
30		0.20	0.00			0.00	0.20				2.60	8.30			0.29	47.20		
31		0.60	0.10			0.00	0.00	0.00			3.20	4.80			4.00	42.40		
32	0.67	0.80	0.10	0.00		0.20	0.40	0.30			5.40	10.20	0.80		9.87	33.20		
33	1.33	0.60	0.00	0.00		0.20	0.96	1.30			14.20	19.60	1.30		20.18	44.80		0.10
34	1.33	2.40	0.20	0.00	2.90	0.58	0.00	12.30			4.00	28.40	1.50	2.90	16.71	29.40		0.10
35	2.33	1.80	0.60	0.00	3.30	1.38	1.12	12.60			8.40	30.20	1.80	2.00	13.33	2.20		0.10
36	4.67	1.60	0.70	0.30	3.37	3.00	0.72	13.50	0.30		10.20	33.70	3.80	2.60	35.58	4.42		0.10
37	6.00	4.20	1.20	0.40	4.90	8.47	3.10	15.60	0.35		11.80	35.40	9.70	1.50	30.18	3.10		0.10
38	9.33	7.80	1.80	0.50	4.30	6.58	5.20	26.30	0.00		1.50	36.00	12.40	2.20	33.20	3.00		0.10
39	13.33	1.00	1.60	0.70	4.20	4.31	3.32	23.50	0.10		10.20	31.50	16.30	1.57	37.00	1.35		0.15
40	16.67	10.60	2.40	0.90	6.20	5.80	3.20	36.30	0.10		12.00	28.60	16.90	5.73	19.80	1.40		0.15
41	15.00	12.40	3.60	1.10	4.30	4.31	2.80	23.50	0.10		14.80	25.10	18.00	2.50	10.80	0.40		0.20
42	12.33	11.40	3.70	1.20	4.40	7.18	4.35	26.60	0.10		8.40	21.60	19.80	3.77	9.40	3.10		0.25
43	9.67	8.40	3.90	1.40	5.63	5.60	3.80	23.30	0.15		6.00	19.40	13.80	1.20	5.40	2.40		0.30
44	7.33	6.40	4.20	1.60	2.10	3.40	4.35	11.30	0.10		5.80	15.70	8.70	0.87	2.80	1.80		0.10
45	10.00	2.20	5.20	1.80	4.40	3.20	5.90	26.50	0.10		4.20	6.90	7.30	0.83	2.20	1.70		0.10
46	16.00	2.00	5.10	1.70	2.90	2.80	7.35	13.20	0.15		2.30	3.40	6.20	2.40	1.40	1.20		0.10
47	13.33	1.60	5.60	1.80	3.50	2.40	6.60	15.60	0.30		1.20	2.20	4.30	1.23	0.00	1.35		0.10
48	15.33	1.40	5.60	2.00	3.23	0.00	6.30	9.90	0.35		0.00	1.00	3.30	0.80	0.00	1.00		
49	17.00	1.00	4.80	2.10	2.00	0.00	6.50	8.90	0.40		0.00	0.00	2.70	1.40	0.00	1.00		
50	17.67	0.80	3.90	2.10	1.70	0.00	7.70	6.90	0.45		0.00	0.00	1.90	2.50	0.00	0.80		
51		0.40	2.80	2.00	2.43	0.00	8.25		0.50		0.00	0.00	1.60	1.40	0.00	0.50		
52		0.00	1.40	1.70	2.20	0.00	9.00		0.55		0.00	0.00	1.40	1.27	0.00	0.60		
01			0.30		1.47									0.70				
02																		

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna

Table: 148. Ent 2. Seasonal dynamics of key pests of cotton (Sucking Pests) under unprotected condition in Central Zone during 2024-25 in DCH 32/ Suvin.

SMW	Natural Enemies/plant*								
	BA	JU**	SU	BH	AK	NA	RA	KH	BW
27									
28	-						0.32		
29	-					0.40	0.40		
30	-	0.00	0.10			0.80	2.56		0.10
31	-	0.10	0.10			1.60	3.68	0.00	0.15
32	-	0.10	0.10	0.20		2.00	2.28	0.30	0.15
33	-	1.00	0.20	0.20		3.00	1.12	0.00	0.20
34	-	0.20	0.20	0.40	0.57	2.40	0.88	1.20	0.25
35	-	0.40	0.20	0.50	2.27	2.00	1.24	0.80	0.25
36	-	0.30	0.20	0.70	0.97	4.80	1.36	1.60	0.25
37	-	0.50	0.20	0.80	0.83	4.60	0.84	1.20	1.20
38	-	0.60	0.30	1.00	0.43	4.60	1.00	0.00	1.40
39	-	0.80	0.20	0.90	1.53	4.80	0.12	3.60	2.00
40	-	0.90	0.30	1.10	0.80	3.00	0.20	3.30	2.00
41	-	1.40	0.40	1.10	0.73	1.80	0.48	2.30	2.00
42	-	1.60	0.60	1.20	1.07	2.00	1.60	0.80	2.00
43	-	2.00	0.40	1.30	0.97	1.60	0.88	0.50	1.25
44	-	2.40	0.80	1.20	1.40	1.20	0.64	0.00	1.30
45	-	2.20	1.20	1.10	1.27	1.00	1.12	3.80	1.25
46	-	2.60	1.20	1.20	1.13	0.80	1.56	0.40	1.20
47	-	2.80	1.40	1.40	1.07	1.00	2.52	0.00	1.20
48	-	2.40	1.60	1.50	1.63	0.80	2.32	0.20	0.80
49	-	2.60	1.80	1.60	2.17	1.00	4.04	0.00	0.80
50	-	3.00	2.00	1.80	2.93	2.60	4.12	0.00	0.60
51	-	3.20	2.00	2.00	1.47	4.40	4.88		0.60
52	-	3.60	2.20	2.10	1.60	5.20	4.94		0.60
01	-		3.20		0.77				
02	-								
03	-								

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna *Natural Enemies include coccinellids, chrysopids, syrphids and spider., **- number per five plant.

Table: 149. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in Central Zone during 2024-25 in DCH 32/ Suvin.

SMW	No. of Larval Recovery/5plants															
	H. armigera															
	JU		SU##		BH##		AK		NA*##		RA##		KH		BW##	
	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
27											0.00	0.00				
28											0.00	0.00				
29									0.00	0.00	0.00	0.00				
30	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00				
31	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.60	0.30		
32	0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.70	0.20		
33	0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.40	0.60	0.00	0.00
34	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	**0.90**	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.40	0.90	0.00	0.00
36	0.00	0.00	0.00	0.00	0.20	0.00		0.10	0.00	0.00	0.00	0.00	0.30	0.60	0.40	0.45
37	0.00	1.00	0.00	0.00	0.00	0.00		0.20	0.00	0.00	0.00	0.00	0.00	0.50	0.70	0.60
38	0.00	1.20	0.00	0.00	0.10	0.00		0.20	0.00	0.13	0.00	0.10	0.60	0.60	0.80	0.70
39	0.00	1.80	0.00	0.20	0.00	0.00		0.00	0.13	0.27	0.00	0.20	0.50	0.60	1.20	0.80
40	0.00	1.00	0.00	0.40	0.00	0.00		0.00	0.00	0.33	0.00	0.40	0.40	0.36	0.60	0.80
41	0.00	2.20	0.00	0.60	0.00	0.10		0.00	0.13	0.47	0.00	0.50	0.00	0.30	0.40	0.60
42	0.00	2.00	0.00	0.60	0.00	0.20		0.10	0.00	0.33	0.00	0.20	0.40	0.50	0.30	0.45
43	0.00	1.80	0.00	1.20	0.00	0.20		0.00	0.00	0.20	0.00	0.00	0.00	0.60		
44	0.00	2.00	0.00	1.40	0.00	0.20		0.10	0.00	0.20	0.00	0.00	**0.60**	0.00		
45	0.00	1.80	0.00	1.60	0.00	0.10		0.00	0.00	0.00	0.00	0.00	0.80	0.00		
46	0.00	2.00	0.00	1.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.50	0.00		
47	0.00	2.00	0.00	0.60	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.40	0.30		
48	0.00	1.80	0.00	0.40	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.20	0.30		
49	0.00	1.40	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.20	0.60		
50	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.50		
51	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00				
52	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00				

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna, , *NA- Larva/plant, ##-number per plant

Table: 150. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in Central Zone during 2024-25 in DCH 32/ Suvin.

SMW	No. of Larval Recovery/5plants															
	Earias spp.															
	JU		SU##		BH##		AK		NA*##		RA##		KH		BW##	
	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
27	-	-	-	-	-	-	-	-	-	-	0.00	0.00	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	0.00	0.00	-	-	-	-
29	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	-	-	-	-
30		0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	0.00	-	-	-	-
31	-	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	0.00	-	0.30	-	-
32	-	0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.13	0.00	0.00		0.30	-	-
33	-	0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.20	0.00	0.10	-	0.36	0.00	0.00
34	-	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.07	0.00	0.00	-	0.00	0.00	0.00
35	-	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00
36	-	0.00	0.00	0.00	0.00	0.10	-	0.00	0.00	0.00	0.00	0.00	-	0.00	0.10	2.00
37	-	0.00	0.00	0.00	0.00	0.20	-	0.00	0.00	0.00	0.00	0.00	-	0.40	0.30	2.50
38	-	0.00	0.00	0.00	0.20	0.30	-	0.00	0.00	0.00	0.00	0.00	-	0.00	0.45	2.75
39	-	0.00	0.00	0.00	0.00	0.20	-	0.00	0.00	0.00	0.00	0.10	-	0.00	0.40	2.00
40	-	0.00	0.00	0.00	0.00	0.10	-	0.00	0.00	0.00	0.00	0.00	-	0.00	0.30	2.50
41	-	0.00	0.00	0.00	0.00	0.10	-	0.00	0.00	0.00	0.00	0.00	-	0.40	0.00	2.50
42	-	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00		0.00	-	3.25
43	-	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	-	0.60	-	2.50
44	-	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00		0.40	-	2.00
45	-	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	-	0.30	-	1.00
46	-	0.00	0.00	0.00	0.00	0.00	-	0.20	0.00	0.00	0.00	0.00	-	0.60	-	0.75
47	-	0.00	0.00	0.00	0.00	0.00	-	0.10	0.00	0.00	0.00	0.00	-	0.50	-	0.50
48	-	0.00	0.00	0.00	0.00	0.00	-	0.10	0.00	0.00	0.00	0.00	-	0.50	-	0.50
49	-	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	-	0.60	-	0.50
50	-	0.00	0.00	0.00	0.00	0.00	-	0.20	0.00	0.00	0.00	0.00	-	0.30	-	0.50
51	-	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	-		-	0.25
52	-	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	-		-	0.25
01	-		0.00	0.00	-	-	-	0.00	-	-	-	-	-	-	-	-

JU- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna, , *NA- Larva/plant
##-number per plant

able: 151. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in Central Zone during 2024-25 in DCH 32/ Suvin.

	No. of Larval Recovery/5plants															
	S. litura															
	JU		SU##		BH##		AK		NA##		RA##		KH		BW##	
SMW	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
27											0.00	0.00				
28											0.00	0.00				
29									0.00	0.00	0.00	0.00				
30		0.00	0.00	0.00					0.00	0.00	0.00	0.00				
31		0.00	0.00	0.00					0.00	0.00	0.00	0.00				
32		0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00				
33		0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00			0.00	0.00
34		0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00			0.00	0.40
35		0.00	0.00	0.00	0.10	0.00			0.00	0.00	0.00	0.00			0.00	0.80
36		0.00	0.00	0.20	0.20	0.00			0.00	0.00	0.00	0.00			0.25	1.20
37		0.00	0.00	0.40	0.20	0.20			0.00	0.00	0.00	0.00			0.25	1.40
38		1.00	0.00	0.60	0.00	0.30			0.00	0.00	0.00	0.00			0.50	0.60
39		1.00	0.00	1.00	0.00	0.60			0.00	0.20	0.00	0.00			0.50	1.20
40		1.00	0.00	1.20	0.00	0.90			0.13	0.40	0.10	0.00			0.00	0.80
41		1.00	0.00	1.40	0.00	1.20			0.07	0.40	0.00	0.20			0.00	0.60
42		2.00	0.00	1.80	0.00	0.80			0.00	0.20	0.00	0.00			0.00	0.30
43		2.00	0.00	2.00	0.00	0.30			0.00	0.20	0.00	0.00			0.00	0.00
44		2.00	0.00	1.60	0.00	0.00			0.00	0.00	0.00	0.00			0.00	0.00
45		1.00	0.00	1.20	0.00	0.00			0.00	0.00	0.00	0.00			0.00	0.20
46		1.00	0.00	0.80	0.00	0.00			0.00	0.00	0.00	0.00			0.00	0.10
47		0.00	0.00	0.40	0.00	0.00			0.00	0.00	0.00	0.00			0.00	0.00
48		0.00	0.00	0.20	0.00	0.00			0.00	0.00	0.00	0.00			0.00	0.05
49		0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00				
50		0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00				
51		0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00				
52		0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00				
1			0.00	0.00												
2																
3																

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna ,
##-number per plant

Table: 152. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in Central Zone during 2024-25 in DCH 32/ Suvin.

SMW	Fruiting Body Damage (%) **					GBD (%) due to ABW/ TC/SBW			GBD (%)/20 green bolls destructive sampling		PBW Larva/20 green boll destructive sampling			Rosette flowers (%) due to PBW			
	SU	BH	AK	NA	BW	SU	BH	AK	RA	KH	JU	RA#	KH	SU	BH	NA	BW
28																	0.00
29				0.00													0.00
30	0.00			0.00		0.00					0.00			0.00			0.00
31	0.00			0.00		0.00				0.00	0.00		0.00	0.00			0.00
32	0.00	0.00		42.86		0.00	0.00			0.00	0.00		0.00	0.00	0.00		0.00
33	0.00	0.00		22.22		0.00	0.00			0.00	0.00		0.00	0.00	0.00	0.00	0.00
34	0.00	0.00		8.33		0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00
35	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	3.33	0.00
36	0.00	0.00		0.00	4.38	0.00	0.00	1.43		20.00	0.00		0.30	0.00	0.00	3.33	0.00
37	1.85	0.00		0.00	2.71	0.00	0.00	3.57		30.00	0.00		0.20	1.25	0.00	0.00	0.00
38	3.05	0.00		8.16	5.06	0.00	0.00	2.07		30.00	0.00		0.30	2.56	1.33	0.00	0.00
39	4.88	0.00		12.07	3.68	0.00	0.00	0.90	10.00	33.00	0.00	1.00	0.30	3.03	3.45	0.00	0.00
40	5.66	0.00		13.70	3.87	0.00	6.38	0.41	20.00	32.00	0.00	2.00	0.25	4.29	4.23	0.00	0.00
41	6.89	2.94		17.74	4.53	4.25	8.89	0.00	20.00	36.00	0.00	1.00	0.60	5.88	4.88	0.00	0.00
42	9.77	3.45		10.00	5.07	6.30	9.26	0.00	10.00	60.00	0.00	1.00	0.60	6.24	1.28	0.00	0.00
43	12.23	4.60		11.43	3.64	7.23	11.54	0.39	40.00	60.00	0.00	6.00	0.45	7.34	1.15	0.00	0.00
44	16.79	4.94		3.85	4.74	11.89	11.86	1.23	80.00	65.00	1.00	11.00	0.65	9.00	0.00	0.00	0.00
45	15.25	5.41		0.00	4.50	14.70	8.33	0.71	60.00	64.00	1.00	8.00	0.65	6.52	0.00	0.00	0.00
46	12.22	6.10		0.00	5.59	13.21	6.35	0.00	60.00	75.00	2.00	6.00	0.99	3.25	0.00	0.00	0.00
47	8.44	3.70		0.00	9.36	11.32	4.23	0.37	80.00	78.00	3.00	13.00	0.89	0.00	0.00	1.67	0.00
48	6.21	2.67		0.00	5.98	8.05	0.00	2.64	100.00	69.00	5.00	20.00	0.99	0.00	0.00	8.33	0.00
49	2.97	1.32		0.00	5.07	6.21	0.00	0.28	100.00	90.00	6.00	24.00	0.89	0.00	0.00	15.00	0.00
50	0.85	0.00		0.00	4.80	4.32	0.00	1.35	100.00	89.00	7.00	21.00	0.88	0.00	0.00	0.00	0.00
51	0.00	0.00		0.00	3.30	3.26	0.00	0.81	100.00		5.00	21.00		0.00	0.00	0.00	0.00
52	0.00	0.00		0.00	2.32	0.00	0.00	0.00	70.00		3.00	11.00		0.00	0.00	0.00	0.00
1	0.00					0.00		0.00						0.00			0.00
2																	0.00
3																	0.00

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna ** Fruiting Body damage includes damage in squares, flowers and boll, #- GBD based on 10 green bolls

Table:153. Ent 2. Seasonal dynamics of key pests of cotton (Sucking Pests) under unprotected condition in Central Zone during 2024-25 in Suraj.

SMW	Sucking Pests															
	Aphids/ 3 leaves							Jassids/ 3 leaves								
	SU	BH	AK	NA	RA	KH	BW	BA	JU	SU	BH	AK	NA	RA	KH	BW
27					8.20									2.50		
28					10.00			-						1.70		
29				5.80	5.20			-					0.58	1.25		
30	0.00			7.89	48.40			-		0.20			2.80	1.92		
31	0.20			11.38	110.72	12.30		-		0.20			4.40	2.20	4.20	
32	0.40	0.00		5.89	101.56	12.30		-		0.60	0.40		6.31	3.35	4.80	
33	0.80	0.10		4.67	71.28	16.50		-		1.00	0.70		7.40	4.70	3.60	
34	1.70	0.20	7.33	2.02	21.76	16.30		-		1.60	0.90	3.27	7.11	1.45	2.10	
35	2.30	0.40	0.00	0.00	30.20	32.30		-		2.40	1.10	4.53	5.40	3.18	3.60	
36	3.80	0.60	0.00	0.00	25.92	23.00		-		3.60	1.60	3.60	8.40	1.20	3.90	
37	5.60	0.80	0.10	2.67	37.32	26.60		-		4.70	2.10	4.87	7.71	4.30	6.30	
38	7.20	1.00	0.00	3.58	48.46	32.60		-		5.60	2.40	3.13	5.47	6.90	4.30	
39	6.30	1.20	0.23	4.51	22.64	33.32		-		6.20	3.20	3.00	4.38	3.70	4.20	
40	6.40	1.30	0.00	0.00	38.50	23.30		-		6.70	3.70	2.80	4.31	2.90	4.80	
41	8.20	2.40	0.00	0.00	32.40	16.50		-		6.90	4.30	3.53	3.38	2.30	3.60	
42	13.20	3.30	0.20	2.11	38.74	19.30		-		7.10	5.10	1.97	3.20	3.90	2.10	
43	19.70	4.70	0.00	2.80	42.40	12.30		-		7.30	4.10	2.70	3.20	2.62	4.20	
44	30.70	6.20	0.13	3.40	45.85	13.50		-		6.70	3.70	3.47	3.40	3.45	4.80	
45	32.80	6.90	0.87	3.80	79.80	16.30		-		7.00	4.40	2.67	3.60	1.30	3.60	
46	36.70	13.80	3.43	4.60	85.00	13.50		-		6.70	3.10	3.73	3.00	2.75	2.10	
47	41.80	8.20	4.83	8.40	95.00	15.50		-		5.90	2.70	5.47	2.60	2.50	1.80	
48	45.80	10.20	14.97	10.33	97.00	16.30		-		5.40	2.40	3.17	1.00	2.60	4.20	
49	46.80	11.40	19.40	31.20	108.00	12.30		-		4.90	2.10	1.53	0.60	3.54	4.80	
50	48.90	14.30	22.70	64.80	111.50	12.00		-		3.70	1.30	2.10	0.20	3.35	3.60	
51	50.70	15.80	25.27	69.40	113.85			-		2.60	1.10	1.43	0.00	2.28		
52	43.80	17.40	16.93	77.20	117.65			-		1.20	1.10	2.77	0.00	2.35		
01	36.70		13.97					-		0.00		0.83				
02								-								
03								-								

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna

Table: 154. Ent 2. Seasonal dynamics of key pests of cotton (Sucking Pests) under unprotected condition in Central Zone during 2024-25 in Suraj.

SMW	Sucking Pests											Natural Enemies/plant*					
	Whitefly/ 3 leaves						Thrips/ 3 leaves										
	SU	BH	AK	NA	RA	KH	SU	BH	AK	NA	RA	SU	BH	AK	NA	RA	KH
27					0.00						1.40						
28					0.00						1.10					0.24	
29				0.00	0.00					0.00	3.40					0.32	
30	0.00			0.00	0.37		1.10			0.58	47.20	0.10			0.60	0.52	
31	0.20			0.00	0.77	1.03	2.70			4.80	45.20	0.20			1.00	1.60	
32	0.40	0.00		0.00	0.61	5.60	4.90	0.80		12.18	36.80	0.30	0.10		2.00	3.82	0.00
33	0.60	0.00		0.08	2.69	6.60	10.80	1.00		23.18	45.80	0.30	0.20		2.20	3.92	0.00
34	0.70	0.00	4.67	0.20	1.05	15.60	15.10	1.80	8.10	18.71	27.60	0.40	0.30		3.20	3.16	1.10
35	0.80	0.10	3.83	0.91	0.77	23.60	26.40	2.70	9.03	15.09	2.63	0.40	0.20	0.57	2.60	2.00	1.30
36	1.10	0.20	4.57	1.91	0.50	9.90	31.20	6.70	1.90	39.18	4.70	0.60	0.40	2.27	2.00	1.52	1.20
37	1.60	0.20	4.70	5.31	0.50	32.60	36.70	11.20	3.77	33.18	2.85	0.80	0.50	0.97	4.60	1.04	0.80
38	1.70	0.30	4.83	4.02	0.73	23.60	41.40	13.80	4.70	35.20	2.00	1.40	0.70	0.83	4.40	1.00	0.60
39	2.10	0.70	3.97	2.02	0.05	33.30	38.20	19.40	4.57	41.38	1.40	1.20	1.00	0.43	4.60	1.36	3.10
40	2.30	0.70	8.73	2.42	2.59	13.30	33.40	21.20	3.83	23.58	2.60	1.20	1.10	1.53	4.80	0.60	1.70
41	3.80	1.00	5.00	3.31	1.23	16.50	28.40	17.20	4.60	12.40	1.00	1.60	1.30	0.80	2.80	0.72	1.10
42	4.60	1.10	4.07	5.31	2.83	15.60	25.40	13.20	4.83	11.18	3.10	1.40	1.00	0.73	1.80	0.60	1.10
43	5.20	1.30	5.93	4.40	2.39	16.35	26.80	8.80	1.10	7.20	1.45	1.20	1.20	1.07	2.00	1.36	1.30
44	5.80	1.40	4.03	3.80	5.11	15.60	23.40	7.40	2.20	4.00	1.28	1.60	1.40	0.97	1.60	0.38	1.20
45	6.00	1.70	2.77	4.60	8.07	26.60	19.20	6.70	1.43	3.60	1.30	2.00	1.30	1.40	1.40	0.72	0.80
46	6.80	1.90	5.13	3.60	9.79	15.60	15.70	6.50	6.67	3.40	1.15	2.40	1.50	1.27	1.40	0.98	0.60
47	6.40	1.60	4.00	3.20	10.83	13.20	13.10	5.40	4.13	1.80	1.10	2.20	1.60	1.13	1.20	3.32	1.10
48	5.40	1.40	3.57	2.60	10.87	26.60	8.60	5.10	2.20	1.00	1.08	2.60	1.90	1.07	1.60	2.20	1.30
49	5.00	1.30	2.93	0.00	11.95	13.50	5.40	2.20	2.33	0.20	0.85	2.40	2.10	1.63	1.40	1.38	1.20
50	4.20	1.10	1.80	0.00	12.95	2.30	1.30	1.80	1.77	0.00	2.40	2.80	2.40	2.17	3.40	4.72	0.20
51	3.10	1.00	2.10	0.00	14.25		0.00	1.00	1.73	0.00	1.40	3.00	2.30	2.93	6.40	5.32	0.00
52	2.10	1.00	2.60	0.00	14.95		0.00	0.70	1.90	0.00	2.00	3.60	2.20	1.47	7.00	5.36	
01	0.70		1.40				0.00		0.30			2.80		1.60	7.80	5.62	
02														0.77			

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna, *Natural Enemies include coccinellids, chrysopids, syrphids and spider.

Table: 155. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in Central Zone during 2024-25 in Suraj.

SMW	No. of Larval Recovery/5plants											
	H. armigera											
	SU##		BH##		AK		NA##		RA##		KH	
	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
27									0.00	0.00		
28									0.00	0.00		
29							0.00	0.00	0.00	0.00		
30	0.00	0.00					0.00	0.00	0.00	0.00		
31	0.00	0.00					0.00	0.00	0.00	0.00	0.00	0.00
32	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00
33	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.30	0.20
34	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.40	0.50
35	0.00	0.00	1.00	0.00		0.53	0.00	0.00	0.00	0.00	0.50	0.40
36	0.00	0.00	1.20	0.00		0.47	0.00	0.20	0.00	0.00	0.20	0.40
37	0.00	0.00	1.00	0.10		0.00	0.00	0.40	0.00	0.00	0.40	0.60
38	0.00	0.00	1.60	0.20		0.23	0.40	0.60	0.00	0.10	0.20	0.00
39	0.00	0.20	0.00	0.30		0.00	0.47	1.07	0.00	0.20	0.30	0.00
40	0.00	0.60	0.00	0.40		0.00	0.60	1.13	0.00	0.50	0.40	0.30
41	0.00	0.60	0.00	0.50		0.00	0.53	1.40	0.00	0.60	0.50	0.40
42	0.00	0.80	1.00	0.40		0.20	0.20	0.67	0.00	0.30	0.80	0.20
43	0.00	1.20	0.00	0.30		0.43	0.00	0.60	0.00	0.10	0.40	0.50
44	0.00	1.40	0.00	0.30		0.00	0.00	0.47	0.00	0.00	0.30	0.40
45	0.00	1.60	0.00	0.20		0.00	0.00	0.40	0.00	0.00	0.40	0.40
46	0.00	1.60	0.00	0.10		0.00	0.00	0.20	0.00	0.00	0.50	0.60
47	0.00	1.20	0.00	0.00		0.00	0.00	0.20	0.00	0.00	0.40	0.20
48	0.00	0.80	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.20	0.50
49	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.40
50	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.40
51	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		
52	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		
01	0.00	0.00				0.00						
02												

SU- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, ##-number per plant

Table:156. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in Central Zone during 2024-25 in Suraj.

SMW	No. of Larvae/5plants													
	Earias spp.													
	SU##		BH##		AK		NA##		RA##		KH		BW##	
	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
27									0.00	0.00				
28									0.00	0.00				
29							0.00	0.00	0.00	0.00				
30	0.00	0.00					0.00	0.00	0.00	0.00				
31	0.00	0.00					0.00	0.00	0.00	0.00		0.00		
32	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00		0.00		
33	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.10		0.00		
34	0.00	0.00	0.00	0.00		0.00	0.00	0.20	0.00	0.10		0.00		
35	0.00	0.00	0.00	0.00		0.00	0.00	0.40	0.00	0.00		0.00		
36	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.40		
37	0.00	0.00	0.20	0.00		0.00	0.00	0.00	0.00	0.00		0.50		
38	0.00	0.00	0.20	0.00		0.00	0.00	0.00	0.00	0.00		0.80		
39	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.10		0.20		
40	0.00	0.00	0.00	0.10		0.23	0.00	0.00	0.00	0.00		0.50		
41	0.00	0.00	0.00	0.20		0.00	0.00	0.00	0.00	0.00		0.40		
42	0.00	0.00	0.30	0.20		0.00	0.00	0.00	0.00	0.00		0.40		
43	0.00	0.00	0.00	0.20		0.00	0.00	0.00	0.00	0.00		0.60		
44	0.00	0.00	0.00	0.00		0.17	0.00	0.00	0.00	0.00		0.40		
45	0.00	0.00	0.00	0.02		0.00	0.00	0.00	0.00	0.00		0.20		
46	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.60		
47	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.40		
48	0.00	0.00	0.00	0.00		0.10	0.00	0.00	0.00	0.00		0.20		
49	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.00		
50	0.00	0.00	0.00	0.00		0.33	0.00	0.00	0.00	0.00		0.00		
51	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00				
52	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00				
01	0.00	0.00				0.00								
02														

SU- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna ##-number per plant

Table:157. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in Central Zone during 2024-25 in Suraj.

SMW	No. of Larvae/5plants									
	S. litura									
	SU##		BH##		AK		NA##		RA##	
	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
									0.00	0.00
28									0.00	0.00
29							0.00	0.00	0.00	0.00
30	0.00	0.00					0.00	0.00	0.00	0.00
31	0.00	0.00					0.00	0.00	0.00	0.00
32	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
33	0.00	0.00	0.10	0.00			0.00	0.00	0.00	0.00
34	0.00	0.00	0.20	0.00			0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.30			0.00	0.00	0.00	0.00
36	0.00	0.20	0.20	0.50			0.00	0.20	0.00	0.00
37	0.00	0.40	0.30	0.60			0.00	0.20	0.00	0.00
38	0.00	0.60	0.00	0.70			0.20	0.87	0.00	0.00
39	0.00	1.00	0.00	0.70			0.13	1.27	0.00	0.00
40	0.00	1.20	0.00	0.90			0.13	1.60	0.00	0.20
41	0.00	1.40	0.00	0.70			0.00	1.87	0.00	0.00
42	0.00	1.00	0.00	0.50			0.00	1.00	0.00	0.00
43	0.00	1.60	0.00	0.20			0.00	0.80	0.00	0.00
44	0.00	1.20	0.00	0.00			0.00	0.40	0.00	0.00
45	0.00	1.00	0.00	0.00			0.00	0.20	0.00	0.00
46	0.00	0.60	0.00	0.00			0.00	0.20	0.00	0.00
47	0.00	0.40	0.00	0.00			0.00	0.13	0.00	0.00
48	0.00	0.20	0.00	0.00			0.00	0.00	0.00	0.00
49	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
51	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
52	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00
01	0.00	0.00								
02										

SU- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **BW**- Bhawanipatna ##-number per plant

Table: 158. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in Central Zone during 2024-25 in Suraj.

SMW	Fruiting Body Damage (%) **							GBD (%) due to ABW/ TC/SBW					GBD (%)/20 green bolls destructive sampling	PBW larva/20 green bolls destructive sampling	
	SU	BH	AK	NA	RA	KH	BW	BA	JU	SU	BH	AK	RA#	RA#	KH
28	-	-	-		-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	0.00	-	-	-	-	-	-	-	-	-	-	-
30	0.00	-	-	0.00	-	-	-	-	-	0.00	-	-	-	-	-
31	0.00	-	-	0.00	-	0.00	-	-	-	0.00	-	-	-	-	0.70
32	0.00	0.00	-	0.00	-	0.00	-	-	-	0.00	0.00		-	-	0.75
33	0.00	0.00	-	0.00	-	0.00	-	-	-	0.00	0.00		-	-	0.75
34	0.00	0.00	-	9.68	-	0.00	-	-	-	0.00	0.00	0.00	-	-	0.00
35	0.00	0.00	-	18.92	-	0.00	-	-	-	0.00	0.00	3.67	-	-	0.00
36	0.60	0.00	-	11.76	-	0.00	-	-	-	0.00	0.00	4.77	-	-	0.00
37	1.20	1.96	-	25.00	-	40.00	-	-	-	0.00	0.00	0.43	-	-	0.20
38	1.25	3.45	-	28.21	-	45.00	-	-	-	0.00	0.00	3.80	-	-	0.70
39	2.60	3.70	-	25.58	-	44.00	-	-	-	0.00	0.00	1.53	10.00	1.00	0.75
40	2.99	4.29	-	26.53	-	45.00	-	-	-	0.00	2.08	2.23	30.00	3.00	0.75
41	3.75	5.33	-	28.85	-	46.00	-	-	-	0.00	5.26	0.00	20.00	1.00	0.50
42	6.78	5.63	-	20.00	-	48.00	-	-	-	2.55	3.45	1.30	20.00	2.00	0.55
43	9.51	6.45	-	25.37	-	49.00	-	-	-	6.67	5.56	2.37	50.00	5.00	0.60
44	11.55	3.57	-	9.86	-	50.00	-	-	-	9.26	8.16	0.70	70.00	6.00	0.70
45	13.26	2.44	-	13.33	-	59.00	-	-	-	13.29	9.52	0.13	60.00	6.00	0.75
46	11.21	2.41	-	6.90	-	50.00	-	-	-	15.00	7.69	0.00	70.00	6.00	0.75
47	9.25	1.56	-	4.92	-	60.00	-	-	-	12.25	5.66	0.00	80.00	14.00	0.70
48	6.78	1.28	-	0.00	-	89.00	-	-	-	10.33	5.88	0.17	90.00	23.00	0.75
49	3.21	0.00	-	0.00	-	89.00	-	-	-	8.62	4.08	0.00	100.00	21.00	0.75
50	1.25	0.00	-	0.00	-	90.00	-	-	-	4.22	2.13	3.50	100.00	27.00	0.85
51	0.00	0.00	-	0.00	-	-	-	-	-	2.01	2.44	0.33	90.00	10.00	-
52	0.00	0.00	-	0.00	-	-	-	-	-	0.00	0.00	0.00	80.00	13.00	-
01	0.00	-	-	-	-	-	-	-	-	0.00	-	0.00	-	-	-
02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

BA- Banswara**, JU-** Junagadh**, SU-** Surat**, BH-** Bharuch**, AK-** Akola**, NA-** Nanded**, RA-** Rahuri, **KH-** Khandwa, **BW-** Bhawanipatna ** Fruiting Body damage includes damage in squares, flowers and bolls**,** #- GBD based on 10 green bolls

Table: 159. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in Central Zone during 2024-25 in Suraj.

SMW	Rosette flowers (%) due to PBW					
	BA	JU	SU	BH	AK	NA
28	-	-	-	-	-	-
29	-	-	-	-	-	-
30	-	-	0.00		-	
31	-	-	0.00		-	
32	-	-	0.00	0.00	-	
33	-	-	0.00	0.00	-	0.00
34	-	-	0.00	0.00	-	5.00
35	-	-	0.00	0.00	-	11.67
36	-	-	0.35	0.00	-	3.33
37	-	-	0.95	0.00	-	0.00
38	-	-	1.08	0.00	-	0.00
39	-	-	1.36	2.70	-	0.00
40	-	-	2.59	3.95	-	0.00
41	-	-	3.25	5.13	-	0.00
42	-	-	6.00	5.26	-	0.00
43	-	-	6.30	3.66	-	0.00
44	-	-	3.02	2.35	-	0.00
45	-	-	0.00	1.28	-	0.00
46	-	-	0.00	0.00	-	3.33
47	-	-	0.00	0.00	-	6.67
48	-	-	0.00	0.00	-	21.67
49	-	-	0.00	0.00	-	23.33
50	-	-	0.00	0.00	-	5.00
51	-	-	0.00	0.00	-	0.00
52	-	-	0.00	0.00	-	0.00
01	-	-	0.00		-	

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna

Table: 160. Ent 2. Seasonal dynamics of key pests of cotton (Bollworm) under unprotected condition in Central Zone during 2024-25- Weekly Trap Catches

SMW	*Helicoverpa armigera*							*Pectinophora gossypiella*						
	BA	**JU**	**SU**	**BH**	**NA**	**RA**	**BW**	**BA**	**JU**	**SU**	**BH**	**NA**	**RA**	**BW**
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	-					0.00		-					0.00	
28	-					0.00		-					0.00	
29	-				0.00	0.00		-				0.00	0.00	
30	-	0.00	0.00		0.00	1.00		-	0.00	0.00		0.00	0.00	
31	-	0.00	0.00		0.00	1.00		-	0.00	0.00		1.25	0.00	
32	-	0.00	0.00	0.80	0.00	3.00		-	0.00	0.00	0.00	2.75	0.00	
33	-	0.00	1.00	1.00	0.00	4.00		-	0.00	1.00	0.00	1.00	0.00	
34	-	0.00	0.00	1.20	0.75	6.00	0.00	-	0.00	0.00	1.20	2.00	0.00	0.00
35	-	0.00	2.00	1.40	1.25	0.00	0.00	-	0.00	1.50	1.60	0.75	1.00	0.00
36	1	1.00	3.00	1.60	1.25	1.00	1.00	-	0.00	4.00	2.00	0.00	2.00	0.00
37	2	2.00	3.50	1.80	1.75	3.00	1.00	-	0.00	3.00	2.40	0.00	6.00	0.00
38	2	5.00	6.00	2.00	3.75	6.00	0.00	-	0.00	5.50	3.80	0.00	19.00	0.00
39	1	5.00	4.50	2.20	6.00	10.00	0.00	-	0.00	6.50	4.40	1.00	24.00	0.00
40	-	8.00	7.50	2.40	10.75	3.00	0.00	-	0.00	7.00	5.00	1.50	6.00	0.00
41	-	12.00	7.00	2.80	9.50	0.00		1.00	4.00	6.50	6.80	1.25	3.00	0.00
42	-	15.00	10.00	2.60	5.25	2.00		2.00	5.00	10.50	9.00	2.00	9.00	0.00
43	-	18.00	12.50	3.00	2.50	1.00		2.00	18.00	12.00	11.40	6.75	7.00	0.00
44	-	20.00	11.00	3.40	1.50	1.00		1.00	38.00	15.50	14.80	14.00	13.00	0.00
45	-	10.00	14.50	4.00	1.25	0.00		-	58.00	17.50	16.40	23.25	26.00	0.00
46	-	8.00	10.50	4.20	0.00	0.00		-	102.00	20.50	17.40	29.75	98.00	0.00
47	-	8.00	8.50	4.80	0.00	0.00		-	146.00	25.50	18.00	40.25	102.00	1.00
48	-	4.00	4.00	3.80	1.50	0.00		-	172.00	30.50	18.20	22.75	101.00	3.00
49	-	4.00	2.50	3.20	1.00	0.00		-	188.00	31.00	19.00	23.00	134.00	6.00
50	-	2.00	1.00	2.60	0.25	0.00		-	200.00	32.50	21.00	59.25	122.00	8.00
51	-	2.00	0.00	2.00	0.00	0.00		-	220.00	40.50	22.00	67.50	97.00	10.00
52	-	2.00	0.00	2.00	0.00	0.00		-	240.00	43.00	22.80	75.25	88.00	12.00
01			0.00							46.50				
02	-	-	-	-	-	-	-	-	-	-	-	-	-	-

BA- Banswara**, JU-** Junagadh**, SU-** Surat**, BH-** Bharuch**, AK-** Akola**, NA-** Nanded**, RA-** Rahuri, **KH-** Khandwa, **BW-** Bhawanipatna

Table: 161. Ent 2. Seasonal dynamics of key pests of cotton (Bollworm) under unprotected condition in Central Zone during 2024-25 in Central Zone- Weekly Trap catches.

SMW	*Earias spp.*							*Spodoptera litura*								
	BA	**JU**	**SU**	**BH**	**RA**	**KH**	**BW**	**BA**	**JU**	**SU**	**BH**	**AK**	**NA**	**RA**	**KH**	**BW**
25	-	-	-	-		-	-	-	-	-	-	-			-	
26	-	-	-	-		-	-	-	-	-	-	-			-	
27	-	-	-	-	0.00	-	-	-	-	-	-	-		0.00	-	
28	-	-	-	-	0.00	-	-	-	-	-	-	-		0.00	-	
29	-	-	-	-	0.00	-	-	-	-	-	-	-	0.00	0.00	-	
30	-	0.00	0.00		0.00	-	-	-	0.00	1.50	-	-	2.75	0.00	-	
31	1.00	0.00	0.00		0.00	-	-	-	0.00	2.00	-	-	4.25	0.00	-	
32	2.00	0.00	0.00	0.00	0.00	-	-	-	0.00	3.50	2.00	-	4.75	0.00	-	
33	1.00	0.00	0.50	0.00	0.00	-	-	-	0.00	3.00	4.00	-	0.00	0.00	-	
34	-	0.00	1.00	0.00	0.00	-	4.00	6.00	0.00	4.50	4.80	-	0.25	0.00	-	8.00
35	-	0.00	1.50	0.00	0.00	-	4.00	12.00	0.00	6.00	5.20	-	0.50	0.00	-	7.00
36	-	1.00	1.00	0.20	0.00	-	3.00	16.00	1.00	15.00	6.80	-	4.25	0.00	-	6.00
37	-	1.00	0.50	0.40	0.00	-	5.00	21.00	2.00	18.00	11.40	-	5.75	0.00	-	8.00
38	-	2.00	0.00	0.40	0.00	-	4.00	5.00	4.00	24.00	12.80	-	11.00	0.00	-	5.00
39	-	2.00	0.00	0.80	5.00	-	3.00	13.00	6.00	30.50	17.70	-	13.50	18.00	-	3.00
40	-	4.00	0.00	0.60	6.00	-	3.00	17.00	8.00	36.50	19.80	-	20.50	3.00	-	5.00
41	-	3.00	0.00	0.00	5.00	-	3.00	25.00	10.00	50.50	20.00	-	20.00	0.00	-	2.00
42	-	2.00	0.00	0.00	4.00	-	3.00	20.00	10.00	55.00	27.00	-	13.00	0.00	-	1.00
43	-	5.00	0.00	0.00	5.00	-	3.00	8.00	14.00	60.50	21.40	-	7.75	0.00	-	1.00
44	-	4.00	0.00	0.20	9.00	-	-	4.00	16.00	66.50	17.80	-	5.00	2.00	-	0.00
45	-	8.00	0.00	0.40	4.00	-	-	-	12.00	51.00	11.00	-	2.00	0.00	-	0.00
46	-	10.00	0.00	0.00	3.00	-	-	-	8.00	48.00	4.60	-	0.00	0.00	-	
47	-	5.00	0.00	0.00	2.00	-	-	-	6.00	41.00	3.20	-	0.00	0.00	-	
48	-	2.00	0.00	0.00	2.00	-	-	-	4.00	36.00	3.00	-	0.25	0.00	-	
49	-	2.00	0.00	0.00	1.00	-	-	-	4.00	24.50	2.80	-	2.00	1.00	-	
50	-	3.00	0.00	0.00	1.00	-	-	-	4.00	11.50	2.00	-	2.25	0.00	-	
51	-	1.00	0.00	0.00	2.00	-	-	-	2.00	3.50	1.00	-	3.75	0.00	-	
52	-	1.00	0.00	0.00	0.00	-	-	-	2.00	1.00	1.00	-	3.00	0.00	-	
01			0.00			-	-			0.00		-			-	
02						-	-					-			-	

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna

Table: 162. Ent 2. Seasonal dynamics of key pests of cotton (Abiotic factors) under unprotected condition in Central Zone during 2024-25.

SMW	Temperature(ºC)													
	JU		SU		BH		AK		NA		RA		BW	
	Min.	Ma.	Min.	Max.	Min.	Max	Min.	Max	Min.	Max.	Min.	Max.	Min.	Max.
23	-	-	-	-	-	-	-	-	-	-	-	-		
24	-	-	-	-	-	-	-	-	-	-	-	-	28.23	39.99
25	-	-	-	-	-	-	-	-	-	-	-	-	26.69	36.54
26	-	-	-	-	-	-	-	-	-	-	-	-	24.94	33.04
27	-	-	-	-	-	-	-	-	-	-	24.36	31.54	24.96	32.69
28	-	-	-	-	-	-	-	-	-	-	23.47	30.54	24.99	32.99
29	-	-	-	-	-	-	-	-	23.94	30.17	23.73	30.31	24.66	31.93
30	25.80	29.40	25.30	30.00	-	-	-	-	24.24	29.65	23.79	29.37	24.26	30.00
31	25.10	30.30	24.70	29.30	-	-	-	-	20.94	30.21	23.57	29.91	24.49	30.54
32	24.75	30.75	26.70	30.90	26.80	31.00	-	-	24.57	30.43	23.24	29.34	24.01	31.06
33	24.61	31.72	27.30	29.90	26.20	31.70	-	-	24.71	32.14	22.59	32.06	24.61	32.97
34	24.88	32.83	26.70	29.30	26.10	32.30	19.60	31.40	24.57	31.00	22.81	30.06	24.70	32.83
35	23.91	29.20	25.40	27.60	26.30	29.60	19.80	31.10	23.43	31.14	22.96	29.57	24.34	31.11
36	24.40	31.50	27.30	29.90	27.60	29.20	19.40	29.60	25.29	32.00	22.59	29.11	24.27	31.31
37	24.60	32.10	25.70	28.40	26.60	30.50	19.90	30.20	22.43	32.57	21.70	30.54	24.79	32.21
38	23.80	33.40	25.60	28.40	25.40	33.00	19.60	32.40	22.00	33.00	20.81	31.26	24.21	32.00
39	23.60	30.70	26.00	29.90	25.50	34.30	019.7	31.50	22.14	33.00	22.56	30.06	24.00	32.16
40	25.00	33.70	26.00	27.10	25.90	32.50	19.60	33.90	20.57	33.00	21.91	32.54	24.11	34.14
41	24.80	33.50	25.60	32.50	26.90	34.80	18.70	33.30	21.57	33.00	21.81	30.37	23.67	33.74
42	24.80	34.00	23.80	33.40	25.50	34.30	18.60	33.30	22.43	33.43	22.16	31.09	22.90	32.93
43	22.40	34.70	25.10	35.30	24.50	34.40	16.50	32.90	21.29	33.14	20.21	30.46	21.50	29.61
44	20.00	36.00	23.60	35.40	23.20	34.90	14.80	33.60	21.14	32.57	17.84	31.51	21.01	32.42
45	19.80	35.20	22.70	37.60	23.90	32.10	13.80	32.20	17.71	32.71	15.56	31.20	17.61	30.74
46	17.00	33.80	21.60	35.00	22.70	33.30	12.60	31.30	17.29	32.29	15.93	30.49	15.67	29.31
47	31.50	19.40	21.60	33.30	22.50	33.40	9.30	29.40	14.43	29.86	12.07	29.57	11.91	27.60
48	13.60	30.70	19.90	31.10	23.50	33.10	9.40	29.00	12.43	29.29	9.76	28.00	14.93	26.83
49	17.30	31.10	19.60	30.90	21.30	32.50	14.10	30.50	17.43	30.71	12.59	29.89	19.99	31.09
50	12.80	28.40	16.70	30.00	17.10	28.70	7.40	27.70	14.29	30.29	9.53	28.00	11.71	27.50
51	12.10	27.60	15.60	29.60	21.40	28.40	14.00	30.80	16.71	30.14	9.16	28.51	14.60	27.19
52	12.50	26.10	16.30	28.60	22.30	29.90	7.60	27.70	16.38	29.50	16.81	28.53	17.34	27.43
01			17.90	30.00			12.20	30.50						

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna

Table: 163. Ent 2. Seasonal dynamics of key pests of cotton (Abiotic factors) under unprotected condition in Central Zone during 2024-25.

SMW	Relative Humidity (%)															
	JU		SU		BH		AK		NA		RA		KH		BW	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
23	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	55.29	43.43
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	65.14	54.71
26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	80.29	79.43
27	-	-	-	-	-	-	-	-	-	-	83.00	58.57	-	-	78.50	81.71
28	-	-	-	-	-	-	-	-	-	-	82.71	62.29	-	-	82.40	82.00
29	-	-	-	-	-	-	-	-	86.43	79.14	87.57	63.86	-	-	83.25	81.00
30	94.00	89.00	84.00	80.00	-	-	-	-	82.60	67.57	85.57	67.86	-	-	24.17	94.50
31	93.00	86.00	90.00	85.00	-	-	-	-	81.45	70.57	83.29	62.43	-	-	81.29	84.57
32	94.40	82.40	80.00	75.00	90.40	82.90	-	-	79.14	64.00	83.71	64.71	-	-	91.14	84.57
33	94.57	78.14	75.00	68.00	81.00	77.00	-	-	70.57	58.57	85.43	53.86	-	-	84.86	80.86
34	92.28	78.00	78.00	69.00	78.40	73.00	85.00	69.00	75.57	72.71	91.86	72.14	-	-	81.00	79.71
35	94.85	86.42	88.00	83.00	79.70	59.10	85.00	67.00	67.57	60.86	81.29	60.71	-	-	83.43	82.14
36	90.00	77.00	87.00	82.00	83.00	62.70	88.00	71.00	69.43	65.14	86.57	64.57	-	-	82.57	83.00
37	89.00	62.00	81.00	78.00	87.10	72.00	85.00	63.00	60.00	55.29	78.57	58.57	-	-	77.57	81.43
38	87.00	57.00	80.00	75.00	79.70	61.60	84.00	56.00	65.29	57.86	80.43	52.57	-	-	81.29	77.00
39	96.00	79.00	75.00	70.00	80.10	60.00	84.00	65.00	61.29	59.00	88.14	65.43	-	-	81.29	82.71
40	86.00	62.00	88.00	81.00	74.10	52.60	85.00	50.00	74.29	64.86	82.43	51.86	-	-	75.29	71.57
41	86.00	61.00	69.00	62.00	83.00	68.90	87.00	56.00	74.29	68.71	86.86	63.43	-	-	67.29	67.14
42	87.00	71.00	67.00	61.00	70.70	69.00	85.00	53.00	65.86	61.86	87.71	63.86	-	-	73.29	72.86
43	85.00	46.00	62.00	56.00	52.90	42.10	84.00	47.00	77.14	63.14	81.00	57.00	-	-	85.29	78.14
44	82.00	34.00	55.00	47.00	51.60	36.40	81.00	40.00	75.14	62.00	82.43	47.57	-	-	75.43	71.43
45	82.00	34.00	49.00	43.00	81.70	53.40	81.00	41.00	82.57	63.00	81.29	35.57	-	-	17.61	67.14
46	82.00	30.00	55.00	45.00	73.60	40.10	80.00	40.00	84.57	61.86	79.57	40.29	-	-	15.67	62.14
47	10.00	83.00	57.00	48.00	74.90	39.90	81.00	38.00	70.29	47.00	79.29	37.00	-	-	11.91	63.43
48	74.00	28.00	55.50	45.00	76.00	45.40	81.00	39.00	71.14	47.43	78.71	34.14	-	-	82.00	68.14
49	65.00	31.00	55.00	45.00	53.10	39.00	81.00	39.00	62.71	50.86	86.71	53.43	-	-	83.14	70.71
50	66.00	30.00	58.00	49.00	46.10	29.00	83.00	33.00	68.43	42.00	79.57	38.43	-	-	74.00	59.43
51	74.00	33.00	58.00	49.00	79.70	50.00	81.00	39.00	52.43	37.43	81.57	34.71	-	-	81.29	68.71
52	80.00	46.00	58.00	49.00	76.60	56.60	83.00	33.00	54.75	45.13	86.67	52.11	-	-	85.00	75.75
01			60.00	50.00			79.86	29.86					-	-		

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna , **AM**-Morning, **PM**-Evenin

Table: 164. Ent 2. Seasonal dynamics of key pests of cotton (Abiotic factors) under unprotected condition in Central Zone during 2024-25.

SMW	Rainfall in mm								
	BA	**JU**	**SU**	**BH**	**AK**	**NA**	**RA**	**KH**	**BW**
23	-	-	-	-	-	-	-	-	
24	-	-	-	-	-	-	-	-	0.00
25	-	-	-	-	-	-	-	-	8.40
26	-	-	-	-	-	-	-	-	103.40
27	-	-	-	-	-	-	21.00	-	36.80
28	-	-	-	-	-	-	36.60	-	52.40
29	-	-	-	-	-	129.60	81.20	-	101.20
30	-	184.60	123.00		-	92.40	28.00	-	99.40
31	-	56.10	272.00		-	93.60	7.80	-	33.40
32	-	19.70	28.00	45.60	-	94.40	3.60	-	146.40
33	-	30.40	18.00	52.00	-	4.00	1.00	-	99.60
34	-	64.10	20.00	180.00	120.20	63.60	253.40	-	11.60
35	-	274.30	126.00	77.50	30.10	262.00	4.00	-	66.40
36	-	11.40	59.00	189.00	59.50	55.00	37.20	-	64.80
37	-	5.60	76.00	46.00	5.50	0.00	0.00	-	34.60
38	-	0.00	57.00	0.00	2.40	37.60	6.20	-	13.40
39	-	250.50	0.00	102.50	30.90	26.60	86.00	-	79.20
40	-	0.00	119.00	0.00	0.00	2.00	0.00	-	0.00
41	-	13.60	0.00	34.20	25.00	32.20	16.20	-	0.00
42	-	57.40	39.00	52.20	65.00	72.00	8.00	-	13.00
43	-	17.50	17.00	0.00	0.00	0.00	6.40	-	4.20
44	-	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00
45	-	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00
46	-	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00
47	-	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00
48	-	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00
49	-	0.00	0.00	0.00	0.00	7.60	0.00	-	3.60
50	-	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00
51	-	0.00	0.00	0.00	0.00	0.00	0.00	-	1.80
52	-	0.00	0.00	0.00	0.00	1.40	0.00	-	111.00
01	-		0.00		0.00			-	
02	-							-	

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna

Table: 165.Ent 2: Incidence of pink bollworm in green boll and open boll stage in different variety/hybrids (Unprotected) at Central Zone (2024-25)

Variety/ hybrids	Green boll damage (%) due to PBW through 50 green boll destructive sampling								
	BA	JU*	SU	BH	AK	NA	RA	KH	BW
DCH 32/Suvin	-	12.67	22.50	10.17	30.56	9.44	23.33	41.55	-
Suraj	-	-	26.00	10.67	27.78	15.44	28.33	40.20	-
RCH 2/Ajeet 155 BG II	-	3.00	16.00	9.33	25.00	12.78	20.00	37.50	-

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna,*20 Green Boll Destructive sampling

Table: 166.Ent 2: Incidence of pink bollworm in green boll and open boll stage in different variety/hybrids (Unprotected) at Central Zone (2024-25)

Variety/ hybrids	**PBW larval recovery (Nos.) through 50 green boll destructive sampling**								
	BA	**JU**	**SU**	**BH**	**AK**	**NA**	**RA**	**KH**	**BW**
DCH 32/Suvin	-	-	12.75	8.25	20.55	7.11	29.00	1.25	-
Suraj	-	-	12.00	10.00	17.64	12.33	14.00	1.63	-
RCH 2/Ajeet 155 BG II	-	-	7.25	7.75	15.42	10.89	8.84	2.00	-

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna

Table: 167.Ent 2: Incidence of pink bollworm in green boll and open boll stage in different variety/hybrids (Unprotected) at Central Zone (2024-25)

Variety/ hybrids	**Open Boll Damage (%)**								
	BA	**JU**	**SU**	**BH**	**AK**	**NA**	**RA**	**KH**	**BW**
DCH 32/Suvin	-	11.90	25.75	11.33	-	23.70	64.62	-	5.29
Suraj	-	-	15.35	10.00	-	39.79	66.15	-	-
RCH 2/Ajeet 155 BG II	-	5.00	13.90	7.33	-	35.04	63.85	-	-

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna

Table: 168.Ent 2: Incidence of pink bollworm in green boll and open boll stage in different variety/hybrids (Unprotected) at Central Zone (2024-25)

Variety/ hybrids	**Locule Damage (%)**								
	BA	**JU**	**SU**	**BH**	**AK**	**NA**	**RA**	**KH**	**BW**
DCH 32/Suvin	-	12.40	14.36	6.89	-	16.59	28.46	-	2.50
Suraj	-	-	7.54	5.83	-	26.98	26.73	-	-
RCH 2/Ajeet 155 BG II	-	3.10	6.32	4.50	-	21.43	27.88	-	-

BA- Banswara**, JU**- Junagadh**, SU**- Surat**, BH**- Bharuch**, AK**- Akola**, NA**- Nanded**, RA**- Rahuri, **KH**- Khandwa, **BW**- Bhawanipatna

South Zone

Table: 169.Ent 2. Seasonal dynamics of key pests of cotton (Sucking Pests) under unprotected condition in South Zone during 2024-25 in Jadoo BG II / Bahubali BG II/ KCH 36 BGII.

SMW	Sucking Pests													
	Aphids/ 3 leaves							Jassid/ 3 leaves						
	LG	ND	DW#	RC#	CN*	CBE	SVPR	LG	ND	DW#	RC#	CN*	CBE	SVPR
24			0.00							0.00				
25			0.00							0.00				
26			0.00							0.00				
27			0.00							0.00				
28			0.00							0.00				
29			0.00							0.00				
30			0.00							0.00				
31			0.00		25.60					0.00		3.56		
32			0.00	8.61	15.60					1.47	2.12	1.58		
33			1.07	7.42	6.50					2.00	3.58	1.24		
34			1.33	11.05	18.25					2.47	7.22	2.45	0.00	
35		0.00	1.53	7.35	15.90				8.20	2.87	3.52	2.15	0.00	
36	2.72	0.00	2.07	6.27	36.40			5.16	9.34	3.07	2.44	5.60	0.00	
37	1.64	0.00	2.87	2.56	41.50			5.44	8.74	3.93	7.79	8.75	0.00	
38	3.92	0.00	6.33	3.84	46.59			9.88	6.73	4.93	8.31	10.25	1.45	
39	-	0.00	8.87	2.74	28.45			-	8.70	7.53	9.24	6.50	3.58	
40	2.64	0.00	9.40	9.23	12.30			5.32	9.50	9.80	5.40	4.34	5.27	1.90
41	2.52	10.00	11.80	5.24	10.54			3.12	10.70	11.67	5.06	3.80	0.00	2.30
42	4.40	18.00	12.33	4.34	8.75			5.80	11.80	12.73	5.95	2.10	0.00	1.40
43	1.68	28.00	16.87	3.84	10.35			6.24	13.70	13.27	5.93	3.15	0.00	1.00
44	1.20	40.00	20.73	0.00	12.42			3.88	15.60	13.87	6.77	4.15	1.58	3.30
45	1.84	44.00	32.33	3.97	28.95			2.96	13.77	11.13	9.42	7.89	2.47	0.80
46	1.24	48.00	36.87	0.00	15.24			4.92	11.80	9.20	11.27	4.33	4.75	0.60
47	1.64	50.00	41.87	0.00	31.45			2.64	13.70	7.93	4.80	8.64	3.52	4.60
48	2.28	55.00	43.40	0.00	10.25			2.92	8.20	7.33	3.95	3.45	2.47	1.60
49	3.64	60.00	25.33	4.57	20.50			5.08	15.20	4.40	4.03	3.10	0.54	1.20
50	2.44	65.00	21.93	0.00	8.25			3.60	10.70	3.53	2.27	3.25	0.00	2.40
51	2.92	60.00	11.43	0.00	5.25			3.20	9.20	2.73	2.74	2.48	0.00	1.80
52	3.36	70.00	5.53	0.00	2.50			4.72	7.50	0.53	2.27	3.41	0.00	0.40
01	3.36							4.72						0.40
02	2.28							4.08						
03	3.28							3.64						

LG-Lam Guntur**, ND**- Nandyal**, DW**-Dharwad**, RC**-Raichur**, CN**- Chamarajanagar**, CBE**- Coimbatore**, SVPR**-Srivilliputtur, **CN***- Bahubali BG-II Sown at Chamarajanagar, #- KCH BGII Sown

Table: 170.Ent 2. Seasonal dynamics of key pests of cotton (Sucking Pests & Natural enemies) under unprotected condition in South Zone during 2024-25 in Jadoo BG II / Bahubali BG II/ KCH 36 BGII.

SMW	Sucking Pests													
	Whitefly/ 3 leaves							Thrips/ 3 leaves						
	LG	ND	DW#	RC#	CN	CBE	SVPR	LG	ND	DW#	RC#	CN	CBE	SVPR
24			0.00							0.00				
25			0.00							0.00				
26			0.00							0.00				
27			0.00							0.00				
28			0.00							0.00				
29			0.00							0.00				
30			0.00							0.00				
31			0.00		2.10					0.00		4.60		
32			0.93	0.00	1.85					1.87	15.65	4.45		
33			1.40	0.00	1.45					9.40	13.85	5.00		
34			1.87	0.00	2.38	0.00				13.80	20.59	5.64	0.00	
35		3.60	2.07	0.00	2.20	0.00			11.12	26.73	19.52	6.75	0.00	
36	1.92	4.20	2.20	0.00	2.40	0.00		1.36	7.30	41.47	16.60	8.90	0.00	
37	1.96	4.34	1.93	3.71	2.60	0.00		1.36	17.45	47.27	23.05	10.25	0.00	
38	0.36	6.50	2.13	4.74	1.50	0.55		11.20	23.40	51.20	24.81	12.54	0.00	
39	-	10.20	3.53	8.14	1.10	1.45		-	25.44	60.73	23.01	6.50	0.00	
40	1.04	16.23	3.80	7.54	0.00	2.75	0.60	10.08	14.50	61.20	29.37	3.24	0.00	0.00
41	1.72	14.20	4.07	4.36	0.00	0.00	0.40	1.52	16.40	35.67	13.29	3.42	0.00	0.00
42	0.44	16.63	4.40	10.28	0.00	0.00	0.40	7.68	10.74	25.80	13.85	2.52	0.00	0.00
43	4.12	15.32	4.93	10.83	0.00	0.00	0.40	1.60	16.27	22.40	18.67	1.28	0.00	0.00
44	4.32	17.74	5.93	8.73	0.00	0.00	0.00	0.24	21.45	19.87	17.02	0.75	0.00	0.00
45	2.04	19.91	5.27	12.11	0.00	0.56	0.20	0.92	27.30	19.87	10.49	0.00	0.00	0.00
46	1.76	27.87	4.47	10.20	0.00	0.87	0.40	0.48	33.30	17.20	6.81	0.00	0.00	0.00
47	1.40	30.24	4.47	9.38	0.00	1.57	0.20	0.44	32.90	14.60	6.61	0.00	1.47	0.00
48	2.12	28.89	3.67	7.51	0.00	2.45	0.00	0.64	31.20	12.80	8.44	0.00	0.54	0.00
49	3.20	33.45	1.13	6.70	0.00	0.00	0.00	2.40	29.80	7.27	7.73	0.00	0.00	0.00
50	2.68	36.74	1.13	3.20	0.00	0.00	0.60	1.84	29.20	2.33	6.93	0.00	0.00	0.00
51	2.48	33.87	0.07	2.47	0.00	0.00	0.40	0.00	28.30	1.60	6.13	0.00	0.00	0.00
52	1.96	37.30	0.00	0.91	0.00	0.00	0.00	0.40	25.30	0.33	5.32	0.00	0.00	0.00
01	1.96						0.10	0.40						0.00
02	1.92							0.64						
03	2.36							1.28						

LG-Lam Guntur**, ND**- Nandyal**, DW**-Dharwad**, RC**-Raichur**, CN**- Chamarajanagar**, CBE**- Coimbatore**, SVPR**-Srivilliputtur,**CN***- Bahubali BG-II Sown at Chamarajanagar, #- KCH BGII Sown

Table: 171. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in South Zone during 2024-25 in Jadoo BG II / Bahubali BG II/ KCH 36 BGII.

SMW	Natural Enemies##							No. of Larval Recovery/5plants						
								H. armigera						
	LG	ND	DW#	RC#	CN*	CBE	SVPR	LG	ND	DW#$	RC#$	CN*$	CBE	SVPR
24			0.00							0.00				
25			0.00							0.00				
26			0.00							0.00				
27			0.00							0.00				
28			0.00							0.00				
29			0.00							0.00				
30			0.00							0.00				
31			0.00		2.80					0.00		0.00		
32			0.00	2.24	2.25					0.00	0.00	0.00		
33			0.20	2.03	1.25					0.00	0.00	0.00		
34			0.60	0.91	2.31					0.10	0.00	0.00		
35			1.00	4.19	1.24					0.10	0.00	0.00		
36	0.16		1.60	3.37	2.85					0.00	0.00	0.00		
37	0.20		0.60	4.47	4.26					0.00	0.00	0.00		
38	0.36		0.80	4.65	3.25					0.00	0.00	0.00		
39	-		0.70	3.00	2.10					0.00	0.00	0.00		
40	0.16		2.10	5.38	1.15		0.00			0.00	0.00	0.00		
41	0.24		2.20	4.37	0.75		0.07			0.00	0.00	0.00		
42	0.16		1.00	2.27	0.00		0.20			0.00	1.44	0.00		
43	0.32		1.40	3.74	0.50		0.10			0.00	0.00	0.00		
44	-		0.80	2.96	0.00		0.20			0.00	0.00	0.00		
45	0.12		2.00	5.56	0.75		0.43			0.00	0.00	0.00		
46	0.16		1.20	3.00	0.00		0.13			0.00	0.00	0.00		
47	0.12		1.10	0.81	0.00		0.60			0.00	1.21	0.00		
48	0.16		0.80	1.54	0.00		0.07			0.00	0.00	0.00		
49	0.12		0.20	1.11	0.00		0.17			0.00	0.00	0.00		
50	0.12		0.00	0.00	0.00		0.33			0.00	0.00	0.00		
51	0.12		0.00	1.83	0.00		0.13			0.00	0.00	0.00		
52	0.12		0.00	0.00	0.00		0.23			0.00	0.00	0.00		
01	0.12						0.33							
02	0.20													
03	0.24													

LG-Lam Guntur**, ND**- Nandyal**, DW**-Dharwad**, RC**-Raichur**, CN**- Chamarajanagar**, CBE**- Coimbatore**, SVPR**-Srivilliputtur,**CN***- Bahubali BG-II Sown at Chamarajanagar ##Natural Enemies include coccinellids, chrysopids, syrphids and spider, #- KCH BGII Sown , $ number per plant

Table: 172. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in South Zone during 2024-25 in Jadoo BG II/ Bahubali BG II/ KCH 36 BGII.

SMW	No. of Larval Recovery/5plants													
	Earias spp.							S. *litura*						
	LG	ND	DW#$	RC#$	CN*$	CBE	SVPR	LG$	ND	DW#$	RC#$	CN*$	CBE	SVPR
24			0.00							0.00				
25			0.00							0.00				
26			0.00							0.00				
27			0.00							0.00				
28			0.00							0.00				
29			0.00							0.00				
30			0.00							0.00				
31			0.00		0.00					0.00		0.00		
32			0.00	0.00	0.00					0.00	0.00	0.00		
33			0.00	0.00	0.00					0.00	0.00	0.00		
34			0.00	0.00	0.00					0.00	0.00	0.00		
35			0.10	0.00	0.00					0.00	0.00	0.00		
36			0.10	0.00	0.00					0.00	0.00	0.00		
37			0.00	0.00	0.00					0.00	0.00	0.00		
38			0.00	0.00	0.00					0.00	0.00	0.00		
39			0.00	0.00	0.00					0.00	0.00	0.00		
40			0.00	0.00	0.00				0.00	0.00	0.11	0.00		
41			0.00	0.00	0.00				0.00	0.00	0.00	0.00		
42			0.00	0.00	0.00				0.00	0.00	0.22	0.00		
43			0.00	0.00	0.00				0.00	0.00	0.22	0.00		
44			0.00	0.00	0.00			0.24	0.00	0.00	1.11	0.00		
45			0.00	0.00	0.00			0.24	0.00	0.00	0.00	0.00		
46			0.00	0.00	0.00			0.20	0.00	0.00	0.00	0.00		
47			0.00	0.00	0.00			-	0.00	0.00	0.00	0.00		
48			0.00	0.00	0.00			0.16	0.00	0.00	0.00	0.00		
49			0.00	0.00	0.00			0.36	0.00	0.00	0.00	0.00		
50			0.00	0.00	0.00			0.24	0.00	0.00	0.00	0.00		
51			0.00	0.00	0.00				0.00	0.00	0.00	0.00		
52			0.00	0.00	0.00				0.00	0.00	0.00	0.00		
01														
02														

LG-Lam Guntur**, ND**- Nandyal**, DW**-Dharwad**, RC**-Raichur**, CN**- Chamarajanagar**, CBE**- Coimbatore**, SVPR**-Srivilliputtur,**CN***- Bahubali BG-II Sown at Chamarajanagar, #- KCH BGII Sown , $ number per plant

Table: 173. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in South Zone during 2024-25 in Jadoo BG II / Bahubali BG II/ KCH 36 BGII.

SMW	Fruiting Body Damage (%) **			GBD (%) by ABW/ TC/SBW		Rosette flowers (%) due to PBW		
	DW#	RC#	CN*	CN*	SVPR	LG	RC#	CBE
24	0.00	-	-	-	-	-	-	-
25	0.00	-	-	-	-	-	-	-
26	0.00	-	-	-	-	-	-	-
27	0.00	-	-	-	-	-	-	-
28	0.00	-	-	-	-	-	-	-
29	0.00	-	-	-	-	-	-	-
30	0.00	-	-	-	-	-	-	-
31	0.00	-	0.00	0.00	-	-	-	-
32	0.00	0.00	0.00	0.00	-	-	0.00	-
33	0.00	0.00	0.00	0.00	-	-	0.00	-
34	0.00	9.19	0.00	0.00	-	-	2.28	0.00
35	0.00	20.67	0.00	0.00	-	-	5.02	0.00
36	0.00	30.63	0.00	0.00	-	-	7.31	0.00
37	0.00	7.35	0.00	0.00	-	-	6.39	0.00
38	0.00	23.63	0.00	0.00	-	-	2.74	0.00
39	0.00	33.41	0.00	0.00	-	-	3.20	0.00
40	0.00	30.77	0.00	0.00	0.00	-	18.27	0.00
41	0.00	31.80	0.00	0.00	0.00	-	13.70	0.00
42	0.00	34.59	0.00	0.00	0.00	-	13.70	0.00
43	0.00	42.41	0.00	0.00	0.00	0.00	12.79	0.00
44	0.00	28.76	0.00	0.00	0.00	0.00	14.61	0.00
45	0.00	25.35	0.00	0.00	0.00	5.00	18.27	0.00
46	0.00	25.17	0.00	0.00	0.00	5.00	18.27	1.24
47	0.00	29.82	0.00	0.00	0.00	15.00	20.09	2.45
48	0.00	15.67	0.00	0.00	0.00	20.00	34.71	2.51
49	0.00	9.65	0.00	0.00	0.00	25.00	26.49	2.89
50	0.00	13.12	0.00	0.00	0.00	20.00	23.75	1.58
51	0.00	14.73	0.00	0.00	0.00	30.00	16.44	0.58
52	0.00	9.09	0.00	0.00	0.00	-	13.70	0.69

LG-Lam Guntur**, ND**- Nandyal**, DW**-Dharwad**, RC**-Raichur**, CN**- Chamarajanagar**, CBE**- Coimbatore**, SVPR**-Srivilliputtur,*- Bahubali BG-II Sown at Chamarajanagar and Dharwad.** Fruiting Body damage includes damage in squares, flowers and boll, #- KCH BGII Sown

Table: 174. Ent 2. Seasonal dynamics of key pests of cotton (Sucking Pests) under unprotected condition in South Zone during 2024-25 in Suvin/DCH 32 NBt.

SMW	Sucking Pests													
	Aphids/ 3 leaves							Jassid/ 3 leaves						
	LG	ND	DW	RC	CN	CBE	SVPR	LG	ND	DW	RC	CN	CBE	SVPR
24			0.00							0.00				
25			0.00							0.00				
26			0.00							0.00				
27			0.00							0.00				
28			0.00							0.00				
29			0.00							0.00				
30			0.00							0.00				
31			0.00		26.71					0.00		4.67		
32			0.87	6.83	16.71					0.00	0.00	2.69		
33			4.30	4.99	7.61					0.33	3.55	2.35		
34			5.33	8.64	19.36					2.20	8.21	3.56	0.00	
35		0.00	5.10	4.92	17.01				9.25	2.67	5.83	3.26	0.00	
36	1.48	0.00	4.40	4.71	37.51			5.68	11.40	2.33	7.95	6.71	0.00	
37	1.16	0.00	7.30	2.17	42.61			6.36	10.60	2.73	11.36	9.86	0.00	
38	2.60	0.00	8.00	0.69	47.7			10.12	15.70	7.93	16.44	11.36	2.33	
39	-	0.00	7.53	0.69	29.56			-	18.50	10.20	11.19	7.61	5.26	
40	1.72	0.00	9.80	7.73	13.41			12.72	18.84	10.67	10.92	5.45	6.25	2.23
41	1.32	16.00	10.67	3.74	11.65			9.28	21.20	14.40	7.30	4.91	0.00	3.10
42	4.28	24.00	14.20	1.91	9.86			10.48	19.80	15.07	8.22	3.21	0.00	1.90
43	0.80	36.00	19.87	1.60	11.46			12.36	25.90	16.13	9.50	4.26	0.00	1.50
44	1.08	50.00	21.53	0.91	13.53			10.72	29.70	16.60	10.32	5.26	3.20	3.70
45	1.48	52.00	31.73	0.00	30.06			7.52	19.50	13.20	11.23	9.00	2.45	1.30
46	0.68	54.00	35.70	0.00	16.35			6.86	20.60	12.80	14.93	5.44	3.25	0.52
47	2.16	58.00	41.87	0.00	32.56			4.84	18.50	11.80	13.14	9.75	1.58	5.70
48	0.48	60.00	44.73	0.00	11.36			7.76	16.30	11.07	8.39	4.56	2.54	2.10
49	2.84	70.00	26.73	0.00	21.61			5.88	31.30	10.40	7.53	4.21	1.10	1.70
50	3.08	80.00	22.47	0.00	9.36			2.84	17.20	6.80	5.74	4.36	0.20	2.30
51	3.28	85.00	13.33	0.00	6.36			7.68	18.30	3.93	4.87	3.59	0.00	1.90
52	2.56	80.00	7.87	0.00	3.61			9.96	17.60	2.60	4.02	4.52	0.00	0.00
01	2.56							9.96						0.82
02	1.60							7.52						
03	2.44							5.12						

LG-Lam Guntur**, ND**- Nandyal**, DW**-Dharwad**, RC**-Raichur**, CN-** Chamarajanagar**, CBE**- Coimbatore**, SVPR**-Srivilliputtur,

Table: 175. Ent 2. Seasonal dynamics of key pests of cotton (Sucking Pests) under unprotected condition in South Zone during 2024-25in Suvin/DCH 32 NBt.

SMW	Sucking Pests													
	Whitefly/ 3 leaves							Thrips/ 3 leaves						
	LG	ND	DW	RC	CN	CBE	SVPR	LG	ND	DW	RC	CN	CBE	SVPR
24			0.00							0.00				
25			0.00							0.00				
26			0.00							0.00				
27			0.00							0.00				
28			0.00							0.00				
29			0.00							0.00				
30			0.00							0.00				
31			1.07		3.21					2.33		5.71		
32			1.33	0.00	2.96					17.80	7.39	5.56		
33			1.67	0.00	2.56					24.20	9.00	6.11		
34			1.93	0.00	3.49	0.00				34.20	15.16	6.75	0.00	
35		5.70	2.53	2.51	3.31	0.00			17.30	43.53	12.45	7.86	0.00	
36	1.52	5.20	1.33	2.70	3.51	0.00		1.64	11.50	55.67	13.37	10.01	0.00	
37	1.44	6.75	2.87	3.53	3.71	0.00		2.04	24.80	59.40	19.85	11.36	0.00	
38	0.28	10.69	4.07	6.66	2.61	1.24		4.32	31.40	59.33	24.50	13.65	0.00	
39	-	17.78	4.13	6.38	2.21	2.54		-	36.20	57.13	18.81	7.61	0.00	
40	0.4	27.82	4.27	7.26	0.00	3.24	1.40	7.20	35.70	32.00	15.18	4.35	0.00	0.00
41	2.08	26.34	4.87	4.07	0.00	0.00	1.80	0.36	33.60	30.64	9.16	4.53	0.00	2.80
42	1.52	32.74	6.13	6.37	0.00	0.00	1.40	6.32	35.70	26.20	7.85	3.63	0.00	0.00
43	2.96	30.70	5.80	7.38	0.00	0.00	0.20	0.36	37.80	19.93	11.81	2.39	0.00	0.00
44	2.24	34.50	5.33	6.21	0.00	0.33	0.80	0.08	32.60	13.27	11.81	1.86	0.00	0.00
45	1.6	38.42	5.00	9.57	0.00	1.25	0.20	0.20	36.70	9.87	12.74	1.20	1.24	0.00
46	2.84	39.80	6.40	9.02	0.00	2.35	0.00	0.48	41.80	6.93	6.31	1.10	1.66	0.00
47	1.24	41.25	6.40	7.31	0.00	2.68	0.80	1.24	42.80	4.67	7.35	0.00	1.58	0.00
48	1.4	39.20	6.40	6.31	0.00	3.55	0.00	0.48	39.30	3.60	6.36	0.00	2.32	0.00
49	2.8	42.30	0.87	5.48	0.00	0.00	0.80	1.16	35.80	2.73	3.52	0.00	0.00	0.00
50	2.04	47.12	0.53	4.58	0.00	0.00	0.00	1.24	39.80	1.87	3.38	0.00	0.00	0.00
51	2.56	48.87	0.33	3.71	0.00	0.00	1.00	0.24	38.70	1.24	1.79	0.00	0.00	0.00
52	0.88	47.40	0.00	4.16	0.00	0.00	0.80	0.16	38.20	0.00	1.65	0.00	0.00	0.00
01	0.88						0.20	0.08						0.00
02	2.96							0.88						
03	2.40							0.88						

LG-Lam Guntur**, ND**- Nandyal**, DW**-Dharwad**, RC**-Raichur**, CN**- Chamarajanagar**, CBE**- Coimbatore**, SVPR**-Srivilliputtur

Table: 176. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in South Zone during 2024-25 in Suvin/DCH 32 NBt.

SMW	Natural Enemies#							No. of Larval Recovery/5plants						
								H. armigera						
	LG	ND	DW	RC	CN	CBE	SVPR	LG	ND	DW*$	RC*$	CN*$	CBE	SVPR
24			0.00							0.00				
25			0.00							0.00				
26			0.00							0.00				
27			0.00							0.00				
28			0.00							0.00				
29			0.00							0.00				
30			0.00							0.00				
31			0.00		3.50					0.00		0.00		
32			0.00	3.36	2.40					0.00	0.00	0.00		
33			0.00	4.61	1.52					0.20	0.18	0.00		
34			0.40	10.66	2.46					0.40	1.25	0.00		
35			0.87	2.69	1.89					0.80	1.60	0.00		
36	0.24		1.33	3.97	3.45					1.20	1.34	0.00		
37	0.16		2.22	4.34	5.12					1.40	1.60	0.00		
38	0.12		2.73	3.79	4.60					2.20	1.96	0.00		
39	-		1.67	3.52	2.35					3.20	1.63	0.00		
40	0.20		1.93	4.89	1.25		0.00			4.00	1.60	0.00		
41	0.20		2.33	5.07	1.00		0.20			5.20	1.51	0.00		
42	0.16		1.87	4.34	0.76		0.20			5.40	1.96	0.00		
43	0.20		1.50	4.89	1.23		0.30			2.80	0.53	0.00		
44	0.12		1.07	4.16	1.31		0.70			2.40	0.00	0.00		
45	0.16		1.33	5.80	1.25		0.77			1.80	1.30	0.00		
46	0.24		2.33	4.16	0.00		0.80			1.20	0.32	0.00		
47	0.20		1.33	1.96	0.00		0.67			0.80	0.32	0.00		
48	0.20		1.07	3.24	0.00		0.63			0.60	0.00	0.00		
49	-		0.87	1.32	0.00		0.47			0.00	0.00	0.00		
50	0.16		0.53	3.06	0.00		0.43			0.00	0.00	0.00		
51	0.12		0.23	3.97	0.00		0.27			0.00	0.00	0.00		
52	-		0.00	4.89	0.00		0.50			0.00	0.00	0.00		
01	0.12						0.33							
02	0.20													
03	0.24													

LG-Lam Guntur**, ND**- Nandyal**, DW**-Dharwad**, RC**-Raichur**, CN**- Chamarajanagar**, CBE**- Coimbatore**, SVPR**-Srivilliputtur, ,#Natural Enemies include coccinellids, chrysopids, syrphids and spider.*-number per plant., $ number per plant

Table: 177. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in South Zone during 2024-25 in Suvin/DCH 32 NBt.

SMW	No. of Larval Recovery/5plants															
	Earias spp.			S. *litura*				Fruiting Body Damage (%) **			GBD (%) by ABW/ TC/SBW		Rosette flowers (%) due to PBW			
	DW$	RC$	CN$	LG$	DW$	RC$	CN$	DW	RC	CN	CN	SVPR	LG	RC	CN	CBE
24	0.00				0.00			0.00								
25	0.00				0.00			0.00								
26	0.00				0.00			0.00								
27	0.00				0.00			0.00								
28	0.00				0.00			0.00								
29	0.00				0.00			0.00								
30	0.00				0.00			0.00								
31	0.00	0.00			0.00		0.00	0.00		0.00	0.00				0.00	
32	0.00	0.00	0.00		0.00	0.00	0.00	0.00	27.15	0.00	0.00			0.00	0.00	
33	0.00	0.00	0.00		0.00	0.00	0.00	0.00	34.67	0.00	0.00			0.00	0.00	
34	0.00	0.00	0.00		0.00	0.00	0.00	24.69	37.96	0.00	0.00			0.00	0.00	0.00
35	0.00	0.00	0.00		0.00	0.00	0.00	30.91	21.63	0.00	0.00			0.00	0.00	0.00
36	0.00	0.00	0.00		0.00	0.00	0.00	36.12	29.48	0.00	0.00			0.00	0.00	0.00
37	0.20	0.00	0.00		0.00	0.36	0.00	37.90	57.07	0.00	0.00			0.00	0.00	0.00
38	0.40	0.00	0.00		0.00	0.62	0.00	37.51	52.46	0.00	0.00			4.53	0.00	0.00
39	0.87	0.00	0.00		0.00	1.01	0.00	35.15	43.98	0.00	0.00			7.60	0.00	0.00
40	1.33	0.00	0.00		0.00	2.00	0.00	39.19	48.28	0.00	0.00	0.00		10.65	0.00	0.00
41	1.07	0.00	0.00		0.00	1.09	0.00	40.14	55.80	0.00	0.00	0.00		22.80	0.00	0.00
42	0.87	0.00	0.00		0.00	0.63	0.00	40.58	58.48	0.00	0.00	0.00		25.90	0.00	0.00
43	0.53	0.00	0.00	0.36	0.00	0.58	0.00	37.88	60.65	0.00	0.00	0.00		28.92	0.00	0.00
44	0.40	0.00	0.00	0.24	0.00	1.01	0.00	36.24	55.98	0.00	0.00	0.00		19.78	0.00	0.56
45	0.20	0.00	0.00	0.24	0.00	0.76	0.00	39.36	51.73	0.00	0.00	0.00	5.00	25.90	0.00	1.25
46	0.00	0.00	0.00	-	0.00	1.33	0.00	35.25	47.90	0.00	0.00	0.00	5.00	21.88	0.00	1.23
47	0.00	0.00	0.00	0.24	0.00	0.62	0.00	37.50	33.88	0.00	0.00	0.00	15.00	22.80	0.00	0.50
48	0.00	0.00	0.00	0.16	0.00	0.80	0.00	33.52	30.04	0.00	0.00	0.00	25.00	25.90	0.00	1.56
49	0.00	0.00	0.00	0.20	0.00	0.00	0.00	30.71	59.61	0.00	0.00	0.00	30.00	28.92	0.00	1.85
50	0.00	0.00	0.00		0.00	0.00	0.00	25.02	23.33	0.00	0.00	0.00	30.00	10.65	0.00	2.04
51	0.00	0.00	0.00		0.00	0.00	0.00	17.39	15.33	0.00	0.00	0.00	35.00	19.78	0.00	1.24
52	0.00	0.00	0.00		0.00	0.00	0.00	13.48	26.85	0.00	0.00	0.00		10.65	0.00	1.15

LG-Lam Guntur**, ND**- Nandyal**, DW**-Dharwad**, RC**-Raichur**, CN-** Chamarajanagar**, CBE**- Coimbatore**, SVPR-**Srivilliputtur, ** Fruiting Body damage includes damage in squares, flowers and boll, $ number per plant.

Table: 178. Ent 2. Seasonal dynamics of key pests of cotton (Sucking Pests) under unprotected condition in South Zone during 2024-25 in Suraj/DCH 32 NBt.

SMW	Sucking Pests													
	Aphids/ 3 leaves							Jassid/ 3 leaves						
	LG	ND	DW	RC	CN	CBE	SVPR	LG	ND	DW	RC	CN	CBE	SVPR
24			0.00							0.00				
25			0.00							0.00				
26			0.00							0.00				
27			0.00							0.00				
28			0.00							0.00				
29			0.00							0.00				
30			0.00							0.00				
31			0.00		25.29					0.00		3.25		
32			0.33	10.55	15.29					2.07	0.00	1.27		
33			0.87	7.52	6.19					2.53	2.29	0.93		
34			1.07	12.34	17.94					2.33	9.26	2.14	0.00	
35			1.53	8.52	15.59					2.53	7.80	1.84	0.00	
36			2.33	6.59	36.09					2.07	9.00	5.29	0.00	
37			2.67	2.95	41.19					8.20	11.41	8.44	0.00	
38			3.44	4.95	46.28					8.67	15.65	9.94	2.67	
39			7.62	1.83	28.14					8.93	12.15	6.19	5.85	
40			8.40	10.51	11.99					9.60	16.53	4.03	7.45	1.90
41			11.07	6.51	10.23					10.47	10.18	3.49	0.00	2.90
42			12.87	3.68	8.44					10.87	11.10	1.79	0.00	1.50
43			15.34	2.77	10.04					11.07	13.29	2.84	0.00	1.90
44			20.33	1.83	12.11					11.40	11.37	3.84	2.54	3.90
45			34.47	2.94	28.64					12.60	13.11	7.58	3.54	1.10
46			36.87	1.83	14.93					13.93	16.90	4.02	5.47	0.70
47			41.63	1.83	31.14					14.07	15.86	8.33	4.86	4.90
48			44.45	1.83	9.94					10.93	10.37	3.14	3.25	2.50
49			24.67	1.83	20.19					9.33	9.16	2.79	1.05	1.90
50			20.60	1.83	7.94					4.80	8.79	2.94	0.00	2.90
51			10.35	1.83	4.94					3.67	6.63	2.17	0.00	1.50
52			4.20	1.83	2.19					2.60	6.08	3.10	0.00	0.70
01														1.10
02														

LG-Lam Guntur**, ND**- Nandyal**, DW-**Dharwad**, RC-**Raichur**, CN-** Chamarajanagar**, CBE**- Coimbatore**, SVPR-**Srivilliputtur,

Table: 179. Ent 2. Seasonal dynamics of key pests of cotton (Sucking Pests) under unprotected condition in South Zone during 2024-25 in Suraj/DCH 32 NBt.

SMW	Sucking Pests										Natural Enemies[#]				
	Whitefly/ 3 leaves					Thrips/ 3 leaves									
	DW	RC	CN	CBE	SVPR	DW	RC	CN	CBE	SVPR	DW	RC	CN	CBE	SVPR
24	0.00					0.00					0.00				
25	0.00					0.00					0.00				
26	0.00					0.00					0.00				
27	0.00					0.00					0.00				
28	0.00					0.00					0.00				
29	0.00					0.00					0.00				
30	0.00					0.00					0.00				
31	0.00		1.79			0.00		4.29			0.00		2.00		
32	0.93	0.00	1.54			2.40	13.27	4.14			0.40	2.92	3.20		
33	1.20	0.00	1.14			15.00	14.07	4.69			0.87	2.37	2.15		
34	1.67	0.00	2.07	0.00		23.13	20.38	5.33			1.33	3.01	1.80		
35	1.73	0.00	1.89	0.00		31.93	22.97	6.44			2.22	2.56	1.50		
36	2.33	0.00	2.09	0.00		41.87	18.40	8.59			2.73	1.74	2.25		
37	1.60	2.74	2.29	0.00		57.40	27.49	9.94			1.67	3.65	2.98		
38	2.67	2.74	1.19	1.66		63.13	28.13	12.23			1.93	4.11	3.60		
39	3.73	2.74	0.79	2.56		85.73	23.13	6.19			2.33	1.10	2.25		
40	3.47	2.74	0.00	4.25	1.00	88.40	30.23	2.93		0.00	1.87	2.37	1.30		0.13
41	4.40	3.68	0.00	0.00	0.80	30.20	10.01	3.11		0.00	1.50	3.20	1.10		0.10
42	4.33	6.69	0.00	0.00	0.80	28.87	13.09	2.21		0.00	1.07	1.55	0.00		0.17
43	4.47	6.60	0.00	0.00	1.00	22.80	17.44	0.97		0.00	1.33	4.57	0.50		0.17
44	4.93	7.49	0.00	0.00	0.40	18.13	16.62	0.44		0.00	2.33	2.56	0.00		0.10
45	4.60	5.77	0.00	1.24	0.20	11.73	7.72	0.00		0.00	1.33	2.83	0.75		0.50
46	3.87	7.01	0.00	1.67	0.60	9.13	8.59	0.00		0.00	1.07	0.91	0.00		0.20
47	3.27	5.77	0.00	2.54	0.80	5.53	6.60	0.00		0.00	0.87	0.55	0.00		0.47
48	2.93	7.63	0.00	1.85	0.00	3.67	9.42	0.00		0.00	0.53	0.00	0.00		0.27
49	2.40	7.49	0.00	0.00	0.40	2.33	8.08	0.00		0.00	0.47	0.91	0.00		0.37
50	1.87	6.35	0.00	0.00	0.60	1.47	7.79	0.00		0.00	0.33	0.00	0.00		0.27
51	0.20	4.46	0.00	0.00	0.20	1.07	5.42	0.00		0.00	0.20	0.00	0.00		0.13
52	0.00	4.20	0.00	0.00	0.00	0.80	5.17	0.00		0.00	0.00	0.00	0.00		0.47

LG-Lam Guntur**, ND**- Nandyal**, DW**-Dharwad**, RC**-Raichur**, CN-** Chamarajanagar**, CBE**- Coimbatore**, SVPR**-Srivilliputtur ,#Natural Enemies include coccinellids, chrysopids, syrphids and spider.

Table: 180. Ent 2. Seasonal dynamics of key pests of cotton (Bollworms) under unprotected condition in South Zone during 2024-25 in Suraj/DCH 32 NBt.

SMW	No. of Larval Recovery/5plants																
	H. armigera			*Earias* spp.			S. *litura*			Fruiting Body Damage (%) **			GBD (%) by ABW/ TC/SBW		Rosette flowers (%) due to PBW		
	DW$	RC$	CN$	DW$	RC$	CN$	DW$	RC$	CN$	DW	RC	CN	CN	SVPR	RC	CN	CBE
24	0.00			0.00			0.00			0.00							
25	0.00			0.00			0.00			0.00							
26	0.00			0.00			0.00			0.00							
27	0.00			0.00			0.00			0.00							
28	0.00			0.00			0.00			0.00							
29	0.00			0.00			0.00			0.00							
30	0.00			0.00			0.00			0.00							
31	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00			0.00	
32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.38	0.00	0.00		0.00	0.00	
33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.35	0.00	0.00		0.00	0.00	
34	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.94	46.42	0.00	0.00		0.00	0.00	0.00
35	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.24	44.10	0.00	0.00		0.00	0.00	0.00
36	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.48	46.86	0.00	0.00		4.31	0.00	0.00
37	1.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.12	31.50	0.00	0.00		7.45	0.00	0.00
38	2.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	35.82	34.46	0.00	0.00		10.98	0.00	0.00
39	3.00	0.91	0.00	0.33	0.00	0.00	0.00	0.00	0.00	31.82	31.24	0.00	0.00		14.23	0.00	0.00
40	4.20	0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00	36.44	24.29	0.00	0.00	0.00	19.85	0.00	0.00
41	5.00	0.00	0.00	0.93	0.00	0.00	0.00	0.67	0.00	38.55	23.63	0.00	0.00	0.00	9.80	0.00	0.00
42	5.20	0.91	0.00	1.33	0.00	0.00	0.00	0.11	0.00	38.91	33.93	0.00	0.00	0.00	10.78	0.00	0.00
43	2.40	0.00	0.00	0.87	0.00	0.00	0.00	0.22	0.00	35.86	41.35	0.00	0.00	0.00	19.89	0.00	0.00
44	2.00	0.00	0.00	0.53	0.00	0.00	0.00	0.00	0.00	34.64	32.84	0.00	0.00	0.00	7.84	0.00	0.00
45	1.60	0.00	0.00	0.33	0.00	0.00	0.00	1.00	0.00	37.01	36.00	0.00	0.00	0.00	19.92	0.00	2.45
46	1.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	33.88	28.10	0.00	0.00	0.00	23.91	0.00	2.89
47	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.47	36.00	0.00	0.00	0.00	27.98	0.00	3.54
48	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.28	34.46	0.00	0.00	0.66	39.30	0.00	3.67
49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.66	55.13	0.00	0.00	0.00	17.64	0.00	3.54
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.02	39.38	0.00	0.00	0.00	18.62	0.00	2.54
51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.12	58.37	0.00	0.00	0.00	18.33	0.00	1.58
52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.76	39.38	0.00	0.00	0.00	0.00	0.00	1.63

LG-Lam Guntur**, ND**- Nandyal**, DW**-Dharwad**, RC**-Raichur**, CN**- Chamarajanagar**, CBE**- Coimbatore**, SVPR**-Srivilliputtur,** Fruiting Body damage includes damage in squares, flowers and boll,*PBW larvae recovery in flowers, $ number per plant

Table:181. Ent 2. Seasonal dynamics of key pests of cotton (Trap catches) under unprotected condition in South Zone during 2024-25.

SMW	Trap Catches/Weekly													
	H. armigera							*Pectinophora gossypiella*						
	LG	ND	DW	RC	CN*	CBE	SVPR	LG	ND	DW	RC	CN*	CBE	SVPR
24			0.00							0.00				
25			0.00							0.00				
26			0.00							0.00				
27			0.00							0.00				
28			0.00							0.00				
29			0.00							0.00				
30			0.00							0.00				
31			0.00		0.00					0.00		0.00		
32			0.00	0.00	0.00					0.00	0.00	0.00		
33			3.60	6.00	0.00					0.00	0.00	0.00		
34			4.86	9.00	0.00					0.60	1.20	0.00		
35		0.00	17.43	8.00	0.00				0.00	0.80	4.03	0.00		
36		0.00	11.86	10.00	0.00				0.00	1.00	12.37	3.75		
37		0.00	16.60	12.00	0.00				1.60	3.40	33.06	7.60		
38		0.00	19.00	15.00	0.00				6.03	6.80	37.55	9.75		
39		0.07	6.00	17.00	0.00				5.14	9.14	41.65	13.25		
40		0.00	11.00	24.00	0.00				5.71	11.71	43.50	12.45		
41		0.00	6.60	26.00	0.00				2.53	15.71	62.96	16.50		
42		0.00	3.43	28.00	0.00				2.71	18.43	76.03	13.40		
43		0.49	6.20	14.00	0.00				8.68	27.86	82.68	15.20		
44		0.14	8.60	33.00	0.00				28.57	31.57	97.50	13.20		
45		0.07	16.86	24.00	0.00				29.86	67.83	84.27	10.00		
46		0.00	12.43	20.00	0.00				27.71	78.89	78.22	5.12		
47		0.07	9.89	12.00	0.00				24.85	86.71	98.25	3.12		
48		0.28	6.71	10.00	0.00				24.53	94.57	90.46	0.00		
49		0.07	2.37	8.00	0.00				38.02	51.45	72.52	0.00		
50		0.80	1.57	4.00	0.00				49.45	25.80	47.41	0.00		
51		0.90	0.00	6.00	0.00				51.75	22.45	18.16	0.00		
52		0.15	0.00	4.00	0.00				54.60	12.43	14.75	0.00		

LG-Lam Guntur**, ND**- Nandyal**, DW**-Dharwad**, RC**-Raichur**, CN**-Chamarajanagar**, CBE**- Coimbatore**, SVPR**-Srivilliputtur,

Table:182. Ent 2. Seasonal dynamics of key pests of cotton (Trap catches) under unprotected condition in South Zone during 2024-25.

SMW	Trap Catches/Weekly													
	Earias spp.							S. *litura*						
	LG	ND	DW	RC	CN	CBE	SVPR	LG	ND	DW	RC	CN	CBE	SVPR
24			0.00							0.00				
25			0.00							0.00				
26			0.00							0.00				
27			0.00							0.00				
28			0.00							0.00				
29			0.00							0.00				
30			0.00							0.00				
31			0.00		0.00					0.00		0.00		
32			0.00	0.00	0.00					0.00	0.00	0.00		
33			0.00	0.00	0.00					0.00	0.00	0.00		
34			0.00	0.00	0.00					2.40	66.50	0.00		
35		0.00	0.40	0.00	0.00				0.00	7.60	65.60	0.00		
36		0.00	0.80	0.00	0.00				0.00	19.40	2.75	0.00		
37		0.07	1.20	0.00	0.00				3.50	31.80	0.25	0.00		
38		0.57	2.60	0.00	0.00				10.71	21.45	22.25	0.00		
39		0.78	3.40	0.00	0.00				6.43	28.00	46.01	0.00		
40		0.28	4.20	0.00	0.00				6.86	11.60	85.00	0.00		
41		0.07	4.80	0.00	0.00				3.64	15.43	88.00	0.00		
42		0.00	11.20	0.00	0.00				1.57	33.20	106.00	0.00		
43		0.57	13.60	0.00	0.00				8.28	29.80	70.23	0.00		
44		0.28	12.40	0.00	0.00				6.07	25.40	22.00	0.00		
45		0.00	10.40	0.00	0.00				8.00	23.60	10.69	0.00		
46		0.07	8.40	0.00	0.00				6.50	17.60	10.52	0.00		
47		0.14	5.60	0.00	0.00				4.71	22.62	12.25	0.00		
48		0.50	3.40	0.00	0.00				2.86	11.40	10.22	0.00		
49		0.00	1.20	0.00	0.00				5.79	8.60	26.31	0.00		
50		1.45	0.00	0.00	0.00				1.75	4.40	0.00	0.00		
51		1.60	0.00	0.00	0.00				10.90	2.80	3.75	0.00		
52		0.60	0.00	0.00	0.00				2.30	0.40	0.67	0.00		

LG-Lam Guntur**, ND**- Nandyal**, DW**-Dharwad**, RC**-Raichur**, CN**- Chamarajanagar**, CBE**- Coimbatore**, SVPR**-Srivilliputtur,

Table:183. Ent 2. Seasonal dynamics of key pests of cotton (Abiotic factors) under unprotected condition in South Zone during 2024-25.

SMW	Temperature (ºC)													
	LG		ND		DW		RC		CN		CBE		SVPR	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
24					21.20	28.60								
25					20.70	30.10								
26					20.90	28.90								
27					21.10	27.80								
28					20.00	26.80								
29					20.40	25.60								
30					20.80	25.10								
31					20.60	26.20			21.03	29.33				
32					20.30	27.30	29.70	24.40	21.66	30.47				
33					20.90	30.70	30.60	25.10	22.66	32.91				
34					20.90	28.10	34.00	24.30	20.34	30.67	24.10	32.10		
35			24.17	31.07	20.40	26.70	31.40	24.60	21.09	30.19	23.60	31.40		
36	25.00	29.60	24.51	31.04	20.50	27.90	33.90	24.50	21.03	30.74	23.80	32.90		
37	26.90	33.90	24.77	33.64	19.50	28.60	30.80	22.70	19.19	31.41	24.10	32.30		
38	26.90	34.70	25.80	33.83	19.30	29.50	30.20	21.80	18.76	32.10	22.90	33.80		
39	26.40	32.40	25.63	33.06	19.20	28.40	30.40	22.50	21.30	31.79	23.70	33.00		
40	26.30	34.70	25.24	34.56	20.50	31.70	31.80	21.40	20.93	32.37	24.40	33.40		
41	25.30	31.40	25.11	33.53	20.30	30.40	33.30	22.20	21.20	30.24	22.90	30.50		
42	25.10	29.90	24.03	29.41	20.90	28.30	31.90	22.30	21.06	30.03	22.50	28.50		
43	24.40	33.70	23.46	34.07	20.10	29.90	33.10	22.60	20.30	31.66	21.90	30.70		
44	23.40	33.30	23.91	34.30	19.90	30.90	32.20	23.20	20.29	31.61	21.60	31.10		
45	23.10	33.90	23.17	33.67	16.80	30.70	30.70	22.70	18.37	30.64	22.20	30.30		
46	22.70	31.10	23.91	32.07	18.20	30.00	32.50	21.00	19.54	29.53	22.60	29.80		
47	20.40	30.70	18.69	31.29	14.20	29.30	33.50	22.10	17.31	29.99	22.20	29.20		
48	20.00	29.00	21.34	29.96	14.20	28.30	32.40	19.40	19.19	26.87	21.50	29.10		
49	21.30	31.60	23.11	30.36	19.60	28.90	31.90	21.00	19.19	31.70	22.00	30.20		
50	19.70	31.00	20.71	30.37	16.20	28.60	30.10	16.00	18.20	27.13	20.80	27.70		
51	19.70	29.60	21.74	31.39	13.20	28.50	30.00	18.00	17.30	30.84	19.90	30.90		
52	19.60	29.90	21.28	30.23	16.60	28.30	31.30	22.20	16.86	29.39	20.90	30.10		

LG-Lam Guntur**, ND-** Nandyal**, DW-**Dharwad**, RC-**Raichur**, CN-** Chamarajanagar**, CBE-** Coimbatore**, SVPR-**Srivilliputtur,

Table:184. Ent 2. Seasonal dynamics of key pests of cotton (Abiotic factors) under unprotected condition in South Zone during 2024-25.

SMW	Relative Humidity (%)													
	LG		ND		DW		RC		CN		CBE		SVPR	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
24					85.90	71.60								
25					87.00	73.90								
26					87.60	77.90								
27					91.00	83.40								
28					91.70	77.60								
29					94.30	91.60								
30					92.00	87.10								
31					92.70	87.60			99.86	66.14				
32					89.90	81.00	89.43	70.57	100.00	61.14				
33					89.30	68.10	85.57	59.43	100.00	61.86				
34					92.40	82.10	84.14	48.00	100.00	58.43	83.00	55.00		
35			87.43	69.57	91.00	85.00	83.35	52.37	100.00	59.86	80.00	55.00		
36	100.00	81.00	89.71	73.57	87.30	81.70	83.29	52.86	99.57	56.00	84.00	53.00		
37	99.00	49.00	81.43	50.14	88.30	74.70	91.86	67.71	100.00	51.00	84.00	60.00		
38	98.00	47.00	76.86	57.71	88.70	57.40	92.86	68.71	99.29	43.86	87.00	52.00		
39	98.00	88.00	81.43	60.43	87.90	54.70	91.29	66.71	98.57	53.00	83.00	56.00		
40	98.00	59.00	81.29	62.00	85.10	71.40	84.00	54.14	100.00	55.43	85.00	61.00		
41	99.00	70.00	77.71	70.71	88.30	77.70	83.43	51.14	100.00	68.86	94.00	65.00		
42	99.00	70.00	94.57	81.86	91.90	74.30	89.43	62.00	100.00	61.86	93.00	72.00		
43	98.00	67.00	85.00	53.00	86.30	60.40	89.57	55.86	100.00	54.00	94.00	72.00		
44	98.00	67.00	82.71	52.29	86.30	58.90	82.14	58.86	100.00	50.57	92.00	65.00		
45	98.00	66.00	80.57	48.71	68.10	49.90	92.57	67.00	100.00	47.43	91.00	51.00		
46	98.00	66.00	83.00	62.57	76.60	49.60	81.00	47.29	100.00	61.14	92.00	66.00		
47	98.00	68.00	84.71	46.71	69.90	42.10	80.71	46.86	100.00	51.29	90.00	59.00		
48	99.00	84.00	77.29	61.57	64.90	56.90	78.71	36.86	100.00	65.14	93.00	64.00		
49	98.00	62.00	92.00	70.43	86.70	68.10	81.14	45.29	100.00	48.71	92.00	58.00		
50	99.00	65.00	84.71	56.14	83.90	62.30	74.14	35.43	99.43	61.14	92.00	70.00		
51	99.00	75.00	87.86	56.57	72.90	45.90	71.43	45.57	100.00	48.43	93.00	50.00		
52	99.50	74.30	89.13	60.13	83.10	62.80	88.29	52.57	100.00	53.29	89.00	56.00		

LG-Lam Guntur**, ND**- Nandyal**, DW**-Dharwad**, RC**-Raichur**, CN-** Chamarajanagar**, CBE**- Coimbatore**, SVPR**-Srivilliputtur, **AM –** Morning **PM**- Evening

Table:185. Ent 2. Seasonal dynamics of key pests of cotton (Abiotic factors) under unprotected condition in South Zone during 2024-25.

SMW	Rainfall in mm						
	LG	ND	DW	RC	CN	CBE	SVPR
24			4.60				
25			21.40				
26			18.00				
27			14.20				
28			29.00				
29			74.40				
30			75.80				
31			73.60		19.50		
32			4.00	63.20	53.00		
33			50.60	1.80	75.00		
34			36.40	0.00	16.00	12.20	
35		9.89	75.20	131.80	17.50	0.40	
36	60.60	5.69	14.60	0.00	1.00	1.00	
37	0.00	0.00	6.60	92.00	0.00	0.00	
38	7.60	0.00	14.20	84.60	0.00	0.00	
39	68.60	1.31	39.40	117.60	27.50	10.20	
40	10.20	8.86	7.60	0.00	75.50	8.20	
41	30.00	0.74	127.00	6.80	87.00	118.00	
42	81.20	10.20	60.20	20.40	26.00	151.60	
43	4.00	0.00	15.40	37.60	18.00	91.60	
44	0.00	0.00	31.60	0.00	11.00	10.00	
45	0.00	0.00	0.00	22.60	0.00	9.40	
46	1.20	0.29	0.00	0.00	28.00	43.20	
47	0.00	0.00	0.00	0.00	0.00	0.00	
48	7.40	0.14	0.00	0.00	53.50	4.80	
49	2.60	4.46	8.00	0.00	11.00	7.60	
50	0.00	0.00	0.00	0.00	3.50	22.80	
51	1.20	0.00	0.00	0.00	0.00	0.00	
52	11.60	0.13	0.00	0.40	0.00	4.50	
01	0.00						
02	0.00						
	0.00						

LG-Lam Guntur**, ND**- Nandyal**, DW-**Dharwad**, RC-**Raichur**, CN-** Chamarajanagar**, CBE**- Coimbatore**, SVPR-**Srivilliputtur,

Table :186. Ent 2: Seasonal dynamics of key pests of cotton (Bollworms & Open boll damage) under unprotected condition in South Zone during 2024-25.

Variety/hybrid	Green Boll Damage (%) Due to PBW through 50 Green boll destructive sampling						PBW larval recovery from 50 green bolls					
	LG	ND	DW	RC	CN	CBE	LG	ND	DW	RC	CN	CBE
Jadoo/ Bahubali BG II/KCH-36	19.83	27.50	26.00	43.49	8.22	2.90	14.50	17.50	13.73	23.22	5.25	3.85
Suvin/ DCH 32 N-Bt	26.33	28.75	36.20	66.88	-	4.43	14.84	20.00	20.54	30.80	-	4.62
Suraj	-	-	30.33	65.46	18.58	7.41	-	-	17.80	28.25	11.16	8.01

LG-Lam Guntur**, ND**- Nandyal**, DW-**Dharwad**, RC-**Raichur**, CN-** Chamarajanagar**, CBE**- Coimbatore**, SVPR-**Srivilliputtur,

Table :187. Ent 2: Seasonal dynamics of key pests of cotton (Open boll damage) under unprotected condition in South Zone during 2024-25.

Variety/hybrid	Open boll damage (%)						Locule boll damage (%)					
	LG	ND	DW	RC	CN	CBE	LG	ND	DW	RC	CN	CBE
Jadoo/ Bahubali BG II/KCH-36	19.00	-	38.89	75.81	7.25	4.28	16.57	-	27.84	70.01	11.23	3.25
Suvin/ DCH 32 N-Bt	24.17	-	64.22	84.33	-	6.89	17.85	-	45.00	78.37	-	5.41
Suraj	-	-	55.11	81.29	23.50	10.89		-	30.88	75.38	25.80	8.59

LG-Lam Guntur**, ND**- Nandyal**, DW-**Dharwad**, RC-**Raichur**, CN-** Chamarajanagar**, CBE**- Coimbatore**, SVPR-**Srivilliputtur,

Table :188. Ent 2: Seasonal dynamics of key pests of cotton (Yield) under unprotected condition in South Zone during 2024-25.

Variety/hybrid	**Yield (q/hec.)**						
	LG	**ND**	**DW**	**RC**	**CN**	**CBE**	**SVPR**
Jadoo/ Bahubali BG II/KCH-36	-	-	-	8.53	-	-	-
Suvin/ DCH 32 N-Bt	-	-	-	1.28	-	-	-
Suraj	-	-	-	5.15	-	-	-

LG-Lam Guntur**, ND**- Nandyal**, DW-**Dharwad**, RC-**Raichur**, CN-** Chamarajanagar**, CBE**- Coimbatore**, SVPR-**Srivilliputtur,

Table: 189. Ent 3: Survey for key and emerging pests in cotton in Farmers Field for weekly advisory in North Zone, Central Zone and South Zone during 2024-25.

Zone	Centre	Duration Of Survey	Total no. of locations surveyed	No. of location crossed ETL									
				Sucking pest					Bollworms				Other pest
				Whitefly	Leaf hopper	Thrips	Aphids	Mirid bug	*H. armigera*	*E. vitella*	*P. gossypiella*	*S. litura*	Shoot weevil
North Zone	Bathinda	June-Nov	360	87	17	36	0	0	0	0	32	0	0
	Faridkot	June- Oct	836	508	13	179	0	0	0	0	33	0	0
	Hisar	June- Oct	333	34	18	04	0	0	0	0	206	0	0
	Sirsa	June-Nov	227	127	34	41	0	0	0	0	107	0	0
	Sriganganagar	June-Oct	478	105	19	18	0	0	0	0	78	0	0
		Total	**2234**	**771**	**101**	**278**	**0**	**0**	**0**	**0**	**456**	**0**	**0**
Central Zone	Banswara	July-Nov	241	-	83	-	-	-	-	-	-	-	-
	Junagadh	June-Dec	175	4	0	17	66	0	0	0	60	0	0
	Surat& Bharuch	June-Dec	827	0	34	28	57	0	0	0	67	0	0
	Akola	Aug-Jan	183	20	36	24	18				16	12	
	Nanded	June-Dec	675	124	276	288	358	0	0	0	540	0	0
	Rahuri	June- Dec	554	0	09	81	98	-	-	0	142	0	-
	Khandwa	-	-	-	-	-	-	-	-	-	-	-	-
	Bhawanipatna	Aug-Dec	1044	0	40	10	0	8	0	0	55	0	39
		Total	**3699**	**148**	**478**	**448**	**597**	**08**	**0**	**0**	**880**	**12**	**39**
South Zone	Lam Guntur	July-Jan	433	3	87	38	22	0	0	0	67	3	0
	Nandyal	-	-	-	-	-	-	-	-	-	-	-	-
	Dharwad	July-Dec	259	0	85	71	55	68	0	0	72	0	12
	Raichur	Aug-Dec	1423	7	166	154	8	0	0	0	299	19	0
	Chamarajanagar	July-Oct	1292	-	20	-	-	-	-	-	-	-	-
	Coimbatore	July-Dec	165	-	33	3	0	0	0	0	35	0	0
	Srivilliputhur	Aug-Jan	132	-	44	-	-	-	-	-	-	-	07
		Total	**3704**	**10**	**435**	**266**	**85**	**68**	**0**	**0**	**473**	**22**	**19**

Table: 190.Ent4a. Evaluation of persistence of insecticides against Pink Bollworm on field dose (Field Condition).

S.N	Insecticides	BT				FA			
		P	T	P*T	RPT	P	T	P*T	RPT
1	Chlorantraniliprole 18.5 SC	-	-	-	-	15	23.88	358.15	1.00
2	Emamectin benzoate 5 SG	15	53.54	803.06	1.48	15	37.21	558.15	1.56
3	Fenpropathrin 10 EC	15	47.98	719.77	1.33	15	43.21	648.15	1.81
4	Cypermethrin 25 EC	-	-	-	-	15	48.21	723.15	2.02
5	Bifenthrin 10 EC	-	-	-	-	15	33.88	508.15	1.42
6	Profenophos 50 EC	15	46.58	698.73	1.29	15	45.88	688.15	1.92
7	Chlorpyrifos 50 EC	-	-	-	-	15	29.88	448.15	1.25
8	Spinetoram 11.7 SC	15	36.21	543.09	1.00	15	53.54	803.15	2.24
9	Quinalphos 25 %EC	-	-	-	-	-	-	-	-

BT-Bathinda, **FA**- Faridkot **P**-Period for which toxicity persisted, **T**= Average residual toxicity (calculated by adding the value of mortality divide by total observation), **RPT**- calculated by using formula of Pradhan 1967(**relative efficacy divided by lowest relative efficacy**).

Table: 191. Ent4a. Evaluation of persistence of insecticides against Pink Bollworm on field dose (Field Condition).

S.N	Insecticides	HI				SR			
		P	T	P*T	RPT	P	T	P*T	RPT
1	Chlorantraniliprole 18.5 SC	10	51.09	510.94	1.28	10	50.24	502.43	1.50
2	Emamectin benzoate 5 SG	15	49.66	744.91	1.87	15	48.51	727.58	2.17
3	Fenpropathrin 10 EC	10	42.06	420.56	1.05	10	44.19	441.93	1.32
4	Cypermethrin 25 EC	10	39.87	398.72	1.00	15	40.91	613.72	1.83
5	Bifenthrin 10 EC	10	46.73	467.26	1.17	10	51.23	512.34	1.53
6	Profenophos 50 EC	15	51.53	772.92	1.94	15	56.09	841.40	2.51
7	Chlorpyrifos 50 EC	10	48.60	485.96	1.22	7	47.95	335.67	1.00
8	Spinetoram 11.7 SC	15	55.01	825.18	2.07	10	46.83	468.34	1.40
9	Quinalphos 25 %EC	15	48.07	721.10	1.81	10	53.26	532.63	1.59

HI- Hisar**, SR-** Sirsa, **P**-Period for which toxicity persisted, **T**= Average residual toxicity (calculated by adding the value of mortality divide by total observation), **RPT**- calculated by using formula of Pradhan 1967(**relative efficacy divided by lowest relative efficacy**).

Table: 192. Ent4a. Effect of different insecticides on green boll damage (GBD), open boll damage (OBD) and yield of cotton in experiment on evaluation of persistence of insecticides

Treatment	SR									
	Pot-cum-lab condition				GBD(%)**		OBD(%)		Yield(Qt./ha.)	
	P	T	P*T	RPT	OV	TV	OV	TV	OV	TV
T1	10	52.24	522.35	1.24	18.33	25.30	15.12	22.87	19.97	-
T2	15	50.39	755.88	1.80	8.33	16.59	9.79	18.21	21.92	-
T3	10	46.32	463.22	1.10	23.33	28.77	16.17	23.68	19.36	-
T4	15	42.93	643.98	1.53	11.67	19.88	10.03	18.42	21.22	-
T5	10	52.96	529.56	1.26	16.67	24.04	13.85	21.84	20.42	-
T6	15	57.47	861.99	2.05	6.67	14.75	7.99	16.33	22.68	-
T7	10	42.11	421.10	1.00	25.00	29.91	18.44	25.41	19.10	-
T8	10	48.90	488.99	1.16	21.67	27.70	15.86	23.46	19.62	-
T9	10	55.26	552.57	1.31	15.00	22.59	11.38	19.70	20.90	-
Control	-	-	-	-	38.33	38.18	33.80	35.54	14.32	-
C.D.	-	-	-	-	-	5.56	-	1.83	0.63	-
S.E. (m)	-	-	-	-	-	1.86	-	0.61	0.21	-
C.V.	-	-	-	-	-	12.99	-	4.69	1.82	-

SR- Sirsa ,GBD- Green boll damage, OBD- Open boll damage, TV- Angular transformation value, C.D. and C.V. based on transformation value, **-average based on 2-3 sprays. T1-Chlorantraniliprole 18.5 SC, T2- Emamectin benzoate 5 SG,T3- Fenpropathrin 10 EC,T4- Cypermethrin 25 EC, T5-Bifenthrin 10 EC, T6- Profenophos 50 EC, T7- Chlorpyrifos 50 EC, T8-Spinetoram 11.7 SC, T9-Quinalphos 25 %EC

Table: 193. Ent4a. Evaluation of persistence of insecticides against Pink Bollworm on field dose (Field Condition).

S.N	Insecticides	AK				JU			
		P	T	P*T	RPT	P	T	P*T	RPT
1	Chlorantraniliprole 18.5 SC	10	48.15	481.55	1.76	10	42.48	424.76	1.50
2	Emamectin benzoate 5 SG	10	44.68	446.82	1.64	10	46.67	466.66	1.64
3	Fenpropathrin 10 EC	7	43.46	304.20	1.11	10	39.43	394.27	1.39
4	Cypermethrin 25 EC	10	42.01	420.09	1.54	10	37.71	377.14	1.33
5	Bifenthrin 10 EC	10	47.26	472.58	1.73	10	38.48	384.77	1.36
6	Profenophos 50 EC	7	39.39	275.73	1.01	10	28.38	283.81	1.00
7	Chlorpyrifos 50 EC	7	39.02	273.15	1.00	10	30.48	304.76	1.07
8	Spinetoram 11.7 SC	10	45.75	457.50	1.67	15	59.62	894.3	3.15
9	Quinalphos 25 %EC/20 AF*	-	-	-	-	10	33.14	331.43	1.17

Ak- Akola, **JU-** Junagadh, **DAS-**days after spray**, P-**Period for which toxicity persisted, **T**= Average residual toxicity (calculated by adding the value of mortality divide by total observation), **RPT-** calculated by using formula of Pradhan 1967(**relative efficacy divided by lowest relative efficacy**).
*-at Junagadg location.

Table: 194. Ent4a. Evaluation of persistence of insecticides against Pink Bollworm on field dose (Field Condition).

S.N	Insecticides	NA				SU			
		P	T	P*T	RPT	P	T	P*T	RPT
1	Chlorantraniliprole 18.5 SC	10	63.11	631.1	1.34	10	41.11	411.12	1.87
2	Emamectin benzoate 5 SG	10	75.19	751.92	1.60	10	38.44	384.43	1.75
3	Fenpropathrin 10 EC	7	70.03	490.18	1.04	10	25.56	255.55	1.16
4	Cypermethrin 25 EC	7	67.38	471.66	1.00	10	45.78	457.77	2.08
5	Bifenthrin 10 EC	7	68.94	482.59	1.02	10	22.00	220.03	1.00
6	Profenophos 50 EC	10	68.52	685.23	1.45	15	42.29	634.31	2.88
7	Chlorpyrifos 50 EC	10	59.25	592.45	1.26	10	24.67	246.67	1.12
8	Spinetoram 11.7 SC	10	72.82	728.22	1.55	15	20.19	302.85	1.38
9	Quinalphos 25 %EC	10	56.98	569.82	1.21	10	23.33	233.33	1.06

NA-Nanded**, SU**- Surat**, DAS**-days after spray**, P**-Period for which toxicity persisted, **T**= Average residual toxicity (calculated by adding the value of mortality divide by total observation), **RPT**- calculated by using formula of Pradhan 1967(**relative efficacy divided by lowest relative efficacy**).

Table: 195. Ent4a. Evaluation of persistence of insecticides against Pink Bollworm on more than 10 % of field dose (Field Condition).

S.N	Insecticides	JU				SU			
		P	T	P*T	RPT	P	T	P*T	RPT
1	Chlorantraniliprole 18.5 SC	10	44.95	449.54	1.62	15	48.00	720.00	2.04
2	Emamectin benzoate 5 SG	10	50.28	502.84	1.81	15	45.14	677.16	1.92
3	Fenpropathrin 10 EC	10	41.52	415.23	1.49	10	40.67	406.65	1.15
4	Cypermethrin 25 EC	10	38.86	388.59	1.40	10	58.45	584.45	1.65
5	Bifenthrin 10 EC	10	39.62	396.2	1.42	10	35.33	353.32	1.00
6	Profenophos 50 EC	10	27.81	278.1	1.00	15	53.14	797.14	2.26
7	Chlorpyrifos 50 EC	10	31.43	314.29	1.13	15	33.72	505.74	1.43
8	Spinetoram 11.7 SC	15	64.38	965.72	3.47	15	33.14	497.14	1.41
9	Quinalphos 25 %EC/20 AF*	10	34.29	342.86	1.23	15	29.33	439.99	1.25

JU-Junagadh**, SU**- Surat**, DAS**-days after spray**, P**-Period for which toxicity persisted, **T**= Average residual toxicity (calculated by adding the value of mortality divide by total observation), **RPT**- calculated by using formula of Pradhan 1967(**relative efficacy divided by lowest relative efficacy**).

*-at Junagadg location.

Table: 196. Ent4a. Evaluation of persistence of insecticides against Pink Bollworm on more than 25 % of field dose (Field Condition).

S.N	Insecticides	JU				SU			
		P	T	P*T	RPT	P	T	P*T	RPT
1	Chlorantraniliprole 18.5 SC	10	50.86	508.59	1.79	15	57.14	857.12	1.76
2	Emamectin benzoate 5 SG	10	56.57	565.71	1.99	15	55.05	825.71	1.70
3	Fenpropathrin 10 EC	10	46.28	462.83	1.63	15	45.33	680.01	1.40
4	Cypermethrin 25 EC	10	40.38	403.8	1.42	10	67.56	675.57	1.39
5	Bifenthrin 10 EC	10	42.29	422.86	1.49	10	48.67	486.68	1.00
6	Profenophos 50 EC	10	28.38	283.81	1.00	15	61.14	917.14	1.88
7	Chlorpyrifos 50 EC	10	33.14	331.43	1.17	15	48.95	734.29	1.51
8	Spinetoram 11.7 SC	15	69.9	1048.56	3.69	15	47.81	717.15	1.47
9	Quinalphos 25 %EC/20 AF*	10	36.95	369.53	1.30	15	38.29	574.29	1.18

JU-Junagadh**, SU**- Surat **, DAS**-days after spray**, P**-Period for which toxicity persisted, **T**= Average residual toxicity (calculated by adding the value of mortality divide by total observation), **RPT**- calculated by using formula of Pradhan 1967(**relative efficacy divided by lowest relative efficacy**), *-at Junagadg location.

Table: 197. Ent4a. Effect of different insecticides on green boll damage (GBD), open boll damage (OBD) and yield of cotton in experiment on evaluation of persistence of insecticides (Field dose).

Treatment	AK						JU						NA					
	GBD (%) **		OBD (%)		Yield (Q/ha.)		GBD (%)**		OBD(%)		Yield(Q/ha.)		GBD(%)**		OBD(%)		Yield(Q/ha.)	
	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
T1	-	-	-	-	-	-	6.38	14.63	8.56	17.01	27.61	-	16.27	23.65	9.79	18.10	16.37	-
T2	-	-	-	-	-	-	4.59	12.37	7.00	15.35	28.00	-	7.68	16.00	4.43	12.06	20.13	-
T3	-	-	-	-	-	-	8.20	16.64	9.85	18.29	23.42	-	14.40	22.23	8.69	17.06	14.77	-
T4	-	-	-	-	-	-	8.26	16.71	10.31	18.73	24.09	-	15.36	22.92	9.16	17.47	14.35	-
T5	-	-	-	-	-	-	8.07	16.50	9.67	18.11	25.02	-	7.68	16.00	4.56	12.26	14.72	-
T6	-	-	-	-	-	-	9.92	18.36	11.24	19.59	22.10	-	13.37	21.35	8.05	16.42	17.92	-
T7	-	-	-	-	-	-	9.90	18.34	11.85	20.14	22.32	-	18.56	25.49	10.76	19.11	13.60	-
T8	-	-	-	-	-	-	3.99	11.52	6.46	14.73	28.55	-	6.72	14.92	4.01	11.45	20.50	-
T9	-	-	-	-	-	-	9.53	17.98	11.12	19.48	23.09	-	19.20	25.89	11.33	19.58	13.20	-
Control	-	-	-	-	-	-	12.65	20.84	15.06	22.83	17.14	-	31.17	33.90	17.66	24.82	8.60	-
C.D.	-	-	-	-	-	-		1.83		2.24	285.64	-	-	3.77	-	3.15	2.19	-
S.E. (m)	-	-	-	-	-	-		0.62		0.75	96.13	-	-	1.26	-	1.05	0.73	-
C.V.	-	-	-	-	-	-		6.51		7.08	7.66	-	-	9.80	-	10.81	8.22	-

Ak- Akola, **JU**- Junagadh, **NA**- Nanded, GBD- Green boll damage, OBD- Open boll damage, TV- Angular transformation value, C.D. and C.V. based on transformation value, **-average based on 2-3 sprays. T1-Chlorantraniliprole 18.5 SC, T2- Emamectin benzoate 5 SG,T3- Fenpropathrin 10 EC,T4- Cypermethrin 25 EC, T5-Bifenthrin 10 EC, T6- Profenophos 50 EC, T7- Chlorpyrifos 50 EC, T8-Spinetoram 11.7 SC, T9-Quinalphos 25 %EC/20 AF

Table: 198. Ent4a. Effect of different insecticides on green boll damage (GBD), open boll damage (OBD) and yield of cotton in experiment on evaluation of persistence of insecticides (Field dose).

Treatment	SU					
	GBD(%)**		OBD(%)		Yield(Qt./ha.)	
	OV	TV	OV	TV	OV	TV
T1	24.50	29.67	15.37	23.08	22.74	-
T2	17.09	24.42	13.68	21.71	22.68	-
T3	21.56	27.67	20.56	26.97	17.21	-
T4	15.84	23.45	13.00	21.13	22.49	-
T5	23.42	28.94	23.79	29.19	15.23	-
T6	14.13	22.08	11.39	19.73	23.31	-
T7	25.68	30.45	21.53	27.65	20.27	-
T8	19.83	26.44	17.20	24.51	21.00	-
T9	25.07	30.05	23.28	28.85	17.85	-
Control	31.77	34.31	27.89	31.88	13.74	-
C.D.	-	3.24	-	3.79	2.96	-
S.E. (m)	-	1.14	-	1.27	0.99	-
C.V.	-	12.19	-	8.67	8.77	-

SU- Surat, GBD- Green boll damage, OBD- Open boll damage, TV- Angular transformation value, C.D. and C.V. based on transformation value, **-average based on 2-3 sprays. T1-Chlorantraniliprole 18.5 SC, T2- Emamectin benzoate 5 SG,T3- Fenpropathrin 10 EC,T4- Cypermethrin 25 EC, T5-Bifenthrin 10 EC, T6- Profenophos 50 EC, T7- Chlorpyrifos 50 EC, T8-Spinetoram 11.7 SC, T9-Quinalphos 25 %EC

Table: 199. Ent4a. Effect of different insecticides on green boll damage (GBD), open boll damage (OBD) and yield of cotton in experiment on evaluation of persistence of insecticides (More than 10 % of Field dose).

Treatment	JU					
	GBD(%)**		OBD(%)		Yield(Qt./ha.)	
	OV	TV	OV	TV	OV	TV
T1	6.53	14.81	8.71	17.17	25.50	-
T2	4.26	11.92	6.71	15.01	26.59	-
T3	7.99	16.42	9.66	18.11	22.98	-
T4	8.13	16.57	10.11	18.54	22.81	-
T5	7.78	16.20	9.45	17.90	23.96	-
T6	9.99	18.42	12.02	20.28	20.45	-
T7	9.78	18.23	11.66	19.97	20.94	-
T8	3.93	11.43	6.40	14.65	27.71	-
T9	9.47	17.93	11.27	19.62	21.87	-
Control	13.58	21.62	15.95	23.54	16.37	-
C.D.		1.98		2.40	304.98	-
S.E. (m)		0.67		0.81	102.64	-
C.V.		7.06		7.56	7.76	-

Table: 200. Ent4a. Effect of different insecticides on green boll damage (GBD), open boll damage (OBD) and yield of cotton in experiment on evaluation of persistence of insecticides (more than 10 % of Field dose).

Treatment	SU					
	GBD(%)**		OBD (%)		Yield(Qt./ha.)	
	OV	TV	OV	TV	OV	TV
T1	13.22	21.32	10.10	18.53	24.53	-
T2	14.22	22.16	12.41	20.62	23.11	-
T3	18.21	25.26	22.82	28.53	16.83	-
T4	11.31	19.65	14.32	22.24	23.46	-
T5	22.16	28.08	23.21	28.80	15.52	-
T6	12.72	20.89	7.24	15.61	25.62	-
T7	21.75	27.80	14.39	22.29	21.18	-
T8	17.59	24.80	16.73	24.15	21.04	-
T9	20.53	26.94	21.35	27.52	17.96	-
Control	34.55	36.00	27.89	31.88	13.74	-
C.D.	-	3.45	-	4.09	2.98	-
S.E. (m)	-	1.21	-	1.38	1.00	-
C.V.	-	14.43	-	9.94	8.56	-

SU- Surat, GBD- Green boll damage, OBD- Open boll damage, TV- Angular transformation value, C.D. and C.V. based on transformation value, **-average based on 2-3 sprays. T1-Chlorantraniliprole 18.5 SC, T2- Emamectin benzoate 5 SG,T3- Fenpropathrin 10 EC,T4- Cypermethrin 25 EC, T5-Bifenthrin 10 EC, T6- Profenophos 50 EC, T7- Chlorpyrifos 50 EC, T8-Spinetoram 11.7 SC, T9-Quinalphos 25 %EC

Table: 201. Ent4a. Effect of different insecticides on green boll damage (GBD), open boll damage (OBD) and yield of cotton in experiment on evaluation of persistence of insecticides more than 25 % of Field dose).

Treatment	JU					
	GBD(%)**		OBD(%)		Yield(Qt./ha.)	
	OV	TV	OV	TV	OV	TV
T1	6.60	14.89	7.80	16.21	23.62	-
T2	4.65	12.45	6.20	14.42	25.33	-
T3	8.26	16.71	8.91	17.36	22.15	-
T4	8.09	16.53	9.19	17.65	21.11	-
T5	8.02	16.45	8.65	17.10	22.53	-
T6	10.47	18.88	11.52	19.84	20.16	-
T7	10.33	18.75	11.17	19.53	19.33	-
T8	4.14	11.74	5.63	13.72	27.27	-
T9	10.26	18.68	10.92	19.30	20.63	-
Control	12.76	20.93	15.20	22.94	15.17	-
C.D.		2.00		2.07	306.37	-
S.E. (m)		0.67		0.70	103.11	-
C.V.		7.02		6.76	7.40	-

JU- Junagadh , GBD- Green boll damage, OBD- Open boll damage, TV- Angular transformation value, C.D. and C.V. based on transformation value, **-average based on 2-3 sprays. T1-Chlorantraniliprole 18.5 SC, T2- Emamectin benzoate 5 SG,T3- Fenpropathrin 10 EC,T4- Cypermethrin 25 EC, T5-Bifenthrin 10 EC, T6- Profenophos 50 EC, T7- Chlorpyrifos 50 EC, T8-Spinetoram 11.7 SC, T9-Quinalphos 20 A/F

Table: 202. Ent4a. Effect of different insecticides on green boll damage (GBD), open boll damage (OBD) and yield of cotton in experiment on evaluation of persistence of insecticides (more than 25 % of Field dose).

Treatment	SU					
	GBD(%)**		OBD(%)		Yield(Qt./ha.)	
	OV	TV	OV	TV	OV	TV
T1	8.05	16.49	6.17	14.38	24.95	-
T2	10.85	19.24	7.10	15.45	23.54	-
T3	14.09	22.05	14.46	22.35	18.86	-
T4	7.28	15.65	14.77	22.60	23.59	-
T5	15.90	23.50	19.96	26.54	16.09	-
T6	8.03	16.46	6.25	14.48	26.60	-
T7	17.57	24.78	8.86	17.32	22.65	-
T8	15.54	23.22	12.47	20.68	22.63	-
T9	15.93	23.53	18.65	25.58	18.28	-
Control	31.24	33.98	27.89	31.88	13.74	-
C.D.	-	4.31	-	3.20	2.55	-
S.E. (m)	-	1.51	-	1.08	0.86	-
C.V.	-	18.65	-	8.84	7.06	-

SU- Surat , GBD- Green boll damage, OBD- Open boll damage, TV- Angular transformation value, C.D. and C.V. based on transformation value, **-average based on 2-3 sprays. T1-Chlorantraniliprole 18.5 SC, T2- Emamectin benzoate 5 SG,T3- Fenpropathrin 10 EC,T4- Cypermethrin 25 EC, T5-Bifenthrin 10 EC, T6- Profenophos 50 EC, T7- Chlorpyrifos 50 EC, T8-Spinetoram 11.7 SC, T9-Quinalphos 25 %EC

Table: 203. Ent4a. Evaluation of persistence of insecticides against Pink Bollworm on field dose (Pot Condition).

S.N	Insecticides	JU				SU			
		P	T	P*T	RPT	P	T	P*T	RPT
1	Chlorantraniliprole 18.5 SC	10	46.10	460.96	1.77	10	41.56	415.56	1.78
2	Emamectin benzoate 5 SG	10	51.81	518.1	1.99	10	38.89	388.89	1.67
3	Fenpropathrin 10 EC	10	40.57	405.69	1.55	10	27.33	273.33	1.17
4	Cypermethrin 25 EC	10	36.76	367.61	1.41	10	46.44	464.44	1.99
5	Bifenthrin 10 EC	10	37.91	379.07	1.45	10	23.33	233.33	1
6	Profenophos 50 EC	10	26.09	260.94	1.00	15	43.24	648.57	2.78
7	Chlorpyrifos 50 EC	10	32.38	323.81	1.24	15	22.48	337.14	1.44
8	Spinetoram 11.7 SC	15	63.81	957.13	3.67	15	21.14	317.14	1.36
9	Quinalphos 25 %EC/20 AF*	10	31.24	312.39	1.20	15	20.57	308.57	1.32

JU- Junagadh **, SU**- Surat**, DAS-**days after spray**, P**-Period for which toxicity persisted, **T**= calculated by adding the value of mortality divide by total observation, **RPT**- calculated by using formula of Pradhan 1967(**relative efficacy divided by lowest relative efficacy**). *-at Junagadg location.

Table: 204. Ent4a. Evaluation of persistence of insecticides against Pink Bollworm on more than 10 % of field dose (Pot Condition).

S.N	Insecticides	JU				SU			
		P	T	P*T	RPT	P	T	P*T	RPT
1	Chlorantraniliprole 18.5 SC	10	47.05	470.49	1.76	15	48.76	731.43	1.99
2	Emamectin benzoate 5 SG	10	52.57	525.70	1.97	15	45.90	688.57	1.88
3	Fenpropathrin 10 EC	10	42.10	420.96	1.58	10	40.44	404.44	1.10
4	Cypermethrin 25 EC	10	36.95	369.53	1.39	10	59.11	591.11	1.61
5	Bifenthrin 10 EC	10	38.86	388.57	1.46	10	36.67	366.67	1.00
6	Profenophos 50 EC	10	26.67	266.67	1.00	15	53.71	805.71	2.20
7	Chlorpyrifos 50 EC	10	34.10	340.96	1.28	15	34.48	517.14	1.41
8	Spinetoram 11.7 SC	15	66.29	994.31	3.73	15	33.71	505.71	1.38
9	Quinalphos 25 %EC/20 AF*	10	30.86	308.59	1.16	15	29.90	448.57	1.22

JU- Junagadh **, SU**- Surat**, DAS**-days after spray**, P**-Period for which toxicity persisted, **T**= calculated by adding the value of mortality divide by total observation, **RPT**- calculated by using formula of Pradhan 1967(**relative efficacy divided by lowest relative efficacy**). *-at Junagadg location.

Table: 205. Ent4a. Evaluation of persistence of insecticides against Pink Bollworm on more than 25 % of field dose (Pot Condition).

S.N	Insecticides	JU				SU			
		P	T	P*T	RPT	P	T	P*T	RPT
1	Chlorantraniliprole 18.5 SC	10	51.81	518.10	1.88	15	57.71	865.71	1.75
2	Emamectin benzoate 5 SG	10	56.57	565.71	2.05	15	55.81	837.14	1.70
3	Fenpropathrin 10 EC	10	46.67	466.66	1.69	15	46.29	694.29	1.41
4	Cypermethrin 25 EC	10	39.62	396.19	1.43	10	67.11	671.11	1.36
5	Bifenthrin 10 EC	10	41.91	419.06	1.52	10	49.33	493.33	1.00
6	Profenophos 50 EC	10	27.62	276.19	1.00	15	61.33	920.00	1.86
7	Chlorpyrifos 50 EC	10	36.95	369.51	1.34	15	49.71	745.71	1.51
8	Spinetoram 11.7 SC	15	68.57	1028.55	3.72	15	48.38	725.71	1.47
9	Quinalphos 25 %EC/20 AF*	10	33.14	331.43	1.20	15	39.43	591.43	1.20

JU- Junagadh **, SU**- Surat**, DAS**-days after spray**, P**-Period for which toxicity persisted, **T**= calculated by adding the value of mortality divide by total observation, **RPT**- calculated by using formula of Pradhan 1967(**relative efficacy divided by lowest relative efficacy**). *-at Junagadg location.

Table: 206. Ent4a. Evaluation of persistence of insecticides against Pink Bollworm (Conventional spraying at ICAR-CICR, Nagpur)

S.N	Insecticides	Field cum-laboratory condition (Conventional spraying)							
		Field dose				1.5 times field dose			
		P	T	P*T	RPT	P	T	P*T	RPT
1	Chlorantraniliprole 18.5 SC	14	53.69	751.69	1.03	14	59.01	826.14	1.00
2	Emamectin benzoate 5 SG	14	53.11	743.54	1.02	14	67.88	950.26	1.15
3	Cypermethrin 25 EC	14	55.81	781.37	1.07	14	75.30	1054.14	1.28
4	Profenophos 50 EC	14	59.56	833.87	1.15	14	76.82	1075.42	1.30
5	Chlorpyrifos 50 EC	14	73.63	1030.82	1.42	14	71.05	994.70	1.20
6	Spinetoram 11.7 SC	14	70.19	982.69	1.35	14	76.60	1072.43	1.30
7	Quinalphos 20 A/F	14	59.31	830.37	1.14	14	60.50	847.06	1.03
8	Fenpropathrin 10 EC	14	58.71	822.00	1.13	14	71.76	1004.61	1.22
9	Bifenthrin 10 EC	14	51.93	727.05	1.00	14	68.55	959.73	1.16

P-Period for which toxicity persisted, **T**= Average residual toxicity (calculated by adding the value of mortality divide by total observation), **RPT**- calculated by using formula of Pradhan 1967(**relative efficacy divided by lowest relative efficacy**).

Table: 207. Ent4a. Evaluation of persistence of insecticides against Pink Bollworm (Conventional spraying at ICAR-CICR, Nagpur)

S.N	Insecticides	Pot cum-laboratory condition (Conventional spraying)							
		Field dose				1.5 times field dose			
		P	T	P*T	RPT	P	T	P*T	RPT
1	Chlorantraniliprole 18.5 SC	14	53.96	755.44	1.00	14	61.66	863.24	1.00
2	Emamectin benzoate 5 SG	14	58.19	814.66	1.08	14	68.20	954.80	1.11
3	Cypermethrin 25 EC	14	65.24	913.36	1.21	14	76.55	1071.70	1.24
4	Profenophos 50 EC	14	68.22	955.08	1.26	14	83.93	1175.02	1.36
5	Chlorpyrifos 50 EC	14	73.65	1031.1	1.36	14	77.58	1086.12	1.26
6	Spinetoram 11.7 SC	14	61.16	856.24	1.13	14	63.18	884.52	1.02
7	Quinalphos 20 A/F	14	61.48	860.72	1.14	14	65.54	917.56	1.06
8	Fenpropathrin 10 EC	14	60.86	852.04	1.13	14	68.65	961.10	1.11
9	Bifenthrin 10 EC	14	56.60	792.40	1.05	14	66.86	936.04	1.08

P-Period for which toxicity persisted, **T**= Average residual toxicity (calculated by adding the value of mortality divide by total observation), **RPT**- calculated by using formula of Pradhan 1967(**relative efficacy divided by lowest relative efficacy**).

Table: 208. Ent4a. Evaluation of persistence of insecticides against Pink Bollworm (Drone spraying at ICAR-CICR, Nagpur).

S.N	Insecticides	Field cum-laboratory condition (Drone spraying)							
		Field dose				1.5 times field dose			
		P	T	P*T	RPT	P	T	P*T	RPT
1	Chlorantraniliprole 18.5 SC	14	71.04	994.53	1.04	14	83.41	1167.78	1.27
2	Emamectin benzoate 5 SG	14	82.41	1153.78	1.21	14	79.74	1116.33	1.21
3	Cypermethrin 25 EC	14	82.69	1157.63	1.22	14	83.26	1165.68	1.27
4	Profenophos 50 EC	14	80.99	1133.83	1.19	14	81.89	1146.43	1.24
5	Chlorpyrifos 50 EC	14	70.79	991.03	1.04	14	72.50	1015.00	1.10
6	Spinetoram 11.7 SC	14	67.99	951.86	1.00	14	65.81	921.31	1.00
7	Quinalphos 20 A/F	14	73.94	1035.09	1.09	14	75.31	1054.38	1.14
8	Fenpropathrin 10 EC	14	80.81	1131.38	1.19	14	82.44	1154.13	1.25
9	Bifenthrin 10 EC	14	78.80	1103.20	1.16	14	84.18	1178.45	1.28

P-Period for which toxicity persisted, **T**= Average residual toxicity (calculated by adding the value of mortality divide by total observation), **RPT**- calculated by using formula of Pradhan 1967(**relative efficacy divided by lowest relative efficacy**).

Table: 209. Ent4a. Effect of different insecticides on green boll damage (GBD) of cotton in experiment on evaluation of persistence of insecticides (Drone spraying at ICAR-CICR, Nagpur).

S.N.	Treatment	Green boll damage (%)			
		Field dose		1.5 times field dose	
		OV	TV	OV	TV
1	Chlorantraniliprole 18.5 SC	19.44	21.91	11.11	12.07
2	Emamectin benzoate 5 SG	0.00	0.48	11.11	12.07
3	Diafenthiuron 50 WP	22.22	18.56	11.11	12.07
4	Cypermethrin 25 EC	0.00	0.48	0.00	0.48
5	Flonicamid 50 WG	19.44	21.91	22.22	18.56
6	Profenophos 50 EC	11.11	12.07	0.00	0.48
7	Chlorpyrifos 50 EC	11.11	12.07	19.44	21.91
8	Spinetoram 11.7 SC	0.00	0.48	11.11	12.07
9	Quinalphos 20 A/F	22.22	18.56	0.00	0.48
10	Fenpropathrin 10 EC	0.00	0.48	0.00	0.48
11	Bifenthrin 10 EC	11.11	12.07	22.22	18.56
12	Control	8.33	10.32	8.33	10.32
C.D. (0.05%)		N/A		N/A	
S.E. (m)		3.14		3.12	
C.V.		176.31		186.64	

GBD- Green boll damage, TV- Angular transformation value, C.D. and C.V. based on transformation value, **-average based on 2-3 sprays.

Table: 210. Ent4a. Evaluation of persistence of insecticides against Pink Bollworm on field dose (Field Condition).

S.N	Insecticides	DH				LG				RC			
		P	T	P*T	RPT	P	T	P*T	RPT	P	T	P*T	RPT
1	Chlorantraniliprole 18.5 SC	7	33.34	233.35	1.11	10	64.99	649.93	8.71	5	15.43	77.15	1.00
2	Emamectin benzoate 5 SG	7	40.00	280.00	1.33	10	54.45	544.5	7.30	7	27.71	193.98	2.51
3	Fenpropathrin 10 EC	10	80.00	800.00	3.81	7	29.33	205.28	2.75	7	34.86	243.99	3.16
4	Cypermethrin 25 EC	10	96.67	966.65	4.60	7	30.67	214.68	2.88	7	34.57	241.99	3.14
5	Bifenthrin 10 EC	10	96.67	966.65	4.60	7	28.01	196.06	2.63	-	-	-	-
6	Profenophos 50 EC	7	43.34	303.35	1.44	7	24.67	172.7	2.31	7	27.71	193.98	2.51
7	Chlorpyrifos 50 EC	7	43.33	303.31	1.44	7	10.66	74.62	1.00	7	20.57	144.00	1.87
8	Spinetoram 11.7 SC	10	80.00	800.00	3.81	10	70.00	699.95	9.38	7	24.86	173.99	2.26
9	Quinalphos 20 A/F	7	30.00	210.00	1.00	7	15.33	107.28	1.44	7	23.43	164.00	2.13

DH- Dharwad**, LG-**Lam Guntur**, RC-**Raichur**, DAS-**days after spray**, P-**Period for which toxicity persisted, **T**= Average residual toxicity (calculated by adding the value of mortality divide by total observation), **RPT-** calculated by using formula of Pradhan 1967(**relative efficacy divided by lowest relative efficacy**).

Table: 211. Ent4a. Evaluation of persistence of insecticides against Pink Bollworm on more than 10 % of field dose (Field Condition).

S.N	Insecticides	DH				LG				RC			
		P	T	P*T	RPT	P	T	P*T	RPT	P	T	P*T	RPT
1	Chlorantraniliprole 18.5 SC	10	53.34	533.35	1.76	10	69.45	694.50	5.96	7	23.43	164.00	1.00
2	Emamectin benzoate 5 SG	10	53.34	533.35	1.76	10	63.33	633.33	5.43	7	40.00	279.99	1.71
3	Fenpropathrin 10 EC	10	86.67	866.70	2.86	7	39.33	275.30	2.36	7	42.86	299.99	1.83
4	Cypermethrin 25 EC	10	100.00	1000.00	3.30	10	31.66	316.62	2.71	7	32.00	223.99	1.37
5	Bifenthrin 10 EC	10	100.00	1000.00	3.30	10	31.11	311.07	2.67	-	-	-	-
6	Profenophos 50 EC	10	56.67	566.65	1.87	7	25.99	181.96	1.56	7	38.57	269.99	1.65
7	Chlorpyrifos 50 EC	10	56.67	566.65	1.87	7	16.66	116.62	1.00	7	31.71	221.98	1.35
8	Spinetoram 11.7 SC	10	86.67	866.65	2.86	10	79.45	794.5	6.81	7	33.14	231.99	1.41
9	Quinalphos 25 %EC	7	43.34	303.35	1.00	10	18.89	188.88	1.62	7	23.43	164.00	1.00

DH- Dharwad**, LG-**Lam Guntur**, RC-**Raichur**, DAS-**days after spray**, P-**Period for which toxicity persisted, **T**= Average residual toxicity (calculated by adding the value of mortality divide by total observation), **RPT-** calculated by using formula of Pradhan 1967(**relative efficacy divided by lowest relative efficacy**).

Table: 212. Ent4a. Evaluation of persistence of insecticides against Pink Bollworm on more than 25 % of field dose (Field Condition).

S.N	Insecticides	DH				LG				RC			
		P	T	P*T	RPT	P	T	P*T	RPT	P	T	P*T	RPT
1	Chlorantraniliprole 18.5 SC	10	63.34	633.35	1.00	15	76.67	1150.01	5.13	7	30.57	213.99	1.00
2	Emamectin benzoate 5 SG	10	63.34	633.35	1.00	15	61.91	928.65	4.15	7	42.86	299.99	1.40
3	Fenpropathrin 10 EC	10	96.67	966.65	1.53	15	38.57	578.57	2.58	7	56.67	396.66	1.85
4	Cypermethrin 25 EC	10	100.00	1000.00	1.58	15	37.14	557.08	2.49	7	40.00	279.99	1.31
5	Bifenthrin 10 EC	10	100.00	1000.00	1.58	15	35.24	528.56	2.36	-	-	-	-
6	Profenophos 50 EC	10	70.00	700.00	1.11	15	30.00	450.00	2.01	7	38.86	271.99	1.27
7	Chlorpyrifos 50 EC	10	63.34	633.35	1.00	7	32.01	224.04	1.00	7	41.14	287.99	1.35
8	Spinetoram 11.7 SC	10	100.00	1000.00	1.58	15	80.48	1207.14	5.39	7	33.14	231.99	1.08
9	Quinalphos 25 %EC	10	63.34	633.35	1.00	10	35.00	349.95	1.56	7	42.86	299.99	1.40

DH- Dharwad**, LG-**Lam Guntur**, RC-**Raichur**, DAS-**days after spray**, P-**Period for which toxicity persisted, **T**= Average residual toxicity (calculated by adding the value of mortality divide by total observation), **RPT-** calculated by using formula of Pradhan 1967(relative efficacy divided by lowest relative efficacy).

Table: 213. Ent4a. Effect of different insecticides on green boll damage (GBD), open boll damage (OBD) and yield of cotton in experiment on evaluation of persistence of insecticides (Field dose).

Treatment	DH						LG					
	GBD (%) **		OBD (%)		Yield (Qt./ha.)		GBD(%)**		OBD(%)		Yield(Qt./ha.)	
	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
T1	30.00	33.20	39.53	38.94	8.97	-	6.15	14.36	3.60	10.94	21.87	-
T2	28.00	31.94	38.20	38.16	9.63	-	8.31	16.75	6.11	14.31	20.57	-
T3	22.00	27.96	30.87	33.74	10.02	-	9.74	18.18	7.98	16.41	19.34	-
T4	17.33	24.59	24.00	29.32	11.02	-	11.91	20.19	9.51	17.97	19.56	-
T5	24.67	29.77	26.53	30.99	10.29	-	13.31	21.39	10.18	18.60	20.26	-
T6	26.67	31.08	35.02	36.27	8.80	-	11.83	20.12	11.59	19.90	16.72	-
T7	31.33	34.03	40.82	39.69	8.69	-	18.68	25.61	14.51	22.39	14.62	-
T8	18.00	25.09	27.30	31.48	9.44	-	4.01	11.56	2.35	8.81	23.10	-
T9	30.00	33.20	41.51	40.10	8.19	-	16.78	24.18	14.34	22.25	15.34	-
Control	49.33	44.60	50.12	45.05	5.50	-	21.77	27.81	19.10	25.91	11.18	-
C.D.	-	2.18	-	1.10	0.74	-	-	0.61	-	0.87	0.32	-
S.E. (m)	-	6.48	-	3.27	2.21	-	-	1.85	-	2.57	0.95	-
C.V.	-	12.06	-	5.25	14.17	-	-	11.87	-	13.24	10.29	-

DH- Dharwad**, LG-**Lam Guntur**, GBD- Green boll damage, OBD- Open boll damage, TV- Angular transformation value, C.D. and C.V. based on transformation value, **-average based on 2-3 sprays.** T1-Chlorantraniliprole 18.5 SC, T2- Emamectin benzoate 5 SG,T3- Fenpropathrin 10 EC,T4- Cypermethrin 25 EC, T5-Bifenthrin 10 EC, T6- Profenophos 50 EC, T7- Chlorpyrifos 50 EC, T8-Spinetoram 11.7 SC, T9-Quinalphos 25 %EC

Table: 214. Ent4a. Effect of different insecticides on green boll damage (GBD), open boll damage (OBD) and yield of cotton in experiment on evaluation of persistence of insecticides (Field dose).

Treatment	RC					
	GBD(%)**		OBD(%)		Yield(Qt./ha.)	
	OV	TV	OV	TV	OV	TV
T1	24.29	29.53	46.33	42.90	9.26	3.12
T2	21.05	27.31	43.09	41.03	11.89	3.52
T3	15.04	22.82	37.08	37.51	11.04	3.40
T4	15.97	23.55	38.01	38.06	9.26	3.12
T5	-	-	-	-	-	-
T6	21.98	27.96	44.02	41.57	11.55	3.47
T7	15.97	23.55	38.01	38.06	14.77	3.91
T8	18.28	25.31	40.32	39.42	11.71	3.49

T9	18.28	25.31	40.32	39.42	13.54	3.75
Control	23.36	28.90	56.69	48.84	6.46	2.64
C.D.	-	1.13	-	1.36	-	0.12
S.E. (m)	-	0.38	-	0.45	-	0.04
C.V.	-	2.50	-	1.93	-	2.12

RC-Raichur , **GBD- Green boll damage, OBD- Open boll damage, TV- Angular transformation value, C.D. and C.V. based on transformation value, **-average based on 2-3 sprays**.** T1-Chlorantraniliprole 18.5 SC, T2- Emamectin benzoate 5 SG,T3- Fenpropathrin 10 EC,T4- Cypermethrin 25 EC, T5-Bifenthrin 10 EC, T6- Profenophos 50 EC, T7- Chlorpyrifos 50 EC, T8-Spinetoram 11.7 SC, T9-Quinalphos 25 %EC

Table: 215. Ent4a. Effect of different insecticides on green boll damage (GBD), open boll damage (OBD) and yield of cotton in experiment on evaluation of persistence of insecticides (More than 10 % of Field dose).

Treatment	DH						LG					
	GBD (%) **		OBD (%)		Yield (Qt./ha.)		GBD(%)**		OBD(%)		Yield(Qt./ha.)	
	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
T1	27.33	31.51	38.88	38.56	9.13	-	4.87	12.75	3.35	10.54	22.24	-
T2	25.33	30.21	35.82	36.75	9.76	-	6.30	14.54	5.76	13.88	21.56	-
T3	20.00	26.55	28.75	32.41	10.40	-	7.73	16.14	7.38	15.76	20.00	-
T4	15.33	23.04	26.07	30.69	12.22	-	9.87	18.31	9.10	17.56	20.73	-
T5	17.33	24.59	28.92	32.52	11.06	-	10.58	18.98	9.70	18.15	21.62	-
T6	24.67	29.77	38.63	38.41	9.16	-	11.3	19.64	10.85	19.23	17.00	-
T7	28.67	32.36	39.52	38.94	8.86	-	19.87	26.47	13.68	21.70	15.24	-
T8	17.33	24.59	28.08	31.99	10.03	-	2.73	9.51	2.11	8.36	23.85	-
T9	29.33	32.78	40.11	39.28	8.38	-	14.68	22.53	13.87	21.86	15.68	-
Control	49.33	44.60	51.21	45.67	5.46	-	23.57	29.04	20.13	26.66	10.15	-
C.D.	-	1.83	-	0.86	1.06	-	-	1.34	-	1.75	0.50	-
S.E. (m)	-	5.45	-	2.56	3.16	-	-	0.44	-	0.59	1.48	-
C.V.	-	10.62	-	4.09	16.53	-	-	9.67	-	11.39	13.14	-

DH- Dharwad**, LG-**Lam Guntur , **GBD- Green boll damage, OBD- Open boll damage, TV- Angular transformation value, C.D. and C.V. based on transformation value, **-average based on 2-3 sprays.** T1-Chlorantraniliprole 18.5 SC, T2- Emamectin benzoate 5 SG,T3- Fenpropathrin 10 EC,T4- Cypermethrin 25 EC, T5-Bifenthrin 10 EC, T6- Profenophos 50 EC, T7- Chlorpyrifos 50 EC, T8-Spinetoram 11.7 SC, T9-Quinalphos 25 %EC

Table: 216. Ent4a. Effect of different insecticides on green boll damage (GBD), open boll damage (OBD) and yield of cotton in experiment on evaluation of persistence of insecticides (more than 10 % of Field dose).

Treatment	RC					
	GBD(%)**		OBD(%)		Yield(Qt./ha.)	
	OV	TV	OV	TV	OV	TV
T1	18.65	25.59	40.69	39.63	12.24	3.57
T2	24.75	29.83	46.79	43.16	15.75	4.03
T3	19.49	26.20	41.53	40.12	14.62	3.89
T4	20.57	26.97	42.61	40.75	12.24	3.57
T5	-	-	-	-	-	-
T6	21.84	27.86	43.88	41.48	15.3	3.97
T7	19.21	25.99	41.25	39.96	19.6	4.48
T8	21.28	27.47	43.32	41.16	15.51	4.00
T9	17.95	25.07	39.99	39.23	17.95	4.30
Control	23.36	28.90	56.69	48.84	8.51	3.00
C.D.	-	0.99	-	1.63	-	0.14
S.E. (m)	-	0.33	-	0.54	-	0.05
C.V.	-	2.11	-	2.26	-	2.15

RC-Raichur, **GBD- Green boll damage, OBD- Open boll damage, TV- Angular transformation value, C.D. and C.V. based on transformation value, **-average based on 2-3 sprays.** T1-Chlorantraniliprole 18.5 SC, T2- Emamectin benzoate 5 SG,T3- Fenpropathrin 10 EC,T4- Cypermethrin 25 EC, T5-Bifenthrin 10 EC, T6- Profenophos 50 EC, T7- Chlorpyrifos 50 EC, T8-Spinetoram 11.7 SC, T9-Quinalphos 25 %EC

Table: 217. Ent4a. Effect of different insecticides on green boll damage (GBD), open boll damage (OBD) and yield of cotton in experiment on evaluation of persistence of insecticides (more than 25 % of Field dose).

Treatment	DH						LG					
	GBD (%) **		OBD (%)		Yield (Qt./ha.)		GBD(%)**		OBD(%)		Yield(Qt./ha.)	
	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
T1	26.00	30.64	38.87	38.55	9.20	-	4.93	12.83	2.75	9.55	23.16	-
T2	22.67	28.42	34.70	36.08	9.97	-	5.64	13.74	4.78	12.63	22.28	-
T3	17.33	24.59	29.43	32.84	10.84	-	7.79	16.21	6.75	15.06	21.22	-
T4	10.67	19.05	24.78	29.85	12.87	-	9.93	18.37	8.32	16.77	21.89	-
T5	12.67	20.84	28.59	32.31	11.05	-	9.93	18.37	8.75	17.21	22.37	-
T6	19.33	26.07	34.76	36.11	9.40	-	11.36	19.70	10.75	19.14	17.86	-
T7	25.33	30.21	35.02	36.27	9.11	-	18.50	25.48	12.93	20.81	16.00	-
T8	14.00	21.96	26.79	31.16	11.84	-	2.17	8.48	1.93	7.99	24.75	-
T9	22.00	27.96	46.57	43.02	8.54	-	17.88	25.01	14.37	21.13	16.10	-
Control	49.33	44.60	50.98	45.54	5.22	-	25.10	30.07	22.37	28.23	9.54	-
C.D.	-	1.53	-	1.38	0.85	-	-	0.89	-	0.33	0.28	-
S.E. (m)	-	4.54	-	4.11	2.54	-	-	2.68	-	1.04	0.87	-
C.V.	-	9.69	-	6.62	15.13	-	-	10.91	-	14.56	12.87	-

DH- Dharwad**, LG-**Lam Guntur **, GBD- Green boll damage, OBD- Open boll damage, TV- Angular transformation value, C.D. and C.V. based on transformation value, **-average based on 2-3 sprays.** T1-Chlorantraniliprole 18.5 SC, T2- Emamectin benzoate 5 SG,T3- Fenpropathrin 10 EC,T4- Cypermethrin 25 EC, T5-Bifenthrin 10 EC, T6- Profenophos 50 EC, T7- Chlorpyrifos 50 EC, T8-Spinetoram 11.7 SC, T9-Quinalphos 25 %EC

Table: 218. Ent4a. Effect of different insecticides on green boll damage (GBD), open boll damage (OBD) and yield of cotton in experiment on evaluation of persistence of insecticides (more than 25 % of Field dose).

Treatment	RC					
	GBD(%)**		OBD(%)		Yield(Qt./ha.)	
	OV	TV	OV	TV	OV	TV
T1	22.44	28.28	44.48	41.83	12.82	3.65
T2	20.13	26.66	42.17	40.50	16.33	4.10
T3	12.89	21.04	34.93	36.23	15.2	3.96
T4	12.55	20.75	34.59	36.02	12.82	3.65
T5	-	-	-	-	-	-
T6	19.21	25.99	41.25	39.96	15.88	4.05
T7	15.51	23.19	37.55	37.79	20.17	4.55
T8	21.51	27.63	43.55	41.29	16.09	4.07
T9	13.66	21.69	35.7	36.69	18.53	4.36
Control	23.36	28.90	56.69	48.84	9.09	3.10
C.D.	-	0.89	-	2.13	-	0.10
S.E. (m)	-	0.30	-	0.71	-	0.03
C.V.	-	2.06	-	4.11	-	1.49

RC-Raichur **, GBD- Green boll damage, OBD- Open boll damage, TV- Angular transformation value, C.D. and C.V. based on transformation value, **-average based on 2-3 sprays.** T1-Chlorantraniliprole 18.5 SC, T2- Emamectin benzoate 5 SG,T3- Fenpropathrin 10 EC,T4- Cypermethrin 25 EC, T5-Bifenthrin 10 EC, T6- Profenophos 50 EC, T7- Chlorpyrifos 50 EC, T8-Spinetoram 11.7 SC, T9-Quinalphos 25 %EC

Table:219. Ent4a. Evaluation of persistence of insecticides against Pink Bollworm on field dose (Pot Condition).

S.N	Insecticides	DH				CBE				RC			
		P	T	P*T	RPT	P	T	P*T	RPT	P	T	P*T	RPT
1	Chlorantraniliprole 18.5 SC	7	43.33	303.31	1.08	15	69.73	1046.00	1.89	7	28.00	196.00	1.00
2	Emamectin benzoate 5 SG	7	46.67	326.66	1.17	15	50.63	759.50	1.38	7	28.00	196.00	1.00
3	Fenpropathrin 10 EC	10	80.00	800.00	2.86	15	57.18	857.75	1.55	7	36.00	252.00	1.29
4	Cypermethrin 25 EC	10	90.00	900.00	3.21	15	50.55	758.25	1.37	7	40.00	280.00	1.43
5	Bifenthrin 10 EC	10	86.67	866.65	3.10	15	52.83	792.50	1.44	-	-	-	-
6	Profenophos 50 EC	7	50.00	350.00	1.25	15	45.98	689.75	1.25	7	28.00	196.00	1.00
7	Chlorpyrifos 50 EC	7	43.33	303.31	1.08	15	37.85	567.75	1.03	7	40.00	280.00	1.43
8	Spinetoram 11.7 SC	10	86.67	866.65	3.10	15	61.92	928.75	1.68	7	28.00	196.00	1.00
9	Quinalphos 25 %EC	7	40.00	280.00	1.00	15	36.80	552.00	1.00	10	23.33	233.30	1.19

CBE- Coimbatore, **DH**- Dharwad**, RC**-Raichur, **DAS**-days after spray**, P**-Period for which toxicity persisted, **T**= calculated by adding the value of mortality divide by total observation, **RPT**- calculated by using formula of Pradhan 1967(**relative efficacy divided by lowest relative efficacy**).

Table: 220. Ent4a. Evaluation of persistence of insecticides against Pink Bollworm on more than 10 % of field dose (Pot Condition).

S.N	Insecticides	DH				RC			
		P	T	P*T	RPT	P	T	P*T	RPT
1	Chlorantraniliprole 18.5 SC	10	53.33	533.30	1.43	7	28.00	196.00	1.00
2	Emamectin benzoate 5 SG	10	63.33	633.30	1.70	7	52.00	364.00	1.86
3	Fenpropathrin 10 EC	10	90.00	900.00	2.41	7	64.00	448.00	2.29
4	Cypermethrin 25 EC	10	100.00	1000.00	2.68	7	36.00	252.00	1.29
5	Bifenthrin 10 EC	10	93.34	933.35	2.50	-	-	-	-
6	Profenophos 50 EC	10	63.34	633.35	1.70	7	40.00	280.00	1.43
7	Chlorpyrifos 50 EC	10	66.67	666.65	1.79	7	32.00	224.00	1.14
8	Spinetoram 11.7 SC	10	90.00	900.00	2.41	7	36.00	252.00	1.29
9	Quinalphos 25 %EC	7	53.34	373.35	1.00	7	36.00	252.00	1.29

DH- Dharwad**, RC-**Raichur **, DAS-**days after spray**, P-**Period for which toxicity persisted, **T**= calculated by adding the value of mortality divide by total observation, **RPT-** calculated by using formula of Pradhan 1967(**relative efficacy divided by lowest relative efficacy**).

Table: 221. Ent4a. Evaluation of persistence of insecticides against Pink Bollworm on more than 25 % of field dose (Pot Condition).

S.N	Insecticides	DH				RC			
		P	T	P*T	RPT	P	T	P*T	RPT
1	Chlorantraniliprole 18.5 SC	10	80.00	800.00	1.20	7	48.00	336.00	1.33
2	Emamectin benzoate 5 SG	10	76.67	766.65	1.15	7	48.00	336.00	1.33
3	Fenpropathrin 10 EC	10	100.00	1000.00	1.50	10	53.33	533.30	2.12
4	Cypermethrin 25 EC	10	100.00	1000.00	1.50	10	36.66	366.60	1.45
5	Bifenthrin 10 EC	10	100.00	1000.00	1.50	-	-	-	-
6	Profenophos 50 EC	10	80.00	800.00	1.20	7	40.00	280.00	1.11
7	Chlorpyrifos 50 EC	10	76.67	766.65	1.15	7	48.00	336.00	1.33
8	Spinetoram 11.7 SC	10	100.00	1000.00	1.50	7	36.00	252.00	1.00
9	Quinalphos 25 %EC	10	66.67	666.70	1.00	7	52.00	364.00	1.44

DH- Dharwad**, RC-**Raichur **, DAS-**days after spray**, P-**Period for which toxicity persisted, **T**= calculated by adding the value of mortality divide by total observation, **RPT-** calculated by using formula of Pradhan 1967(**relative efficacy divided by lowest relative efficacy**).

Table: 222. Ent 4(b) Efficacy of insecticides applied through drone and conventional against JIG at field dose.

Treatment	Surat				Junagadh				Rahuri			
	Drone		Conventional		Drone		Conventional		Drone		Conventional	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Chlorantraniliprole 18.5 SC	II	II	II	II	I	I	I	I	I	I	I	I
Emamectin benzoate 5 SG	II	II	II	II	I	I	I	I	I	I	I	I
Diafenthiuron 50 WP	II	I	II	I	I	I	I	I	I	I	I	I
Cypermethrin 25 EC	II	II	II	II	I	I	I	I	I	I	I	I
Flonicamid 50 WG	II	I	II	I	I	I	I	I	I	I	I	I
Profenofos 50 EC	II	I	II	I	I	I	I	I	I	I	I	I
Chlorpyrifos 50 EC	II	II	II	II	I	I	I	I	I	I	I	I
Spinetoram 11.7 SC	II	I	II	I	I	I	I	I	I	I	I	I
Quinalphos 25 EC	II	II	II	II	I	I	I	I	I	I	I	I
Control	II	II	II	II	I	I	I	I	I	I	I	I

***JIG**- Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave

Table: 223. Ent 4(b) Efficacy of insecticides applied through drone and conventional against JIG at more than 10 % & 25 % of field dose.

Treatment	**Surat**							
	more than 10 % of field dose				**more than 25 (%) of field dose**			
	Drone		Conventional		Drone		Conventional	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Chlorantraniliprole 18.5 SC	II	II	II	II	II	II	II	II
Emamectin benzoate 5 SG	II	II	II	II	II	II	II	II
Diafenthiuron 50 WP	II	I	II	I	II	I	II	I
Cypermethrin 25 EC	II	II	II	II	II	II	II	II
Flonicamid 50 WG	II	I	II	I	II	I	II	I
Profenofos 50 EC	II	I	II	I	II	I	II	I
Chlorpyrifos 50 EC	II	II	II	II	II	II	II	II
Spinetoram 11.7 SC	II	I	II	I	II	I	II	I
Quinalphos 25 EC	II	II	II	II	II	II	II	II
Control	II	II	II	II	II	II	II	II

***JIG-** Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave

Table: 224. Ent 4(b) Efficacy of insecticides applied through drone and conventional against JIG.

Treatment	Nagpur							
	Field Dose				1.5 times filed dose			
	Drone		Conventional		Drone		Conventional	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Chlorantraniliprole 18.5 SC	I	II	I	I	I	II	I	I
Emamectin benzoate 5 SG	I	II	I	I	I	II	I	I
Diafenthiuron 50 WP	I	II	I	I	I	II	I	I
Cypermethrin 25 EC	I	II	I	I	I	II	I	I
Flonicamid 50 WG	I	II	I	I	I	II	I	I
Profenofos 50 EC	II	II	I	I	I	II	I	I
Chlorpyrifos 50 EC	II	II	I	I	I	II	I	I
Spinetoram 11.7 SC	II	II	I	I	I	II	I	I
Quinalphos 20 AF	II	II	I	I	I	II	I	I
Fenpropathrin 10% EC	II	II	I	I	I	II	I	I
Bifenthrin 10% EC	II	II	I	I	I	II	I	I
Control	II	II	I	I	I	II	I	I

***JIG**- Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leave

Table: 225. Ent 4(b) Efficacy of insecticides applied through drone and conventional against Leafhopper at field dose.

Treatment	Surat						Junagadh					
	Drone			Conventional			Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	5.12	5.15	26.85	5.55	6.17	15.13	18.86	11.49	38.52	18.60	14.16	28.38
Emamectin benzoate 5 SG	4.70	5.74	18.47	5.60	6.14	15.54	18.32	11.02	41.04	19.65	13.25	32.98
Diafenthiuron 50 WP	5.16	2.01	71.45	5.70	2.51	65.47	19.30	10.26	45.10	18.75	12.46	36.98
Cypermethrin 25 EC	5.02	4.78	32.10	5.80	6.04	16.92	18.75	11.93	36.17	18.06	14.41	27.11
Flonicamid 50 WG	5.36	0.91	87.07	5.50	1.77	75.65	20.07	9.86	47.24	20.52	9.18	53.57
Profenofos 50 EC	5.12	3.49	50.43	6.00	3.62	50.21	17.70	6.97	62.71	18.38	14.87	24.79
Chlorpyrifos 50 EC	4.88	4.80	31.82	5.21	5.60	22.97	17.06	12.56	32.80	17.92	15.42	22.00
Spinetoram 11.7 SC	5.40	2.94	58.24	5.90	3.23	55.57	18.81	10.82	42.11	20.19	12.82	35.15
Quinalphos 25 EC	5.16	5.22	25.85	5.85	5.51	24.21	21.16	12.94	30.77	19.86	15.42	22.00
Control	6.00	7.04	-	6.68	7.27	-	19.83	18.69	-	21.41	19.77	-
P(T<=t) one-tail	0.31						0.03					
t Critical one-tail	1.76						1.76					
P(T<=t) two-tail	0.62						0.06					
t Critical two-tail	2.14						2.14					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 226. Ent 4(b) Efficacy of insecticides applied through drone and conventional against Leafhopper at field dose.

Treatment	Rahuri					
	Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	4.13	1.60	51.07	3.53	2.00	39.94
Emamectin benzoate 5 SG	4.40	1.60	51.07	3.60	2.07	37.84
Diafenthiuron 50 WP	3.80	1.60	51.07	2.40	2.07	37.84
Cypermethrin 25 EC	3.93	2.00	38.84	3.87	2.47	25.83
Flonicamid 50 WG	2.73	1.53	53.21	4.00	1.93	42.04
Profenofos 50 EC	2.93	2.40	26.61	3.00	2.67	19.82
Chlorpyrifos 50 EC	2.47	2.60	20.49	2.33	2.73	18.02
Spinetoram 11.7 SC	2.47	1.80	44.95	2.20	2.20	33.93
Quinalphos 25 EC	2.87	2.93	10.40	2.93	2.93	12.01
Control	2.33	3.27	-	2.20	3.33	-
P(T<=t) one-tail	1.26					
t Critical one-tail	0.11					
P(T<=t) two-tail	1.76					
t Critical two-tail	0.23					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 227. Ent 4(b) Efficacy of insecticides applied through drone and conventional against Leafhopper at more than 10 % of field dose.

Treatment	Surat					
	Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	5.16	4.50	34.88	5.45	5.92	17.09
Emamectin benzoate 5 SG	4.88	5.08	26.48	5.70	5.79	18.91
Diafenthiuron 50 WP	5.26	1.96	71.64	5.75	2.39	66.53
Cypermethrin 25 EC	5.02	4.59	33.57	5.90	5.72	19.89
Flonicamid 50 WG	5.45	0.87	87.41	5.50	1.45	79.69
Profenofos 50 EC	5.07	3.20	53.69	5.95	3.42	52.10
Chlorpyrifos 50 EC	4.98	4.54	34.30	5.26	5.50	22.97
Spinetoram 11.7 SC	5.45	3.10	55.14	5.90	3.05	57.28
Quinalphos 25 EC	5.21	4.85	29.81	5.85	5.39	24.51
Control	6.05	6.91	-	6.47	7.14	-
P(T<=t) one-tail	0.30					
t Critical one-tail	1.76					
P(T<=t) two-tail	0.59					
t Critical two-tail	2.14					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 228. Ent 4(b) Efficacy of insecticides applied through drone and conventional against Leafhopper at more than 25 % of field dose.

Treatment	Surat					
	Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	5.12	4.27	38.21	5.55	5.88	16.71
Emamectin benzoate 5 SG	4.70	4.66	32.56	5.60	5.67	19.69
Diafenthiuron 50 WP	5.16	1.89	72.65	5.70	2.08	70.54
Cypermethrin 25 EC	5.02	4.62	33.14	5.80	5.60	20.68
Flonicamid 50 WG	5.36	0.70	89.87	5.50	1.18	83.29
Profenofos 50 EC	5.12	3.19	53.84	6.00	3.17	55.10
Chlorpyrifos 50 EC	4.88	3.98	42.40	5.21	5.42	23.23
Spinetoram 11.7 SC	5.40	3.03	56.15	5.90	2.94	58.36
Quinalphos 25 EC	5.16	4.68	32.27	5.85	5.22	26.06
Control	6.00	6.91	-	6.68	7.06	-
P(T<=t) one-tail	0.28					
t Critical one-tail	1.76					
P(T<=t) two-tail	0.56					
t Critical two-tail	2.14					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 229. Ent 4(b) Efficacy of insecticides applied through drone and conventional against Leafhopper.

Treatment	Nagpur											
	Field Dose						1.5 times filed dose					
	Drone			Conventional			Drone			Conventional		
	Pre	Post	ROC(%)	Pre	Post	ROC(%)	Pre	Post	ROC(%)	Pre	Post	ROC(%)
Chlorantraniliprole 18.5 SC	1.41	2.90	23.08	0.87	0.87	-47.46	3.16	3.34	11.41	1.15	1.33	-125.42
Emamectin benzoate 5 SG	2.52	3.13	16.98	0.99	0.95	-61.02	2.04	3.08	18.30	0.92	0.97	-64.41
Diafenthiuron 50 WP	2.14	2.89	23.34	0.88	0.68	-15.25	1.51	2.50	33.69	1.19	1.18	-100.00
Cypermethrin 25 EC	2.20	3.33	11.67	0.93	1.28	-116.95	1.64	3.96	-5.04	1.79	1.50	-154.24
Flonicamid 50 WG	1.97	2.91	22.81	0.59	0.56	5.08	1.64	3.04	19.36	1.01	0.99	-67.80
Profenofos 50 EC	2.86	3.53	6.37	1.16	0.84	-42.37	2.27	2.88	23.61	1.63	1.19	-101.69
Chlorpyrifos 50 EC	3.41	5.04	-33.69	1.11	1.16	-96.61	3.90	3.67	2.65	1.50	1.33	-125.42
Spinetoram 11.7 SC	2.95	4.42	-17.24	0.70	0.81	-37.29	2.18	2.95	21.75	0.90	1.06	-79.66
Quinalphos 20 AF	2.92	4.38	-16.18	0.92	0.93	-57.63	2.18	2.57	31.83	1.10	0.74	-25.42
Fenpropathrin 10% EC	2.98	4.39	-16.45	1.01	0.97	-64.41	2.49	3.07	18.57	1.14	1.06	-79.66
Bifenthrin 10% EC	2.78	3.89	-3.18	1.05	0.94	-59.32	2.03	2.95	21.75	1.15	1.13	-91.53
Control	3.11	3.77	-	1.33	0.59	-	3.11	3.77		1.36	0.59	-
P(T<=t) one-tail	0.00						1.67E-08					
t Critical one-tail	1.73						1.734064					
P(T<=t) two-tail	0.00						3.34E-08					
t Critical two-tail	2.10						2.100922					

Table: 230. Ent 4(b) Efficacy of insecticides applied through drone and conventional against Whitefly at field dose.

Treatment	Junagadh						Rahuri					
	Drone			Conventional			Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	15.18	8.82	52.88	17.89	11.02	44.76	1.87	1.53	-15.04	1.40	1.87	-3.89
Emamectin benzoate 5 SG	17.42	8.55	54.33	20.25	10.35	48.12	1.53	1.80	-35.34	1.20	2.13	-18.33
Diafenthiuron 50 WP	20.34	7.64	59.19	18.89	9.53	52.23	1.53	0.80	39.85	0.93	1.07	40.56
Cypermethrin 25 EC	19.86	9.24	50.64	20.58	11.29	43.41	0.87	1.07	19.55	0.93	1.40	22.22
Flonicamid 50 WG	18.84	5.34	71.47	21.56	7.27	63.56	0.73	1.07	19.55	0.93	1.20	33.33
Profenofos 50 EC	17.03	9.51	49.20	21.25	11.74	41.15	2.27	0.40	69.92	1.87	0.60	66.67
Chlorpyrifos 50 EC	16.08	9.78	47.76	18.12	12.06	39.55	1.47	1.20	9.77	0.93	1.47	18.33
Spinetoram 11.7 SC	17.25	8.10	56.73	20.46	10.82	45.76	2.13	1.73	-30.08	1.60	2.00	-11.11
Quinalphos 25 EC	20.76	10.18	45.62	20.58	12.37	37.99	1.47	1.40	-5.26	1.07	1.80	0.00
Control	19.71	18.72	-	21.53	19.95	-	2.33	1.33	-	2.07	1.80	-
P(T<=t) one-tail	0.04						0.31					
t Critical one-tail	1.76						1.76					
P(T<=t) two-tail	0.08						0.62					
t Critical two-tail	2.14						2.14					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 231. Ent 4(b) Efficacy of insecticides applied through drone and conventional against Whitefly.

Treatment	Nagpur											
	Field Dose						1.5 Field Dose					
	Drone			Conventional			Drone			Conventional		
	Pre	Post	ROC(%)	Pre	Post	ROC(%)	Pre	Post	ROC(%)	Pre	Post	ROC(%)
Chlorantraniliprole 18.5 SC	0.79	0.62	33.33	0.90	1.04	-30.00	2.03	0.99	-6.45	0.76	0.76	5.00
Emamectin benzoate 5 SG	1.02	0.85	8.60	1.10	0.93	-16.25	1.19	0.79	15.05	0.90	1.01	-26.25
Diafenthiuron 50 WP	1.59	1.29	-38.71	0.93	0.79	1.25	2.08	0.87	6.45	1.02	0.69	13.75
Cypermethrin 25 EC	1.53	1.47	-58.06	0.90	0.91	-13.75	1.58	0.91	2.15	1.07	1.14	-42.50
Flonicamid 50 WG	1.36	1.11	-19.35	0.81	1.04	-30.00	1.41	0.69	25.81	0.87	1.27	-58.75
Profenofos 50 EC	1.57	1.12	-20.43	0.96	0.78	2.50	1.56	0.89	4.30	0.83	1.16	-45.00
Chlorpyrifos 50 EC	1.34	0.86	7.53	0.82	1.02	-27.50	2.08	1.15	-23.66	0.97	0.94	-17.50
Spinetoram 11.7 SC	1.41	0.81	12.90	1.11	1.23	-53.75	1.40	0.86	7.53	1.04	1.36	-70.00
Quinalphos 20 % AF	0.96	1.06	-13.98	0.80	0.99	-23.75	1.76	1.05	-12.90	0.86	0.75	6.25
Fenpropathrin 10% EC	1.32	1.00	-7.53	1.02	0.95	-18.75	1.99	0.78	16.13	0.98	1.10	-37.50
Bifenthrin 10% EC	1.81	1.01	-8.60	0.51	0.86	-7.50	1.75	1.05	-12.90	0.79	0.93	-16.25
Control	1.91	0.93	0.00	0.62	0.80	0.00	1.91	0.93	0.00	0.68	0.80	0.00
P(T<=t) one-tail	0.29						0.00					
t Critical one-tail	1.73						1.73					
P(T<=t) two-tail	0.57						0.00					
t Critical two-tail	2.10						2.10					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 232. Ent 4(b) Efficacy of insecticides applied through drone and conventional against Aphid at field dose.

Treatment	Surat						Junagadh					
	Drone			Conventional			Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	30.72	25.56	40.56	32.20	28.36	38.67	15.24	7.43	64.94	16.86	8.18	65.97
Emamectin benzoate 5 SG	32.24	26.36	38.70	33.12	27.76	39.97	18.03	6.97	67.11	19.48	7.71	67.93
Diafenthiuron 50 WP	35.88	6.12	85.77	34.08	9.40	79.67	16.24	5.95	71.92	19.33	6.35	73.59
Cypermethrin 25 EC	32.80	30.20	29.77	34.20	28.12	39.19	19.07	8.03	62.10	19.07	8.78	63.48
Flonicamid 50 WG	34.00	2.76	93.58	33.64	5.40	88.32	14.62	3.97	81.26	16.70	5.14	78.62
Profenofos 50 EC	34.80	10.48	75.63	35.72	14.76	68.08	17.06	8.16	61.49	18.95	9.51	60.44
Chlorpyrifos 50 EC	33.88	21.12	50.88	34.92	24.32	47.40	13.86	8.49	59.93	16.35	10.76	55.24
Spinetoram 11.7 SC	33.88	6.56	84.74	35.08	13.00	71.89	18.55	6.73	68.24	17.95	6.97	71.01
Quinalphos 25 EC	33.20	20.28	52.84	35.12	22.40	51.56	15.68	8.82	58.38	18.15	11.38	52.66
Control	33.24	43.00	-	34.20	46.24	-	17.39	21.19		22.85	24.04	
P(T<=t) one-tail	0.38						0.41					
t Critical one-tail	1.76						1.76					
P(T<=t) two-tail	0.77						0.83					
t Critical two-tail	2.14						2.14					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 233. Ent 4(b) Efficacy of insecticides applied through drone and conventional against Aphid at field dose.

Treatment	Rahuri					
	Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	9.00	6.93	48.28	8.73	6.93	53.18
Emamectin benzoate 5 SG	10.53	7.53	43.81	10.13	7.00	52.70
Diafenthiuron 50 WP	7.93	6.40	52.24	7.33	6.07	58.99
Cypermethrin 25 EC	8.93	6.07	54.70	9.27	5.80	60.81
Flonicamid 50 WG	7.13	2.33	82.61	7.13	3.47	76.55
Profenofos 50 EC	10.93	5.53	58.73	10.33	6.93	53.18
Chlorpyrifos 50 EC	10.47	12.33	7.99	10.73	13.87	6.28
Spinetoram 11.7 SC	9.47	12.27	8.43	8.93	13.20	10.81
Quinalphos 25 EC	12.20	12.67	5.45	11.33	12.80	13.51
Control	13.40	13.40	-	11.87	14.80	-
P(T<=t) one-tail	0.43					
t Critical one-tail	1.76					
P(T<=t) two-tail	0.87					
t Critical two-tail	2.14					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 234. Ent 4(b) Efficacy of insecticides applied through drone and conventional against Aphid at more than 10 % of field dose.

Treatment	Surat					
	Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	30.68	24.72	42.67	32.24	27.84	40.82
Emamectin benzoate 5 SG	31.84	25.60	40.63	33.12	26.84	42.94
Diafenthiuron 50 WP	35.60	5.20	87.94	33.80	8.48	81.97
Cypermethrin 25 EC	32.96	29.52	31.54	34.00	27.52	41.50
Flonicamid 50 WG	33.76	1.88	95.64	33.68	4.68	90.05
Profenofos 50 EC	34.92	9.72	77.46	35.44	13.56	71.17
Chlorpyrifos 50 EC	33.72	20.24	53.06	34.88	23.20	50.68
Spinetoram 11.7 SC	32.92	5.60	87.01	34.52	12.40	73.64
Quinalphos 25 EC	33.24	19.40	55.01	35.04	21.36	54.59
Control	33.20	43.12	-	33.92	47.04	-
P(T<=t) one-tail	0.40					
t Critical one-tail	1.76					
P(T<=t) two-tail	0.80					
t Critical two-tail	2.14					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 235. Ent 4(b) Efficacy of insecticides applied through drone and conventional against Aphid at more than 25 % of field dose.

Treatment	Surat					
	Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	30.96	23.32	47.57	32.16	26.72	42.56
Emamectin benzoate 5 SG	32.20	24.60	44.69	32.92	25.52	45.14
Diafenthiuron 50 WP	35.72	4.76	89.30	33.68	7.72	83.40
Cypermethrin 25 EC	32.08	28.32	36.33	33.96	26.88	42.22
Flonicamid 50 WG	34.08	0.92	97.93	33.84	3.88	91.66
Profenofos 50 EC	34.60	8.88	80.04	35.20	12.96	72.14
Chlorpyrifos 50 EC	33.04	19.68	55.76	34.32	22.52	51.59
Spinetoram 11.7 SC	34.16	4.84	89.12	34.88	11.36	75.58
Quinalphos 25 EC	33.00	18.72	57.91	34.92	20.92	55.03
Control	32.44	44.48	-	34.56	46.52	-
P(T<=t) one-tail	0.34					
t Critical one-tail	1.76					
P(T<=t) two-tail	0.69					
t Critical two-tail	2.14					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 236. Ent 4(b) Efficacy of insecticides applied through drone and conventional against Aphid.

Treatment	Nagpur											
	Field Dose						1.5 times Field Dose					
	Drone			Conventional			Drone			Conventional		
	Pre	Post	ROC(%)	Pre	Post	ROC(%)	Pre	Post	ROC(%)	Pre	Post	ROC(%)
Chlorantraniliprole 18.5 SC	33.28	12.26	69.14	3.37	3.27	20.82	30.24	18.96	52.28	3.74	3.33	19.37
Emamectin benzoate 5 SG	29.79	5.36	86.51	5.33	5.80	-40.44	23.27	15.63	60.66	3.57	3.64	11.86
Diafenthiuron 50 WP	29.37	2.59	93.48	1.62	1.11	73.12	26.33	1.46	96.33	2.78	0.90	78.21
Cypermethrin 25 EC	30.91	4.73	88.09	4.01	4.73	-14.53	34.56	7.75	80.49	2.55	3.65	11.62
Flonicamid 50 WG	28.20	1.76	95.57	2.04	1.21	70.70	30.04	1.76	95.57	3.06	1.61	61.02
Profenofos 50 EC	31.04	1.78	95.52	4.29	2.84	31.23	30.68	2.22	94.41	2.65	2.04	50.61
Chlorpyrifos 50 EC	24.07	4.10	89.68	3.05	3.21	22.28	25.63	3.15	92.07	2.45	1.70	58.84
Spinetoram 11.7 SC	29.84	14.84	62.65	3.39	6.14	-48.67	27.28	7.39	81.40	4.61	3.60	12.83
Quinalphos 20% AF	28.36	3.44	91.34	4.00	2.56	38.01	39.61	8.94	77.50	2.99	3.51	15.01
Fenpropathrin 10% EC	36.71	19.33	51.35	3.66	4.58	-10.90	32.67	12.83	67.71	3.85	5.16	-24.94
Bifenthrin 10% EC	27.15	24.48	38.38	4.44	8.27	-100.24	27.98	15.33	61.41	5.81	3.76	8.96
Control	27.04	39.73	-	2.05	4.13	-	27.04	39.33	-	2.05	4.13	-
P(T<=t) one-tail	0.00						7.87E-05					
t Critical one-tail	1.73						1.734064					
P(T<=t) two-tail	0.00						0.000157					
t Critical two-tail	2.10						2.100922					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 237. Ent 4(b) Efficacy of insecticides applied through drone and conventional against Thrips at field dose.

Treatment	Junagadh						Rahuri					
	Drone			Conventional			Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	19.24	9.02	47.47	21.19	11.00	48.55	17.13	10.53	10.23	17.63	11.47	8.46
Emamectin benzoate 5 SG	18.58	8.82	48.63	19.83	10.67	50.09	17.57	10.33	11.94	18.13	11.10	11.41
Diafenthiuron 50 WP	14.16	8.55	50.20	18.06	10.09	52.81	15.04	9.90	15.60	16.82	10.73	14.37
Cypermethrin 25 EC	18.03	9.22	46.30	20.49	11.27	47.29	13.33	10.07	14.15	16.36	10.93	12.77
Flonicamid 50 WG	16.70	5.73	66.63	18.66	7.09	66.84	16.20	9.30	20.72	16.23	10.67	14.84
Profenofos 50 EC	18.03	7.42	56.79	21.01	11.67	45.42	14.10	10.60	9.63	14.73	11.60	7.42
Chlorpyrifos 50 EC	16.38	9.82	42.81	18.46	11.81	44.76	14.53	10.90	7.08	14.87	11.67	6.86
Spinetoram 11.7 SC	20.37	8.16	52.48	21.75	9.51	55.52	14.77	9.97	15.00	15.37	10.87	13.25
Quinalphos 25 EC	18.43	10.13	41.00	21.19	12.20	42.94	16.67	11.37	3.07	16.93	11.90	5.03
Control	17.98	17.17	-	20.40	21.38	-	17.00	11.73	-	17.23	12.53	
P(T<=t) one-tail	0.24						0.01					
t Critical one-tail	1.73						1.73					
P(T<=t) two-tail	0.48						0.03					
t Critical two-tail	2.10						2.10					

Table: 238. Ent 4(b) Efficacy of insecticides applied through drone and conventional against Thrips.

Treatment	Nagpur											
	Field Dose						1.5 times Field Dose					
	Drone			Conventional			Drone			Conventional		
	Pre	Post	ROC (%)	Pre	Post	ROC (%)	Pre	Post	ROC (%)	Pre	Post	ROC (%)
Chlorantraniliprole 18.5 SC	0.87	1.71	-11.76	0.86	1.15	-55.41	2.07	1.70	-11.11	0.72	1.02	-37.84
Emamectin benzoate 5 SG	1.16	1.38	9.80	0.76	1.06	-43.24	1.94	1.75	-14.38	0.67	0.83	-12.16
Diafenthiuron 50 WP	2.21	1.72	-12.42	0.85	0.76	-2.70	2.97	1.29	15.69	0.79	0.58	21.62
Cypermethrin 25 EC	2.16	1.85	-20.92	1.00	1.26	-70.27	2.07	1.61	-5.23	0.65	1.19	-60.81
Flonicamid 50 WG	2.81	1.39	9.15	0.90	0.90	-21.62	1.69	1.66	-8.50	0.86	1.27	-71.62
Profenofos 50 EC	2.79	1.42	7.19	0.63	0.70	5.41	1.99	1.58	-3.27	0.48	0.85	-14.86
Chlorpyrifos 50 EC	1.82	1.80	-17.65	0.65	0.43	41.89	2.13	1.40	8.50	0.62	0.86	-16.22
Spinetoram 11.7 SC	2.58	1.50	1.96	0.58	1.19	-60.81	1.44	1.27	16.99	0.82	0.67	9.46
Quinalphos 20% AF	1.74	1.37	10.46	0.47	0.58	21.62	1.93	1.23	19.61	0.79	0.64	13.51
Fenpropathrin 10% EC	1.72	1.35	11.76	0.51	0.43	41.89	1.60	0.89	41.83	0.87	0.81	-9.46
Bifenthrin 10% EC	1.70	1.49	2.61	0.44	0.78	-5.41	1.62	1.02	33.33	0.70	0.93	-25.68
Control	2.16	1.53		0.81	0.74		2.16	1.53		0.84	0.74	
P(T<=t) one-tail	0.24						0.01					
t Critical one-tail	1.73						1.73					
P(T<=t) two-tail	0.48						0.03					
t Critical two-tail	2.10						2.10					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 239. Ent 4(b) Efficacy of insecticides applied through drone and conventional against green boll damage at field dose.

Treatment	Surat						Junagadh					
	Drone			Conventional			Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	26.00	14.00	60.00	27.00	16.00	56.76	11.31	4.79	66.85	8.63	6.07	56.83
Emamectin benzoate 5 SG	26.00	16.00	54.29	28.00	19.00	48.65	8.11	3.06	78.82	7.44	3.96	71.83
Diafenthiuron 50 WP	28.00	33.00	5.71	29.00	36.00	2.70	9.50	7.88	45.47	8.44	8.65	38.48
Cypermethrin 25 EC	22.00	18.00	48.57	25.00	21.00	43.24	10.58	7.23	49.97	8.29	8.13	42.18
Flonicamid 50 WG	27.00	33.00	5.71	28.00	34.00	8.11	8.85	7.45	48.44	7.93	8.26	41.25
Profenofos 50 EC	26.00	18.00	48.57	29.00	17.00	54.05	10.01	10.53	27.13	10.30	11.33	19.42
Chlorpyrifos 50 EC	25.00	30.00	14.29	27.00	30.00	18.92	10.31	10.05	30.45	9.99	11.12	20.91
Spinetoram 11.7 SC	29.00	27.00	22.86	30.00	29.00	21.62	7.72	2.30	84.08	7.78	3.05	78.31
Quinalphos 25 EC	27.00	28.00	20.00	28.00	30.00	18.92	9.31	10.40	28.03	10.26	10.92	22.33
Control	29.00	35.00	-	30.00	37.00	-	11.13	14.45		10.39	14.06	
P(T<=t) one-tail	0.48						0.26					
t Critical one-tail	1.76						1.76					
P(T<=t) two-tail	0.96						0.53					
t Critical two-tail	2.14						2.14					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 240. Ent 4(b) Efficacy of insecticides applied through drone and conventional against green boll damage at field dose.

Treatment	Rahuri					
	Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	16.67	15.00	25.00	16.67	15.00	25.00
Emamectin benzoate 5 SG	18.33	13.33	33.35	16.67	13.33	33.35
Diafenthiuron 50 WP	21.67	20.00	0.00	25.00	21.67	-8.35
Cypermethrin 25 EC	18.33	15.00	25.00	16.67	13.33	33.35
Flonicamid 50 WG	23.33	16.67	16.65	21.67	18.33	8.35
Profenofos 50 EC	20.00	15.00	25.00	20.00	13.33	33.35
Chlorpyrifos 50 EC	18.33	16.67	16.65	18.33	18.33	8.35
Spinetoram 11.7 SC	16.67	13.33	33.35	13.33	11.67	41.65
Quinalphos 25 EC	18.33	18.33	8.35	18.33	20.00	0.00
Control	21.67	20.00		25.00	20.00	
P(T<=t) one-tail	0.45					
t Critical one-tail	1.76					
P(T<=t) two-tail	0.90					
t Critical two-tail	2.14					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 241. Ent 4(b) Efficacy of insecticides applied through drone and conventional against green boll damage at more than 10 (%) of field dose.

Treatment	Surat					
	Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	25.00	10.00	67.74	26.00	10.00	67.74
Emamectin benzoate 5 SG	26.00	12.00	61.29	27.00	13.00	58.06
Diafenthiuron 50 WP	27.00	29.00	6.45	28.00	30.00	3.23
Cypermethrin 25 EC	23.00	14.00	54.84	26.00	15.00	51.61
Flonicamid 50 WG	28.00	29.00	6.45	28.00	28.00	9.68
Profenofos 50 EC	27.00	14.00	54.84	28.00	11.00	64.52
Chlorpyrifos 50 EC	26.00	26.00	16.13	26.00	24.00	22.58
Spinetoram 11.7 SC	30.00	23.00	25.81	29.00	23.00	25.81
Quinalphos 25 EC	28.00	24.00	22.58	28.00	24.00	22.58
Control	30.00	31.00	-	30.00	31.00	-
P(T<=t) one-tail	0.46					
t Critical one-tail	1.76					
P(T<=t) two-tail	0.92					
t Critical two-tail	2.14					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 242. Ent 4(b) Efficacy of insecticides applied through drone and conventional against green boll damage at more than 25 % of field dose.

Treatment	Surat					
	Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	26.00	8.00	68.00	27.00	7.00	72.00
Emamectin benzoate 5 SG	25.00	7.00	72.00	28.00	8.00	68.00
Diafenthiuron 50 WP	27.00	23.00	8.00	29.00	24.00	4.00
Cypermethrin 25 EC	24.00	8.00	68.00	24.00	9.00	64.00
Flonicamid 50 WG	26.00	23.00	8.00	27.00	22.00	12.00
Profenofos 50 EC	26.00	8.00	68.00	29.00	5.00	80.00
Chlorpyrifos 50 EC	27.00	20.00	20.00	27.00	18.00	28.00
Spinetoram 11.7 SC	28.00	17.00	32.00	30.00	17.00	32.00
Quinalphos 25 EC	27.00	18.00	28.00	27.00	18.00	28.00
Control	30.00	25.00	-	30.00	25.00	-
P(T<=t) one-tail	0.46					
t Critical one-tail	1.76					
P(T<=t) two-tail	0.91					
t Critical two-tail	2.14					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 243.Ent 4(b) Efficacy of insecticides applied through drone and conventional against Larval Recovery/20 boll at field dose.

Treatment	Junagadh						Rahuri					
	Drone			Conventional			Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	1.92	1.59	66.74	1.79	2.33	58.76	11.67	15.00	10.02	13.33	13.33	27.28
Emamectin benzoate 5 SG	1.85	1.07	77.62	0.99	1.66	70.62	10.00	13.33	20.04	11.67	11.67	36.33
Diafenthiuron 50 WP	1.99	2.79	41.63	2.79	3.40	39.82	15.00	18.33	-9.96	16.67	13.33	27.28
Cypermethrin 25 EC	1.88	2.44	48.95	2.26	3.05	46.02	16.67	16.67	0.00	18.33	15.00	18.17
Flonicamid 50 WG	2.05	2.53	47.07	2.38	3.24	42.65	13.33	15.00	10.02	16.67	16.67	9.06
Profenofos 50 EC	2.19	3.80	20.50	3.80	4.40	22.12	11.67	15.00	10.02	11.67	13.33	27.28
Chlorpyrifos 50 EC	2.19	3.60	24.69	3.26	4.38	22.48	18.33	18.33	-9.96	16.67	16.67	9.06
Spinetoram 11.7 SC	1.99	0.92	80.75	0.83	1.17	79.29	11.67	15.00	10.02	16.67	13.33	27.28
Quinalphos 25 EC	2.31	3.58	25.10	3.06	4.33	23.36	13.33	18.33	-9.96	16.67	16.67	9.06
Control	2.37	4.78		4.19	5.65		16.67	16.67		18.33	18.33	
P(T<=t) one-tail	0.41						0.00					
t Critical one-tail	1.76						1.76					
P(T<=t) two-tail	0.83						0.01					
t Critical two-tail	2.14						2.14					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 244. Ent 4 (b) Impact of insecticides applied through drone and conventional method on seed cotton yield (q/ha.) at field dose.

Treatment	Surat					
	Field Dose		More than 10 (%) of Field dose		More than 25 (%) of Field dose	
	DS	CS	DS	CS	DS	CS
Chlorantraniliprole 18.5 SC	24.59	23.70	26.37	24.81	27.26	26.06
Emamectin benzoate 5 SG	23.11	22.19	23.41	22.93	23.99	23.82
Diafenthiuron 50 WP	26.96	26.04	27.11	26.04	27.56	26.44
Cypermethrin 25 EC	25.66	25.48	26.37	25.75	27.79	28.15
Flonicamid 50 WG	28.07	27.85	29.05	26.96	29.85	30.52
Profenofos 50 EC	22.52	21.63	22.83	23.41	22.93	22.52
Chlorpyrifos 50 EC	20.15	19.26	19.77	20.50	19.84	20.15
Spinetoram 11.7 SC	20.44	19.50	20.05	20.07	20.17	19.85
Quinalphos 25 EC	21.04	20.15	20.41	20.37	20.46	20.10
Control	15.11	14.52	15.05	15.11	15.03	14.96

t-Test: Paired Two Sample for Means, IYOC- Increasing yield over control (%), DS- Drone spraying, CS- Conventional spraying

Table: 245. Ent 4 (b) Impact of insecticides applied through drone and conventional method on seed cotton yield (q/ha).

Treatment	Nagpur								Junagadh	
	Field Dose				1.5 times Field Dose				Field Dose	
	Drone		Conventional		Drone		Conventional		DS	CS
	OV	TV	OV	TV	OV	TV	OV	TV		
Chlorantraniliprole 18.5 SC	12.03	3.47	10.92	3.30	13.26	3.64	9.99	3.16	24.25	23.00
Emamectin benzoate 5 SG	14.33	3.79	12.60	3.55	14.81	3.85	11.21	3.35	24.91	23.95
Diafenthiuron 50 WP	17.88	4.23	11.67	3.42	15.38	3.92	10.97	3.31	28.09	25.60
Cypermethrin 25 EC	16.44	4.05	11.62	3.41	14.99	3.87	10.62	3.26	23.53	22.85
Flonicamid 50 WG	16.38	4.05	12.25	3.50	15.65	3.96	10.87	3.30	32.43	28.85
Profenofos 50 EC	14.86	3.85	11.69	3.42	14.30	3.78	10.70	3.27	23.09	22.20
Chlorpyrifos 50 EC	13.65	3.69	12.30	3.51	13.01	3.61	11.20	3.35	22.34	21.76
Spinetoram 11.7 SC	15.41	3.93	12.57	3.55	14.63	3.82	10.86	3.29	27.59	23.59
Quinalphos 20 AF	13.88	3.73	11.27	3.36	15.72	3.96	10.59	3.25	22.13	20.45
Fenpropathrin 10% EC	13.91	3.73	13.31	3.65	15.49	3.94	11.08	3.33	17.14	16.48
Bifenthrin 10% EC	15.78	3.97	12.63	3.55	16.29	4.04	11.07	3.33		
Control	11.70	3.42	10.19	3.19	11.70	3.42	10.19	3.19		

DS- Drone spraying, CS- Conventional spraying

Table: 246. Ent 4 (b) Phytotoxicity of different insecticides applied through drone and conventional at field dose.

S.N.	Treatment	Phytotoxicity (%)					
		Surat		Junagadh		Rahuri	
		Drone	Conventional	Drone	Conventional	Drone	Conventional
1	Chlorantraniliprole 18.5 SC	No	No	-	-	No	No
2	Emamectin benzoate 5 SG	No	No	-	-	No	No
3	Diafenthiuron 50 WP	No	No	-	-	No	No
4	Cypermethrin 25 EC	No	No	-	-	No	No
5	Flonicamid 50 WG	No	No	-	-	No	No
6	Profenofos 50 EC	No	No	-	-	No	No
7	Chlorpyrifos 50 EC	No	No	-	-	No	No
8	Spinetoram 11.7 SC	No	No	-	-	No	No
9	Quinalphos 25 EC	No	No	-	-	No	No
10	Control	No	No	-	-	No	No
	P(T<=t) one-tail	-	-	-	-	-	-
	t Critical one-tail	-	-	-	-	-	-
	P(T<=t) two-tail	-	-	-	-	-	-
	t Critical two-tail	-	-	-	-	-	-

Phytotoxicity (%)- Basis of Crop Response Injuries Rating - Phytotoxicity Rating Scale (PRS), t-Test: Paired Two Sample for Means

Table: 247. Ent 4 (b) Phytotoxicity of different insecticides applied through drone and conventional at more than 10 % of field dose.

S.N.	Treatment	Phytotoxicity (%)					
		Surat		Junagadh		Rahuri	
		Drone	Conventional	Drone	Conventional	Drone	Conventional
1	Chlorantraniliprole 18.5 SC	No	No	-	-	-	-
2	Emamectin benzoate 5 SG	No	No	-	-	-	-
3	Diafenthiuron 50 WP	No	No	-	-	-	-
4	Cypermethrin 25 EC	No	No	-	-	-	-
5	Flonicamid 50 WG	No	No	-	-	-	-
6	Profenofos 50 EC	No	No	-	-	-	-
7	Chlorpyrifos 50 EC	No	No	-	-	-	-
8	Spinetoram 11.7 SC	No	No	-	-	-	-
9	Quinalphos 25 EC	No	No	-	-	-	-
10	Control	No	No	-	-	-	-
P(T<=t) one-tail		-	-	-	-	-	-
t Critical one-tail		-	-	-	-	-	-
P(T<=t) two-tail		-	-	-	-	-	-
t Critical two-tail		-	-	-	-	-	-

Phytotoxicity (%)- Basis of Crop Response Injuries Rating - Phytotoxicity Rating Scale (PRS), t-Test: Paired Two Sample for Means

Table: 248. Ent 4 (b) Phytotoxicity of different insecticides applied through drone and conventional at more than 25 % of field dose.

S.N.	Treatment	Phytotoxicity (%)					
		Surat		Junagadh		Rahuri	
		Drone	Conventional	Drone	Conventional	Drone	Conventional
1	Chlorantraniliprole 18.5 SC	No	No	-	-	-	-
2	Emamectin benzoate 5 SG	No	No	-	-	-	-
3	Diafenthiuron 50 WP	No	No	-	-	-	-
4	Cypermethrin 25 EC	No	No	-	-	-	-
5	Flonicamid 50 WG	No	No	-	-	-	-
6	Profenofos 50 EC	No	No	-	-	-	-
7	Chlorpyrifos 50 EC	No	No	-	-	-	-
8	Spinetoram 11.7 SC	No	No	-	-	-	-
9	Quinalphos 25 EC	No	No	-	-	-	-
10	Control	No	No	-	-	-	-
P(T<=t) one-tail		-	-	-	-	-	-
t Critical one-tail		-	-	-	-	-	-
P(T<=t) two-tail		-	-	-	-	-	-
t Critical two-tail		-	-	-	-	-	-

Phytotoxicity (%)- Basis of Crop Response Injuries Rating - Phytotoxicity Rating Scale (PRS), t-Test: Paired Two Sample for Means

Table: 249. Ent 4 (b) Phytotoxicity of different insecticides applied through drone and conventional spraying (Nagpur).

S.N.	Treatment	Phytotoxicity (%)			
		Field dose		1.5 times field dose	
		Drone	Conventional	Drone	Conventional
1	Chlorantraniliprole 18.5 SC	No	No	No	No
2	Emamectin benzoate 5 SG	No	No	No	No
3	Diafenthiuron 50 WP	No	No	No	No
4	Cypermethrin 25 EC	No	No	No	No
5	Flonicamid 50 WG	No	No	No	No
6	Profenofos 50 EC	**Yes**	No	**Yes**	No
7	Chlorpyrifos 50 EC	No	No	No	No
8	Spinetoram 11.7 SC	No	No	No	No
9	Quinalphos 20 AF	**Yes**	No	**Yes**	No
10	Fenpropathrin 10% EC	No	No	No	No
11	Bifenthrin 10% EC				
12	Control				
	P(T<=t) one-tail	-		-	
	t Critical one-tail	-		-	
	P(T<=t) two-tail	-		-	
	t Critical two-tail	-		-	

Table: 250. Ent 4(b) Efficacy of insecticides applied through drone and conventional against JIG at CICR, RS Coimbatore.

Treatment	Field dose				More than 25 (%) of field dose			
	Drone		Conventional		Drone		Conventional	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Chlorantraniliprole 18.5 SC	II	II	II	II	II	II	II	II
Emamectin benzoate 5 SG	II	II	II	II	II	II	II	II
Diafenthiuron 50 WP	II	I	II	I	II	I	II	I
Cypermethrin 25 EC	II	II	II	II	II	II	II	II
Flonicamid 50 WG	III	I	III	I	III	I	III	I
Profenofos 50 EC	II	I	II	I	II	I	II	I
Chlorpyrifos 50 EC	II	II	II	II	II	II	II	II
Spinetoram 11.7 SC	II	I	II	I	II	I	II	I
Quinalphos 25 EC	III	I	III	II	III	II	III	II
Control	II	II	II	II	II	II	II	II

Table: 251. Ent 4(b) Efficacy of insecticides applied through drone and conventional against leafhopper at CICR, RS Coimbatore.

Treatment	Field dose						More than 25 (%) of field dose					
	Drone			Conventional			Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	3.67	3.42	19.15	3.37	2.37	51.93	4.87	3.52	27.72	3.63	2.41	51.61
Emamectin benzoate 5 SG	4.03	2.36	44.21	4.70	4.13	16.23	5.63	4.51	7.39	4.30	3.97	20.28
Diafenthiuron 50 WP	3.10	0.69	83.69	4.90	1.26	74.44	2.77	0.00	100.00	4.70	0.49	90.16
Cypermethrin 25 EC	4.60	2.39	43.50	5.03	3.28	33.47	3.47	1.26	74.13	4.90	2.67	46.39
Flonicamid 50 WG	4.23	0.53	87.47	4.30	1.19	75.86	4.19	0.67	86.24	5.03	0.37	92.57
Profenofos 50 EC	3.47	1.28	69.74	4.67	1.64	66.73	3.30	1.28	73.72	4.67	1.28	74.30
Chlorpyrifos 50 EC	2.57	1.69	60.05	4.00	2.36	52.13	4.37	2.49	48.87	4.00	1.97	60.44
Spinetoram 11.7 SC	2.80	0.37	91.25	5.63	2.49	49.49	3.37	2.07	57.49	3.37	0.96	80.72
Quinalphos 25 EC	3.67	2.19	48.23	5.40	3.25	34.08	3.03	1.29	73.51	5.63	2.39	52.01
Control	3.63	4.23		5.87	4.93		4.13	4.87	-	5.40	4.98	-
P(T<=t) one-tail	**0.0089**						**0.4327**					
t Critical one-tail	**1.8331**						**1.8331**					
P(T<=t) two-tail	**0.0178**						**0.8655**					
t Critical two-tail	**2.2621**						**2.2622**					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 252. Ent 4(b) Efficacy of insecticides applied through drone and conventional against white fly at CICR, RS Coimbatore.

Treatment	Field dose						More than 25 % of field dose					
	Drone			Conventional			Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	0.47	0.00	100.00	0.60	0.00	100.00	0.30	0.00	100.00	0.27	0.67	0.00
Emamectin benzoate 5 SG	0.77	1.00	-203.03	0.33	0.00	100.00	0.57	0.33	75.19	0.43	0.33	50.75
Diafenthiuron 50 WP	0.97	0.00	100.00	0.30	0.00	100.00	0.63	0.00	100.00	0.60	0.00	100.00
Cypermethrin 25 EC	0.63	2.00	-506.06	0.43	0.67	0.00	0.47	0.33	75.19	0.37	0.33	50.75
Flonicamid 50 WG	0.63	0.33	0.00	0.27	0.33	50.75	0.43	0.33	100.00	0.80	0.00	100.00
Profenofos 50 EC	0.50	1.33	-303.03	0.40	0.00	100.00	0.70	0.00	100.00	0.63	1.33	-98.51
Chlorpyrifos 50 EC	0.57	0.00	100.00	0.63	0.33	50.75	0.63	0.00	75.19	0.20	0.39	41.79
Spinetoram 11.7 SC	0.53	0.00	100.00	0.37	0.00	100.00	0.27	0.33	75.19	0.50	0.67	0.00
Quinalphos 25 EC	0.43	0.00	100.00	0.80	1.33	-98.51	0.60	0.33	75.19	0.57	1.67	-149.25
Control	0.67	0.33	-	0.60	0.67	-	0.48	1.33		0.43	0.67	-
P(T<=t) one-tail	0.2723						0.0795					
t Critical one-tail	1.8331						1.8331					
P(T<=t) two-tail	0.5446						0.1590					
t Critical two-tail	2.2622						2.2622					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 253. Ent 4(b) Efficacy of insecticides applied through drone and conventional against aphid at CICR, RS Coimbatore.

Treatment	Field dose						More than 25 (%) of field dose					
	Drone			Conventional			Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	13.00	9.61	37.60	11.67	12.60	-38.01	6.67	6.23	34.42	2.00	5.73	49.34
Emamectin benzoate 5 SG	17.33	5.20	66.23	14.67	11.83	-29.57	8.00	8.27	12.95	4.00	3.73	67.02
Diafenthiuron 50 WP	17.67	12.17	20.97	11.00	12.20	-33.63	8.00	1.27	86.63	5.67	0.30	97.35
Cypermethrin 25 EC	6.33	1.63	89.42	8.00	4.40	51.81	13.67	5.10	46.32	3.67	2.70	76.13
Flonicamid 50 WG	11.33	1.50	90.26	4.67	0.60	93.43	8.33	3.50	63.16	9.00	1.60	85.85
Profenofos 50 EC	11.00	4.67	69.68	7.67	3.10	66.05	13.67	2.00	78.95	6.33	2.43	78.51
Chlorpyrifos 50 EC	16.67	4.33	71.88	25.67	6.00	34.28	9.33	5.20	45.26	4.67	2.60	77.01
Spinetoram 11.7 SC	9.00	4.90	68.18	7.67	1.97	78.42	15.67	12.17	-28.11	4.33	3.83	66.14
Quinalphos 25 EC	5.67	3.87	74.87	10.33	3.10	66.05	7.67	4.63	51.26	9.00	2.28	79.84
Control	11.67	15.40		12.33	9.13		11.00	9.50		8.67	11.31	
P(T<=t) one-tail	0.4435						0.0197					
t Critical one-tail	1.8331						1.8331					
P(T<=t) two-tail	0.8871						0.0394					
t Critical two-tail	2.2622						2.2622					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 254. Ent 4(b) Efficacy of insecticides applied through drone and conventional against thrips at CICR, RS Coimbatore.

Treatment	Field dose						More than 25 % of field dose					
	Drone			Conventional			Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	14.33	15.23	-1.33	13.67	10.67	13.46	12.33	17.33	-20.94	11.33	8.00	36.86
Emamectin benzoate 5 SG	17.00	2.47	83.57	14.70	1.33	89.21	14.33	2.67	81.37	8.67	1.67	86.82
Diafenthiuron 50 WP	16.67	4.57	69.59	13.67	8.67	29.68	10.33	4.67	67.41	9.67	6.67	47.36
Cypermethrin 25 EC	19.67	12.80	14.84	18.67	4.67	62.12	11.67	3.67	74.39	7.67	8.00	36.86
Flonicamid 50 WG	15.33	2.67	82.24	17.33	2.67	78.35	9.33	2.00	86.04	5.67	1.33	89.50
Profenofos 50 EC	11.00	3.63	75.85	19.67	5.67	54.01	10.33	3.67	74.39	8.67	3.67	71.03
Chlorpyrifos 50 EC	12.00	3.37	77.58	10.00	8.67	29.68	10.67	7.67	46.48	12.67	3.33	73.72
Spinetoram 11.7 SC	10.33	1.70	88.69	7.67	2.67	78.35	8.33	2.33	83.74	8.67	2.33	81.61
Quinalphos 25 EC	14.33	4.90	67.40	16.33	8.67	29.68	12.67	7.67	46.48	12.33	3.33	73.72
Control	17.00	15.03	-	9.33	12.33	-	13.00	14.33	-	9.33	12.67	-
P(T<=t) one-tail	0.4898						0.1209					
t Critical one-tail	1.8331						1.8331					
P(T<=t) two-tail	0.9796						0.2418					
t Critical two-tail	2.2622						2.2622					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 255. Ent 4(b) Efficacy of insecticides applied through drone and conventional against Green boll damage at CICR, RS Coimbatore.

Treatment	Field dose						More than 25 (%) of field dose					
	Drone			Conventional			Drone			Conventional		
	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)	Pre spray	Post spray	ROC (%)
Chlorantraniliprole 18.5 SC	19.33	11.67	40.67	15.67	9.67	57.96	18.33	9.67	55.38	17.67	11.33	46.88
Emamectin benzoate 5 SG	16.67	9.33	52.57	13.33	4.63	79.87	10.67	3.67	83.06	16.33	5.67	73.42
Diafenthiuron 50 WP	21.33	19.67	0.00	21.00	23.67	-2.91	22.33	21.67	0.00	15.33	23.67	-10.97
Cypermethrin 25 EC	16.67	9.33	52.57	15.33	7.33	68.13	12.67	4.67	78.45	21.33	8.33	60.95
Flonicamid 50 WG	21.67	23.67	-20.34	16.67	21.67	5.78	24.00	21.33	1.57	11.33	16.67	21.85
Profenofos 50 EC	20.00	14.33	27.15	15.33	4.67	79.70	19.33	6.67	69.22	23.33	6.33	70.32
Chlorpyrifos 50 EC	18.33	8.67	55.92	16.67	9.33	59.43	21.67	13.00	40.01	29.00	11.67	45.29
Spinetoram 11.7 SC	13.33	7.33	62.74	13.33	5.67	75.35	18.67	4.67	78.45	21.67	9.33	56.26
Quinalphos 25 EC	18.33	11.67	40.67	14.33	6.33	72.48	14.67	9.33	56.95	18.33	11.67	45.29
Control	21.67	19.67		19.67	23.00		18.00	21.67		15.67	21.33	
P(T<=t) one-tail	0.0830						0.1440					
t Critical one-tail	1.8331						1.8331					
P(T<=t) two-tail	0.1661						0.2881					
t Critical two-tail	2.2622						2.2622					

ROC- Reduction over control (based on 7 DAS observation basis) and total 3 round sprays were applied, t-Test: Paired Two Sample for Means

Table: 256. Ent 4 (b) Phytotoxicity of different insecticides applied through drone and conventional at CICR, RS Coimbatore.

S.N.	Treatment	Phytotoxicity (%)			
		Field dose		More than 25 (%) of field dose	
		Drone	Conventional	Drone	Conventional
1	Chlorantraniliprole 18.5 SC	No	No	No	No
2	Emamectin benzoate 5 SG	No	No	No	No
3	Diafenthiuron 50 WP	No	No	No	No
4	Cypermethrin 25 EC	No	No	No	No
5	Flonicamid 50 WG	No	No	No	No
6	Profenofos 50 EC	No	No	No	No
7	Chlorpyrifos 50 EC	No	No	No	No
8	Spinetoram 11.7 SC	No	No	No	No
9	Quinalphos 25 EC	No	No	No	No
10	Control	No	No	No	No
P(T<=t) one-tail					
t Critical one-tail					
P(T<=t) two-tail					
t Critical two-tail					

Phytotoxicity (%)- Basis of Crop Response Injuries Rating - Phytotoxicity Rating Scale (PRS), t-Test: Paired Two Sample for Means

Table: 257. Ent 5a: To identify suitable seed treatment interventions for pest management in organic cotton production 2024-25 (North zone) Bathinda

S.N.	Treatments	Sucking pests/3 leaves											
		In Field conditions						In Pot conditions					
		Jassid		Thrips		Whitefly		Jassid		Thrips		Whitefly	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	T1	3.20	10.19	11.28	19.44	9.46	17.16	2.76	9.47	11.77	19.95	8.64	2.10
2	T2	3.59	10.82	10.93	19.10	9.70	17.35	2.62	9.24	11.35	19.58	8.37	2.60
3	T3	3.44	10.60	10.35	18.58	8.77	16.62	2.49	8.96	10.74	19.03	7.65	2.15
4	T4	3.11	10.08	10.13	18.37	8.77	16.54	2.33	8.68	10.77	19.05	7.56	2.52
5	T5	3.27	10.30	10.84	19.04	8.88	16.45	2.69	9.34	11.35	19.58	7.64	2.41
6	T6	3.22	10.25	9.83	18.07	7.48	15.31	2.22	8.48	10.28	18.61	6.77	2.40
7	T7	2.62	9.19	9.03	17.30	6.88	14.59	2.04	8.09	9.74	18.09	6.59	2.21
8	T8	2.70	9.30	9.68	17.95	7.90	15.75	2.27	8.56	10.29	18.61	7.01	2.29
9	T9	6.01	14.08	16.40	23.77	13.15	20.76	5.38	13.32	17.81	24.83	11.57	2.81
10	T10	2.57	9.05	8.58	16.81	6.35	13.78	1.64	7.12	9.07	17.42	6.43	1.90
	S.Em.±		0.22		0.14		0.51		0.19		0.19		0.44
	C.D. at 5%		0.66		0.41		1.47		0.55		0.54		N/A
	C.V. %		3.72		1.51		6.17		3.53		1.93		42.11

Table: 258. Ent 5a: To identify suitable seed treatment interventions for pest management in organic cotton production 2024-25 (North zone) Hisar

S.N.	Treatments	Sucking pests/3 leaves											
		In Field conditions						In Pot conditions					
		Jassid		Thrips		Whitefly		Jassid		Thrips		Whitefly	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	T1	1.53	1.59	2.77	1.94	4.51	2.35	2.64	1.91	9.12	3.18	7.42	2.90
2	T2	1.80	1.67	3.20	2.05	5.09	2.47	3.13	2.03	10.20	3.35	8.26	3.04
3	T3	1.87	1.69	3.23	2.06	5.43	2.54	3.30	2.07	10.29	3.36	8.61	3.10
4	T4	1.80	1.67	3.20	2.05	5.22	2.49	3.19	2.05	10.40	3.38	8.23	3.04
5	T5	1.87	1.69	3.27	2.06	5.31	2.51	3.34	2.09	10.59	3.40	8.30	3.05
6	T6	1.68	1.64	3.06	2.01	4.83	2.41	3.08	2.02	9.80	3.29	7.73	2.96
7	T7	1.71	1.65	3.10	2.02	5.01	2.45	3.18	2.04	9.92	3.30	8.11	3.02
8	T8	1.58	1.61	3.00	2.00	4.61	2.37	2.84	1.96	9.42	3.23	7.61	2.93
9	T9	1.93	1.71	3.37	2.09	5.58	2.56	3.46	2.11	11.09	3.48	8.93	3.15
10	T10	1.19	1.48	2.46	1.86	4.16	2.27	2.20	1.79	8.01	3.00	6.31	2.70
	S.Em.±		0.03		0.05		0.06		0.03		0.05		0.06
	C.D. at 5 %		0.09		N/A		N/A		0.10		0.16		0.19
	C.V. %		3.32		4.24		4.49		2.79		2.85		3.65

T1-Soil application of neem cake**,** ***T2****-Psedomonas fluorescensm,* ***T3****- Beauveria bassiana,* ***T4****- Metarhizium anisiopliae,* ***T5****- Lecanicillium lecanii,* ***T6****- Lecanicillium lecanii + Psedomonas fluorescens,* ***T7****- Beauveria bassiana + Psedomonas fluorescens,* ***T8***-Beejamritham**, T9**-Control**, T10**- Seed treatments with insecticides

Table: 259. Ent 5a: To identify suitable seed treatment interventions for pest management in organic cotton production 2024-25 (North zone) Sirsa

S.N.	Treatments	Sucking pests/3 leaves											
		In Field conditions						In Pot conditions					
		Jassid		Thrips		Whitefly		Jassid		Thrips		Whitefly	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	T1	-	-	-	-	-	-	0.38	1.16	-	-	10.38	3.24
2	T2	-	-	-	-	-	-	1.00	1.41	-	-	9.25	3.14
3	T3	-	-	-	-	-	-	0.38	1.16	-	-	11.38	3.47
4	T4	-	-	-	-	-	-	0.38	1.16	-	-	7.63	2.82
5	T5	-	-	-	-	-	-	0.25	1.11	-	-	12.63	3.51
6	T6	-	-	-	-	-	-	0.75	1.29	-	-	9.58	3.21
7	T7	-	-	-	-	-	-	1.00	1.40	-	-	9.08	3.12
8	T8	-	-	-	-	-	-	1.00	1.41	-	-	13.17	3.65
9	T9	-	-	-	-	-	-	1.75	1.64	-	-	14.08	3.81
10	T10	-	-	-	-	-	-	0.67	1.29	-	-	6.50	2.64
	S.Em.±								0.07				0.17
	C.D. at 5 %								0.204				0.497
	C.V. %								10.754				10.448

T1-Soil application of neem cake**, T2**-*Psedomonasfluorescensm**, T3**- *Beauveriabassiana, **T4**- Metarhizium anisiopliae**, T5**- Lecanicillium lecanii, **T6**- Lecanicillium lecanii + Psedomonas fluorescens**, T7**- Beauveria bassiana + Psedomonas fluorescens**, T8***-Beejamritham**, T9**-Control**, T10**- Seed treatments with insecticides

Table: 260. Ent 5a: To identify suitable seed treatment interventions for pest management in organic cotton production 2024-25 (Central zone) Akola

S.N.	Treatments	Sucking pests/3 leaves											
		In Field conditions						In Pot conditions					
		Jassid		Thrips		Whitefly		Jassid		Thrips		Whitefly	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	T1	In Field Condition, trial was vitiated because of poor plant population due to continuous rains after sowing.						5.35	2.31	7.40	2.72	3.79	1.94
2	T2							5.18	2.27	7.28	2.68	3.90	1.96
3	T3							6.01	2.43	7.32	2.70	4.43	2.10
4	T4							5.08	2.25	8.46	2.88	3.32	1.82
5	T5							6.09	2.47	7.11	2.66	4.31	2.03
6	T6							4.61	2.14	7.66	2.77	3.94	1.97
7	T7							4.18	2.04	6.89	2.62	3.14	1.76
8	T8							4.47	2.11	6.96	2.61	3.28	1.81
9	T9							10.69	3.25	14.79	3.83	6.99	2.64
10	T10							3.58	1.88	4.80	2.19	2.67	1.63
	S.Em.±							0.133		0.173		0.123	
	C.D. at 5 %							0.394		0.515		0.366	
	C.V. %							9.94		10.85		10.84	

T1-Soil application of neem cake**, T2**-*Psedomonas fluorescensm**, T3**- Beauveria bassiana, **T4**- Metarhizium anisiopliae**, T5**- Lecanicillium lecanii, **T6**- Lecanicillium lecanii + Psedomona sfluorescens**, T7**- Beauveria bassiana + Psedomonas fluorescens**, T8***-Beejamritham**, T9**-Control**, T10**- Seed treatments with insecticides

Table: 261. Ent 5a: To identify suitable seed treatment interventions for pest management in organic cotton production 2024-25 (Central zone) Junagadh

S.N.	Treatments	Sucking pests/3 leaves											
		In Field conditions						In Pot conditions					
		Jassid		Thrips		Whitefly		Jassid		Thrips		Whitefly	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	T1	4.48	2.12	7.42	2.72	7.25	2.69	5.95	2.44	7.99	2.83	7.99	2.83
2	T2	4.62	2.15	8.57	2.93	7.27	2.7	6.07	2.46	9.14	3.02	7.58	2.75
3	T3	3.18	1.78	5.70	2.39	6.55	2.56	3.76	1.94	5.74	2.40	6.88	2.62
4	T4	4.59	2.14	7.22	2.69	8.31	2.88	6.59	2.57	8.43	2.90	8.01	2.83
5	T5	5.38	2.32	10.82	3.29	10.98	3.31	6.37	2.52	11.09	3.33	10.96	3.31
6	T6	5.97	2.44	11.29	3.36	9.06	3.01	6.52	2.55	10.69	3.27	11.31	3.36
7	T7	6.12	2.47	11.95	3.46	8.88	2.98	6.67	2.58	12.06	3.47	8.53	2.92
8	T8	4.96	2.23	9.38	3.06	8.45	2.91	5.09	2.26	8.72	2.95	10.15	3.19
9	T9	14.01	3.74	22.91	4.79	18.60	4.31	14.34	3.79	23.94	4.89	19.21	4.38
10	T10	3.69	1.92	8.92	2.99	5.82	2.41	4.13	2.03	7.09	2.66	7.18	2.68
	S.Em.±	0.10		0.16		0.16		0.09		0.16		0.17	
	C.D. at 5 %	0.28		0.46		0.47		0.28		0.46		0.5	
	C.V. %	7.11		8.51		9.18		6.53		8.5		9.39	

T1-Soil application of neem cake**, T2**-*Psedomonas fluorescensm**, T3**- Beauveria bassiana, **T4**- Metarhizium anisiopliae**, T5**- Lecanicillium lecanii, **T6**- Lecanicilliumlecanii + Psedomonas fluorescens**, T7**- Beauveria bassiana + Psedomonas fluorescens**, T8**-*Beejamritham**, T9**-Control**, T10**- Seed treatments with insecticides

Table: 262. Ent 5a: To identify suitable seed treatment interventions for pest management in organic cotton production 2024-25 (Central zone) Bhawanipatna

S.N.	Treatments	Sucking pests/3 leaves											
		In Field conditions						In Pot conditions					
		Jassid		Thrips		Whitefly		Jassid		Thrips		Whitefly	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	T1	4.07	2.13	0.18	0.82	0.36	0.92	6.13	2.57	1.73	1.45	0.73	1.06
2	T2	8.20	2.95	0.63	1.06	0.22	0.85	6.93	2.71	0.87	1.16	1.40	1.38
3	T3	6.80	2.67	0.28	0.88	0.24	0.86	4.80	2.26	0.53	1.00	1.33	1.33
4	T4	7.20	2.75	0.28	0.87	0.60	1.04	5.53	2.37	1.13	1.24	1.27	1.29
5	T5	5.80	2.50	0.70	1.06	0.20	0.83	6.67	2.67	0.27	0.86	0.73	1.11
6	T6	6.53	2.63	1.67	1.44	0.29	0.88	5.13	2.37	0.20	0.82	1.07	1.24
7	T7	7.00	2.74	1.26	1.31	0.42	0.96	6.93	2.72	0.40	0.93	0.53	0.99
8	T8	7.60	2.76	0.33	0.91	0.51	1.00	4.00	2.08	0.00	0.71	0.47	0.98
9	T9	7.07	2.72	0.64	1.03	0.24	0.86	3.13	1.90	0.07	0.75	0.27	0.86
10	T10	2.27	1.64	0.13	0.79	0.58	1.03	3.53	1.99	0.27	0.85	0.20	0.84
	S.Em.±	0.24		0.12		0.02		0.23		0.15		0.04	
	C.D. at 5 %	0.73		0.34		0.05		0.68		0.43		0.11	
	C.V. %	16.62		19.69		3.60		16.86		25.89		6.21	

T1-Soil application of neem cake**, T2**-*Psedomonas fluorescensm**, T3**- Beauveria bassiana, **T4**- Metarhizium anisiopliae**, T5**- Lecanicillium lecanii, **T6**- Lecanicillium lecanii + Psedomonas fluorescens**, T7**- Beauveria bassiana + Psedomonas fluorescens**, T8**-*Beejamritham**, T9**-Control**, T10**- Seed treatments with insecticides

Table: 263. Ent 5a: To identify suitable seed treatment interventions for pest management in organic cotton production 2024-25 (Central zone) Nagpur

S.N.	Treatments	Sucking pests/3 leaves											
		In Field conditions						In Pot conditions					
		Jassid		Thrips		Whitefly		Jassid		Thrips*		Whitefly*	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	T1	1.50	1.38	0.00	0.00	0.64	1.04	0.00	0.71	-	-	-	-
2	T2	1.50	1.37	0.00	0.00	0.60	1.03	1.08	1.25	-	-	-	-
3	T3	1.58	1.41	0.00	0.00	0.69	1.03	0.00	0.71	-	-	-	-
4	T4	1.47	1.38	0.00	0.00	0.75	1.08	0.05	0.74	-	-	-	-
5	T5	1.41	1.35	0.00	0.00	0.76	1.08	0.00	0.71	-	-	-	-
6	T6	1.53	1.39	0.00	0.00	0.69	1.06	0.00	0.71	-	-	-	-
7	T7	1.66	1.43	0.00	0.00	0.73	1.08	0.00	0.71	-	-	-	-
8	T8	1.61	1.41	0.00	0.00	0.69	1.06	0.00	0.71	-	-	-	-
9	T9	1.47	1.36	0.00	0.00	0.73	1.06	0.92	1.19	-	-	-	-
10	T10	1.90	1.51	0.00	0.00	1.11	1.23	0.85	1.16	-	-	-	-
	S.Em.±		0.04				0.04		0.01				
	C.D. at 5 %		0.11				0.11		0.04				
	C.V. %		4.96				6.59		2.87				

T1-Soil application of neem cake**, T2**-*Psedomonas fluorescensm, T3- Beauveria bassiana, T4- Metarhizium anisiopliae, T5- Lecanicillium lecanii, T6- Lecanicillium lecanii + Psedomonas fluorescens, T7- Beauveria bassiana + Psedomonas fluorescens, T8*-Beejamritham**, T9**-Control**, T10-** Seed treatments with insecticides.

Table: 264. Ent 5a: To identify suitable seed treatment interventions for pest management in organic cotton production 2024-25 (Central zone) Rahuri

S.N.	Treatments	Sucking pests/3 leaves											
		In Field conditions						In Pot conditions					
		Jassid		Thrips		Whitefly		Jassid		Thrips		Whitefly	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	T1	3.80	-	9.72	-	1.85	-	4.65	-	11.18	-	NC	-
2	T2	3.45	-	12.10	-	1.64	-	4.16	-	12.75	-	NC	-
3	T3	4.10	-	8.50	-	1.56	-	4.92	-	9.72	-	NC	-
4	T4	3.70	-	10.75	-	2.05	-	4.56	-	11.32	-	NC	-
5	T5	3.84	-	12.40	-	2.34	-	4.75	-	13.81	-	NC	-
6	T6	3.68	-	12.20	-	2.28	-	4.58	-	13.58	-	NC	-
7	T7	3.50	-	13.65	-	1.99	-	4.43	-	15.10	-	NC	-
8	T8	3.90	-	12.34	-	2.20	-	4.73	-	13.65	-	NC	-
9	T9	6.10	-	28.50	-	4.12	-	7.05	-	30.05	-	NC	-
10	T10	3.40	-	9.26	-	1.32	-	4.34	-	10.20	-	NC	-
	S.Em.±	0.075	-	0.10	-	0.049	-	0.11	-	0.09	-	NC	-
	C.D. at 5 %	0.224	-	0.29	-	0.146	-	0.31	-	0.28	-	NC	-
	C.V. %	6.202	-	4.65	-	5.328	-	7.81	-	4.29	-	NC	-

T1-Soil application of neem cake**, T2**-*Psedomonas fluorescensm, T3- Beauveria bassiana, T4- Metarhizium anisiopliae, T5- Lecanicillium lecanii, T6- Lecanicillium lecanii + Psedomonas fluorescens, T7- Beauveria bassiana + Pseudomonas fluorescens, T8*-Beejamritham**, T9**-Control**, T10-** Seed treatments with insecticides , **NC - Not Carried out due to lack of whitefly population**

South Zone

Table: 265. Ent 5a: To identify suitable seed treatment interventions for pest management in organic cotton production 2024-25 (South zone) Dharwad

S.N.	Treatments	Sucking pests/3 leaves											
		In Field conditions						In Pot conditions					
		Jassid		Thrips		Whitefly		Jassid		Thrips		Whitefly	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	T1	1.05	1.24	10.72	3.35	-	-	-	-	28.07	5.34	-	-
2	T2	1.32	1.35	11.63	3.48	-	-	-	-	29.87	5.51	-	-
3	T3	1.09	1.26	10.40	3.30	-	-	-	-	29.89	5.51	-	-
4	T4	1.13	1.28	10.52	3.32	-	-	-	-	29.27	5.46	-	-
5	T5	0.91	1.19	8.72	3.04	-	-	-	-	28.62	5.40	-	-
6	T6	0.88	1.17	8.61	3.02	-	-	-	-	28.53	5.39	-	-
7	T7	1.05	1.25	10.41	3.30	-	-	-	-	29.45	5.47	-	-
8	T8	1.35	1.36	11.45	3.46	-	-	-	-	30.73	5.59	-	-
9	T9	1.66	1.47	12.61	3.62	-	-	-	-	33.31	5.81	-	-
10	T10	0.76	1.12	7.06	2.75	-	-	-	-	23.40	4.89	-	-
	S.Em.±	0.06		0.11						0.15			
	C.D. at 5 %	0.12		0.33						0.47			
	C.V. %	5.93		5.41						5.04			

T1-Soil application of neem cake**, T2**-*Psedomonas fluorescensm***, *T3*-** *Beauveria bassiana,* ***T4***- *Metarhizium anisiopliae***, *T5*-** *Lecanicillium lecanii,* ***T6***- *Lecanicillium lecanii + Psedomonas fluorescens***, *T7*-** *Beauveria bassiana + Psedomonas fluorescens***, *T8*-**Beejamritham**, T9**-Control**, T10**- Seed treatments with insecticides

Table: 266. Ent 5a: To identify suitable seed treatment interventions for pest management in organic cotton production 2024-25 (South zone) Chamarajanagar

S.N.	Treatments	Sucking pests/3 leaves											
		In Field conditions						In Pot conditions					
		Jassid		Thrips		Whitefly		Jassid		Thrips		Whitefly	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	T1	5.35	2.40	4.16	2.14	3.10	1.87	4.28	2.18	2.19	1.64	1.02	1.23
2	T2	5.96	2.52	4.19	2.02	3.14	1.88	4.48	2.23	2.35	1.68	1.03	1.23
3	T3	4.93	2.30	3.72	2.04	2.58	1.73	3.56	2.00	1.81	1.51	0.64	1.07
4	T4	5.92	2.52	4.06	2.12	2.92	1.83	4.43	2.21	2.18	1.64	0.92	1.19
5	T5	4.79	2.28	3.15	1.89	2.07	1.57	3.51	2.00	1.34	1.35	0.61	1.05
6	T6	4.31	2.16	2.97	1.85	1.76	1.46	3.13	1.90	1.00	1.22	0.56	1.03
7	T7	4.53	2.21	3.06	1.87	1.75	1.47	3.22	1.93	0.93	1.20	0.41	0.95
8	T8	5.97	2.52	4.42	2.21	3.53	1.99	4.70	2.28	2.74	1.80	1.58	1.43
9	T9	9.89	3.21	5.31	2.39	7.25	2.78	8.67	3.03	4.37	2.20	3.68	2.04
10	T10	3.55	2.00	2.01	1.56	1.70	1.47	2.36	1.68	0.95	1.20	0.35	0.92
	S.Em.±	-		-		-		-		-		-	
	C.D. at 5 %	0.37		0.39		0.31		0.34		0.24		0.24	
	C.V. %	8.99		11.21		9.73		9.21		8.91		11.42	

T1-Soil application of neem cake**, T2**-*Psedomonasfluorescensm***, *T3*-** *Beauveria bassiana,* ***T4***- *Metarhizium anisiopliae***, *T5*-** *Lecanicillium lecanii,* ***T6***- *Lecanicillium lecanii + Psedomonas fluorescens***, *T7*-** *Beauveria bassiana + Psedomonas fluorescens***, *T8*-**Beejamritham**, T9**-Control**, T10**- Seed treatments with insecticides

Table: 267. Ent 5a: To identify suitable seed treatment interventions for pest management in organic cotton production 2024-25 (South zone) Nandyal

S.N.	Treatments	Sucking pests/3 leaves											
		In Field conditions						In Pot conditions					
		Jassid		Thrips		Whitefly		Jassid		Thrips		Whitefly	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	T1	7.77	2.87	28.03	5.34	23.03	4.83	8.43	2.98	32.40	5.74	23.83	4.93
2	T2	3.13	1.90	10.97	3.38	10.70	3.34	4.07	2.14	11.53	3.43	9.43	3.15
3	T3	6.73	2.64	25.03	5.03	20.70	4.60	7.67	2.83	28.17	5.35	22.23	4.76
4	T4	7.60	2.84	22.07	4.75	23.63	4.82	8.30	2.97	26.33	5.18	24.37	4.98
5	T5	5.20	2.39	20.87	4.62	24.40	4.98	6.70	2.68	24.40	4.99	26.37	5.18
6	T6	3.17	1.91	10.13	3.26	10.43	3.30	4.10	2.14	11.77	3.50	10.57	3.32
7	T7	5.37	2.41	20.83	4.61	20.47	4.58	7.97	2.91	26.37	5.18	21.10	4.65
8	T8	7.20	2.77	28.53	5.33	23.20	4.87	7.93	2.89	24.53	4.94	16.03	4.03
9	T9	12.60	3.62	38.73	6.26	38.10	6.21	4.33	2.18	26.97	5.24	37.27	6.14
10	T10	3.07	1.89	11.37	3.40	9.93	3.23	13.40	3.73	10.40	3.30	10.37	3.27
	S.Em.±		-		-		-		-		-		-
	C.D. at 5 %		0.45		0.71		0.72		0.35		0.69		0.55
	C.V. %		10.31		9.05		9.41		7.30		8.63		7.22

T1-Soil application of neem cake**, T2-***Psedomonas fluorescensm**, T3- Beauveria bassiana, T4- Metarhizium anisiopliae, T5- Lecanicillium lecanii, T6- Lecanicillium lecanii + Psedomonas fluorescens, T7- Beauveria bassiana + Psedomonas fluorescens, T8-*Beejamritham**, T9-***Control**, T10-* Seed treatments with insecticides.

Table: 268. Ent 5a: To identify suitable seed treatment interventions for pest management in organic cotton production 2024-25 (South zone) Raichur

S.N.	Treatments	Sucking pests/3 leaves											
		In Field conditions						In Pot conditions					
		Jassid		Thrips		Whitefly		Jassid		Thrips		Whitefly	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	T1	1.96	1.57	8.51	3.00	0.30	0.90	6.99	2.74	3.84	2.08	0.23	0.86
2	T2	2.13	1.62	8.03	2.92	0.46	0.98	7.18	2.77	3.34	1.96	0.31	0.90
3	T3	1.05	1.25	7.40	2.81	0.08	0.76	5.62	2.47	2.70	1.79	0.00	0.71
4	T4	1.83	1.53	8.81	3.05	0.38	0.94	7.22	2.78	4.15	2.16	0.31	0.90
5	T5	1.94	1.56	9.86	3.22	0.23	0.85	7.64	2.85	5.26	2.40	0.16	0.81
6	T6	1.60	1.45	8.50	3.00	0.30	0.90	6.57	2.66	3.82	2.08	0.23	0.86
7	T7	0.46	0.98	5.96	2.54	0.08	0.76	4.70	2.28	1.41	1.38	0.00	0.71
8	T8	1.36	1.36	7.32	2.80	0.56	1.03	6.49	2.64	2.77	1.81	0.49	0.99
9	T9	2.55	1.75	8.48	3.00	0.99	1.22	8.43	2.99	3.81	2.08	0.77	1.13
10	T10	0.68	1.09	5.39	2.43	0.15	0.81	3.59	2.02	2.59	1.76	0.08	0.76
	S.Em.±	-	-	-	-	-	-	-	-	-	-	-	-
	C.D. at 5 %	-	-	-	-	-	-	-	-	-	-	-	-
	C.V. %	-	-	-	-	-	-	-	-	-	-	-	-

T1-Soil application of neem cake**, T2-***Psedomonas fluorescensm**, T3- Beauveria bassiana, T4- Metarhizium anisiopliae, T5- Lecanicillium lecanii, T6- Lecanicillium lecanii + Psedomonas fluorescens, T7- Beauveria bassiana + Psedomonas fluorescens, T8-*Beejamritham**, T9-***Control**, T10-* Seed treatments with insecticides**.**

Table: 269. Ent. 5b: Incidence of sucking pests to validate IPM module based on existing interventions for organic cotton production 2024-25 (North zone)

S.N.	Treatments	JIG/Plant				Jassids/3 leaves				Whitefly/3 leaves			
		BT		SR		BT		SR		BT		SR	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	**M-1**	III	-	III	-	8.33	3.05	4.07	2.25	43.69	6.68	13.29	3.72
2	**M-2**	III	-	III	-	9.97	3.29	3.77	2.18	61.42	7.90	12.14	3.71
3	**M-3**	II	-	III	-	4.94	2.43	3.48	2.11	21.07	4.68	11.59	3.49
4	**Control 1**-IPM)	I	-	II	-	3.22	2.05	2.28	1.80	14.73	3.94	10.24	3.31
5	**Control-2**	II	-	II	-	5.72	2.57	2.50	1.84	30.53	5.61	11.26	3.45
	S. Em.± (T)						0.08		0.06		0.10		0.11
	CD at 5%						0.26		0.17		0.34		N/A
	CV%						5.30		10.23		3.14		11.24

BT- Bathinda**; SR**- Sirs**a; M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices), **JIG**- Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leaves

Table: 270. Ent. 5b: Incidence of sucking pests to validate IPM module based on existing interventions for organic cotton production 2024-25 (North zone)

S.N.	Treatments	Thrips/3 leaves				Natural Enemies/Plant				Other Non-target pest/3 Leaves			
		BT		SR		BT		SR		BT		SR	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	**M-1**	18.07	4.36	12.67	3.18	5.56	2.51	1.84	1.68	-	-	3.06	2.00
2	**M-2**	25.33	5.13	11.94	3.13	5.03	2.41	1.63	1.59	-	-	2.98	1.96
3	**M-3**	12.21	3.62	10.06	2.89	4.55	2.31	1.60	1.60	-	-	2.88	1.94
4	**Control-1**	9.58	3.23	8.03	2.64	4.03	2.20	1.44	1.55	-	-	2.77	1.90
5	**Control-2**	15.28	4.03	9.70	2.97	3.40	2.07	1.50	1.57	-	-	2.70	1.88
	S. Em.± (T)		0.10		0.22				0.03				0.05
	CD at 5%		0.33		N/A				N/A				N/A
	CV%		4.26		25.88				6.95				9.87

BT- Bathinda**; SR**- Sirs**a; M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices), * Natural Enemies include coccinellids, chrysopids, syrphids and spider mites.

Table: 271. Ent 5b: Incidence bollworms to validate IPM module based on existing interventions for organic cotton production 2024-25 (North zone)

S.N.	Treatments	No of Larva of PBW(10 bolls destructive sampling)				GBD (%) by PBW (10 bolls destructive sampling				Open Boll Damage (%)				Locule Damage (%)			
		BT		SR		BT		SR		BT		SR		BT		SR	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	**M-1**	0.00	0.00	0.71	1.29	0.00	0.00	19.58	25.18	0.00	0.00	11.03	19.39	0.00	0.00	6.11	14.30
2	**M-2**	0.00	0.00	0.63	1.25	0.00	0.00	14.17	20.53	0.00	0.00	10.86	19.23	0.00	0.00	5.34	13.34
3	**M-3**	0.00	0.00	0.54	1.22	0.00	0.00	11.67	17.50	0.00	0.00	9.95	18.37	0.00	0.00	5.05	12.96
4	**Control-1**	0.00	0.00	0.29	1.12	0.00	0.00	6.25	11.12	0.00	0.00	8.37	16.80	0.00	0.00	4.01	11.52
5	**Control-2**	0.00	0.00	0.42	1.18	0.00	0.00	10.42	15.12	0.00	0.00	9.24	17.68	0.00	0.00	4.50	12.25
	S. Em.± (T)				0.04				2.04				0.34				N/A
	CD at 5%				N/A				6.35				1.40				0.58
	CV%				7.46				22.80				2.68				6.46

BT- Bathinda**; SR**- Sirs**a; M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on- farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices)

Table: 272. Ent 5b: Incidence bollworms and Number of times the sucking pest crossed ETL to validate IPM module based on existing interventions for organic cotton production 2024-25 (North zone).

S.N.	Treatments	Number of times the sucking pest crossed ETL								No. of Sprays		Yield (q/ha.)	
		Whitefly		Leafhopper		Thrips		PBW based on GBD (%)					
		BT	SR	BT	SR	BT	SR	BT	SR	BT	SR	BT	SR
1	M-1	19	4	20	1	4	2	0	4	-	5	18.36	8.41
2	M-2	20	4	20	1	4	1	0	3	-	5	18.10	9.39
3	M-3	10	2	1	1	0	1	0	2	-	5	23.20	11.44
4	Control-1	6	1	1	0	0	0	0	1	-	4	24.80	21.01
5	Control-2	17	1	9	0	4	0	0	2	-	4	22.68	18.94
	S. Em.± (T)	-	-	-	-	-	-	-	-	-	-	-	-
	CD at 5%	-	-	-	-	-	-	-	-	-	-	-	-
	CV%	-	-	-	-	-	-	-	-	-	-	-	-

BT- Bathinda**; SR**- Sirs**a; M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on- farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices)

Central Zone

Table: 273. Ent 5b: Incidence of sucking pest to validate IPM module based on existing interventions for organic cotton production 2024-25 (Central Zone)

S.N.	Treatments	JIG/Plant									
		JU		SU		RA		BW		NG	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	M-1	I	-	I	-	II	-	II	-	I	-
2	M-2	I	-	I	-	II	-	II	-	I	-
3	M-3	I	-	I	-	I	-	II	-	I	-
4	Control-1(IPM)	I	-	I	-	I	-	III	-	II	-
5	Control-2	I	-	I	-	I	-	III	-	III	-
	S. Em.± (T)	-	-	-	-	-	-	-	-	-	-
	CD at 5%	-	-	-	-	-	-	-	-	-	-
	CV%	-	-	-	-	-	-	-	-	-	-

JU- Junagadh**, SU**-Surat**, RA**- Rahuri, **BW**- Bhawanipatna**, NG**-Nagpur **M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices) **JIG**- Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leaves

Table: 274. Ent 5b: Incidence of sucking pest to validate IPM module based on existing interventions for organic cotton production 2024-25 (Central Zone)

S.N.	Treatments	Jassids/3 leaves									
		JU		SU		RA		BW		NG	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	M-1	5.40	2.32	2.92	1.85	4.33	2.20	1.28	1.33	1.49	1.39
2	M-2	5.10	2.25	3.38	1.97	3.22	1.93	0.83	1.15	1.44	1.37
3	M-3	5.30	2.3	3.03	1.88	2.93	1.85	1.53	1.42	1.57	1.41
4	Control 1-(IPM)	3.00	1.74	1.75	1.50	2.66	1.78	0.70	1.10	2.49	1.70
5	Control-2	7.70	2.78	2.46	1.72	2.75	1.80	1.20	1.30	2.69	1.75
	S. Em.± (T)		0.1		0.04		0.06		0.12		0.03
	CD at 5%		0.31		0.12		0.19		0.38		0.10
	CV%		8.88		10.62		6.60		19.94		4.26

JU- Junagadh**, SU**-Surat**, RA**- Rahuri, **BW**- Bhawanipatna**, NG**-Nagpur **M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices)

Table: 275. Ent 5b: Incidence of sucking pest to validate IPM module based on existing interventions for organic cotton production 2024-25 (Central Zone)

S.N.	Treatments	Whitefly/3 leaves									
		JU		SU		RA		BW		NG	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	M-1	12.10	3.48	1.75	1.50	-	-	-	-	1.90	1.50
2	M-2	10.30	3.22	2.89	1.84	-	-	-	-	2.10	1.60
3	M-3	11.20	3.35	2.32	1.68	-	-	-	-	1.20	1.30
4	Control 1-(IPM)	8.40	2.9	1.11	1.27	-	-	-	-	1.20	1.30
5	Control-2	14.40	3.79	1.46	1.40	-	-	-	-	1.20	1.30
	S. Em.± (T)		0.14		0.04						0.00
	CD at 5%		0.43		0.10						0.10
	CV%		8.29		14.46						4.40

JU- Junagadh**, SU**-Surat**, RA**- Rahuri, **BW**- Bhawanipatna**, NG**-Nagpur **M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices)

Table: 276. Ent 5b: Incidence of sucking pest to validate IPM module based on existing interventions for organic cotton production 2024-25 (Central Zone)

S.N.	Treatments	Thrips/3 leaves									
		JU		SU		RA		BW		NG	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	M-1	9.50	3.09	19.24	4.44	19.02	4.42	1.15	1.28	1.65	1.45
2	M-2	8.70	2.95	23.51	4.90	16.87	4.17	1.67	1.47	0.74	1.11
3	M-3	9.50	3.08	20.48	4.58	15.63	4.02	0.55	1.02	1.03	1.23
4	Control 1-(IPM)	7.10	2.67	12.46	3.60	14.72	3.90	5.22	2.39	1.59	1.44
5	Control-2	13.00	3.61	17.37	4.23	13.97	3.80	4.37	2.21	1.85	1.52
	S. Em.± (T)		0.14		0.15		0.09		0.17		0.02
	CD at 5%		0.43		0.46		0.30		0.51		0.07
	CV%		8.97		8.26		5.16		20.59		3.56

JU- Junagadh**, SU**-Surat**, RA**- Rahuri, **BW**- Bhawanipatna**, NG**-Nagpur **M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices)

Table: 277. Ent 5b: Incidence of sucking pest to validate IPM module based on existing interventions for organic cotton production 2024-25 (Central Zone)

S.N.	Treatments	Aphids/3 leaves									
		JU		SU		RA		BW		NG	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	M-1	6.80	2.60	6.58	2.66	20.67	4.60	2.43	1.71	-	-
2	M-2	6.60	2.56	12.10	3.55	19.22	4.44	2.63	1.77	-	-
3	M-3	6.70	2.58	8.56	3.01	19.32	4.45	3.05	1.88	-	-
4	Control 1-(IPM)	4.20	2.06	4.21	2.17	20.27	4.56	6.60	2.66	-	-
5	Control-2	8.40	2.90	5.75	2.50	21.02	4.64	2.38	1.70	-	-
	S. Em.± (T)		0.12		0.10		0.13		0.17		
	CD at 5%		0.38		0.30		N/A		0.52		
	CV%		9.79		12.34		6.17		17.63		

JU- Junagadh**, SU**-Surat**, RA**- Rahuri, **BW**- Bhawanipatna**, NG**-Nagpur **M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices

Table: 278. Ent 5b: Incidence of sucking pest to validate IPM module based on existing interventions for organic cotton production 2024-25 (Central Zone)

S.N.	Treatments	Natural Enemies/Plant									
		JU		SU		RA		BW		NG	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	M-1	1.38	1.40	1.49	1.41	2.77	1.81	0.27	0.88	0.07	0.75
2	M-2	1.36	1.35	1.22	1.31	2.55	1.75	0.25	0.87	0.06	0.75
3	M-3	1.35	1.32	1.40	1.38	2.30	1.67	0.18	0.83	0.09	0.77
4	Control 1-(IPM)	1.20	0.94	1.30	1.34	2.13	1.62	0.38	0.94	0.12	0.78
5	Control-2	1.06	0.92	1.30	1.34	1.38	1.37	0.38	0.94	0.08	0.76
	S. Em.± (T)		0.03		0.02		0.05		0.03		0.02
	CD at 5%		0.12		0.07		0.16		0.10		0.05
	CV%		3.36		10.49		6.42		7.61		4.56

JU- Junagadh**, SU**-Surat**, RA**- Rahuri, **BW**- Bhawanipatna**, NG**-Nagpur **M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices * Natural Enemies include coccinellids, chrysopids, syrphids and spider mites

Table: 279. Ent 5b: Incidence of bollworm to validate IPM module based on existing interventions for organic cotton production 2024-25 (Central Zone)

S.N.	Treatments	No. of Larva of PBW(10 bolls destructive sampling)									
		JU		SU		RA		BW		NG	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	M-1	0.66	1.08	2.22	1.65	18.75	25.66	6.67	2.68	0.16	0.81
2	M-2	0.89	1.18	2.59	1.76	8.75	17.21	4.17	2.16	0.15	0.80
3	M-3	0.77	1.13	2.57	1.75	16.25	23.77	1.25	1.32	0.11	0.78
4	Control 1-(IPM)	0.87	1.17	1.36	1.36	15.00	22.79	3.75	2.06	0.39	0.94
5	Control-2	1.09	1.26	1.82	1.52	13.75	21.77	2.50	1.73	0.28	0.88
	S. Em.± (T)		0.05		0.06		0.59		0.41		0.01
	CD at 5%		0.43		0.16		1.86		1.25		0.04
	CV%		7.87		14.78		5.39		44.10		2.76

JU- Junagadh**, SU**-Surat**, RA**- Rahuri, **BW**- Bhawanipatna**, NG**-Nagpur **M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices)

Table: 280. Ent 5b: Incidence of bollworm to validate IPM module based on existing interventions for organic cotton production 2024-25 (Central Zone)

S.N.	Treatments	*Helicoverpa armigera*/ Plant									
		JU		SU		RA		BW		NG	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	M-1	1.15	0.82	0.62	1.06	0.71	1.10	0.00	0.71	0.03	0.73
2	M-2	1.12	0.75	0.77	1.13	0.78	1.13	0.00	0.71	0.04	0.73
3	M-3	1.06	0.62	0.65	1.07	0.58	1.04	0.00	0.71	0.04	0.73
4	Control 1-(IPM)	0.96	0.42	0.40	0.95	0.39	0.95	0.00	0.71	0.10	0.78
5	Control-2	0.97	0.43	0.51	1.00	0.38	0.94	0.00	0.71	0.10	0.77
	S. Em.± (T)		0.03		0.02		0.02		0.00		0.01
	CD at 5%		0.09		0.06		0.08		0.00		0.04
	CV%		5.47		8.18		5.55		0.00		3.89

JU- Junagadh**, SU**-Surat**, RA**- Rahuri, **BW**- Bhawanipatna**, NG**-Nagpur **M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices)

Table: 281. Ent 5b: Incidence of bollworm to validate IPM module based on existing interventions for organic cotton production 2024-25 (Central Zone)

S.N.	Treatments	Spotted bollworm/ Plant									
		JU		SU		RA		BW		NG	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	M-1	-		-	-	0.08	0.76	0.00	0.71	0.00	0.00
2	M-2	-	-	-	-	0.07	0.75	0.00	0.71	0.00	0.00
3	M-3	-	-	-	-	0.05	0.74	0.00	0.71	0.00	0.00
4	Control 1-(IPM)	-	-	-	-	0.05	0.74	0.58	1.04	0.00	0.00
5	Control-2	-	-	-	-	0.04	0.73	0.00	0.71	0.00	0.00
	S. Em.± (T)						0.01		0.07		
	CD at 5%						N/A		0.23		
	CV%						2.73		19.18		

JU- Junagadh**, SU**-Surat**, RA**- Rahuri, **BW**- Bhawanipatna**, NG**-Nagpur **M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices)

Table: 282. Ent 5b: Incidence of bollworm to validate IPM module based on existing interventions for organic cotton production 2024-25 (Central Zone)

S.N.	Treatments	*Spodoptera litura*/ Plant									
		JU		SU		RA		BW		NG	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	M-1	0.40	1.18	0.57	1.03	0.52	1.01	0.00	0.71	0.01	0.63
2	M-2	0.89	1.07	0.63	1.06	0.50	1.00	0.05	0.74	0.01	0.63
3	M-3	1.05	0.6	0.68	1.09	0.39	0.94	0.00	0.71	0.00	0.62
4	Control 1-(IPM)	1.12	0.75	0.37	0.93	0.29	0.89	0.13	0.80	0.01	0.63
5	Control-2	1.20	0.94	0.44	0.97	0.24	0.86	0.05	0.74	0.02	0.63
	S. Em.± (T)		0.04		0.02		0.02		0.02		0.01
	CD at 5%		0.08		0.07		0.05		0.07		NS
	CV%		7.33		9.73		3.28		6.38		3.04

JU- Junagadh**, SU**-Surat**, RA**- Rahuri, **BW**- Bhawanipatna**, NG**-Nagpur **M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices)

Table: 283. Ent 5b: Incidence of bollworm to validate IPM module based on existing interventions for organic cotton production 2024-25 (Central Zone)

S.N.	Treatments	GBD (%) by ABW/ TC/SBW									
		JU		SU		RA		BW		NG	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	**M-1**	16.57	8.13	7.64	16.05	7.48	15.88	0.94	1.20	6.44	12.46
2	**M-2**	15.89	7.50	10.13	18.55	6.85	15.17	2.07	1.60	6.75	13.28
3	**M-3**	14.69	6.43	8.85	17.31	5.78	13.92	1.32	1.35	8.69	15.80
4	**Control 1** (IPM)	12.13	4.42	4.86	12.74	3.77	11.19	0.35	0.92	30.38	31.61
5	**Control-2**	13.05	5.10	6.89	15.22	4.45	12.18	0.45	0.97	28.63	30.87
	S. Em.± (T)		0.72		0.66		0.78		0.08		1.16
	CD at 5%		2.24		2.03		2.44		0.24		3.57
	CV%		11.90		10.07		13.94		13.23		17.02

JU- Junagadh**, SU**-Surat**, RA**- Rahuri, **BW**- Bhawanipatna**, NG**-Nagpur **M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices)

Table: 284. Ent 5b: Incidence of bollworm to validate IPM module based on existing interventions for organic cotton production 2024-25 (Central Zone)

S.N.	Treatments	GBD (%) by PBW (10 bolls destructive sampling)									
		JU		SU		RA		BW		NG	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	**M-1**	19.85	26.42	11.55	19.87	12.39	20.61	7.50	2.83	10.42	18.14
2	**M-2**	14.40	22.22	12.29	20.52	9.57	18.02	6.25	2.60	8.33	14.93
3	**M-3**	21.10	27.19	13.41	21.49	7.75	16.16	13.00	3.67	8.75	16.05
4	**Control-1**	9.36	17.72	7.66	16.07	3.72	11.11	7.50	2.83	16.67	23.67
5	**Control-2**	27.07	31.21	10.52	18.92	4.59	12.38	6.25	2.60	14.17	21.50
	S. Em.± (T)		1.25		1.16		0.41		0.23		1.64
	CD at 5%		3.87		3.27		1.28		0.70		5.06
	CV%		10.01		24.09		5.27		15.92		19.48

JU- Junagadh**, SU**-Surat**, RA**- Rahuri, **BW**- Bhawanipatna**, NG**-Nagpur **M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices)

Table: 285. Ent 5b: Incidence of bollworm to validate IPM module based on existing interventions for organic cotton production 2024-25 (Central Zone)

S.N.	Treatments	Open Boll Damage (%)									
		JU		SU		RA		BW		NG	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	**M-1**	21.21	27.42	7.77	16.19	17.70	24.88	4.87	2.32	10.00	18.01
2	**M-2**	18.67	25.60	11.16	19.52	13.40	21.47	2.05	1.60	7.50	15.66
3	**M-3**	15.74	23.37	9.62	18.07	10.55	18.95	2.19	1.64	6.75	14.97
4	**Control-1**	11.61	19.93	5.84	13.98	6.70	15.00	6.00	2.55	12.50	20.65
5	**Control-2**	21.46	27.60	7.67	16.08	5.35	13.37	3.98	2.12	13.75	21.68
	S. Em.± (T)		0.98	0.99		0.45		0.08			0.65
	CD at 5%		3.03	3.05		1.42		0.24			2.02
	CV%		7.93	11.80		4.85		7.56			7.22

JU- Junagadh**, SU**-Surat**, RA**- Rahuri, **BW**- Bhawanipatna**, NG**-Nagpur **M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices)

Table: 286. Ent 5b: Incidence of bollworm to validate IPM module based on existing interventions for organic cotton production 2024-25 (Central Zone)

S.N.	Treatments	Locule Damage (%)									
		JU		SU		RA		BW		NG	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	M-1	20.46	26.89	4.35	12.04	8.13	16.56	0.32	0.90	5.94	13.38
2	M-2	17.85	24.99	6.75	15.06	5.78	13.90	0.00	0.71	5.00	11.77
3	M-3	15.06	22.83	5.54	13.61	5.38	13.41	0.00	0.71	5.31	13.00
4	Control-1	10.97	19.34	2.51	9.12	3.33	10.51	0.62	1.06	13.33	21.15
5	Control-2	21.01	27.28	3.68	11.06	2.88	9.76	0.00	0.71	11.46	19.46
	S. Em.± (T)		0.97	0.53		0.30		0.00			0.74
	CD at 5%		2.99	1.65		0.93		0.01			2.27
	CV%		7.99	8.78		4.70		0.59			10.76

JU- Junagadh**, SU**-Surat**, RA**- Rahuri, **BW**- Bhawanipatna**, NG**-Nagpur **M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices)

Table: 287. Ent 5b: Yield obtained in the experiment to validate IPM module based on existing interventions for organic cotton production 2024-25 (Central Zone)

S.N.	Treatments	Yield (q /ha.)									
		JU		SU		RA		BW		NG	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	M-1	25.06	-	10.83	-	20.58	-	7.60	-	-	-
2	M-2	28.45	-	10.32	-	33.56	-	7.89	-	-	-
3	M-3	26.21	-	12.87	-	28.10	-	8.04	-	-	-
4	Control-1	31.50	-	19.38	-	30.86	-	15.97	-	-	-
5	Control-2	20.82	-	18.68	-	31.04	-	12.62	-	-	-
	S. Em.± (T)			8.7				0.94			
	CD at 5%			2.68				2.89			
	CV%			12.05				18.40			

JU- Junagadh**, SU**-Surat**, RA**- Rahuri, **BW**- Bhawanipatna**, NG**-Nagpur **M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices)

Table: 288. Ent 5b: Incidence of sucking pest to validate IPM module based on existing interventions for organic cotton production 2024-25 (South Zone)

S.N.	Treatments	JIG/Plant						Jassids/3 leaves					
		DW		RC		SVPR		DW		RC		SVPR	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	M-1	-	-	II	-	IV	-	5.46	2.44	10.73	2.95	4.26	2.06
2	M-2	-	-	II	-	III	-	4.87	2.32	6.89	2.24	3.42	1.84
3	M-3	-	-	II	-	II	-	4.56	2.25	4.57	1.90	3.16	1.77
4	Control 1-(IPM)	-	-	II	-	II	-	3.65	2.04	5.57	2.05	3.34	1.83
5	Control-2	-	-	I	-	III	-	3.89	2.10	3.70	1.74	4.10	2.02
	S. Em.± (T)								0.21				-
	CD at 5%								0.40				0.03
	CV%								4.77				-

DW-Dharwad**, RC**-Raichur**, SVPR**-Srivilliputtur, **M1**-(Completely farm resources), **M2**- (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices) **JIG**- Jassid Injury Grade (I-entire foliage free of curling and yellowing, II- curling of few leaves in lower portion of plant + marginal yellowing , III- curling of leaves almost all over the plant, IV- extreme curling, bronzing and drying of leaves

Table: 289. Ent 5b: Incidence of sucking pest to validate IPM module based on existing interventions for organic cotton production 2024-25 (South Zone)

S.N.	Treatments	Whitefly/3 leaves						Thrips/3 leaves					
		DW		RC		SVPR		DW		RC		SVPR	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	**M-1**	-	-	2.61	1.53	2.89	1.70	28.37	5.37	15.85	4.02	3.10	1.76
2	**M-2**	-	-	1.84	1.36	3.60	1.89	26.21	5.17	14.15	3.82	2.50	1.58
3	**M-3**	-	-	1.59	1.30	2.52	1.59	24.83	5.03	7.55	2.83	1.90	1.37
4	**Control 1**-(IPM)	-	-	2.42	1.50	2.62	1.63	17.93	4.29	13.13	3.66	1.50	1.22
5	**Control-2**	-	-	0.69	1.03	3.74	1.92	19.83	4.51	3.73	2.04	3.50	1.87
	S. Em.± (T)						-		0.11				-
	CD at 5%						0.04		0.34				0.11
	CV%						-		4.56				-

DW-Dharwad**, RC**-Raichur**, SVPR**-Srivilliputtur, **M1**-(Completely farm resources), **M2-** (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices)

Table: 290. Ent 5b: Incidence of sucking pest to validate IPM module based on existing interventions for organic cotton production 2024-25 (South Zone)

S.N.	Treatments	Aphids/3 leaves						Natural Enemies/Plant					
		DW		RC		SVPR		DW		RC		SVPR	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	**M-1**	13.71	3.77	14.75	3.51	-	-	-	-	1.13	1.26	2.30	1.51
2	**M-2**	12.43	3.60	12.71	3.26	-	-	-	-	0.99	1.21	1.87	1.36
3	**M-3**	10.50	3.32	6.52	2.43	-	-	-	-	1.47	1.40	1.87	1.36
4	**Control 1**-(IPM)	8.24	2.96	10.20	2.92	-	-	-	-	1.36	1.36	2.07	1.46
5	**Control-2**	9.22	3.12	3.19	1.77	-	-	-	-	0.37	0.91	1.47	1.20
	S. Em.± (T)		0.07										-
	CD at 5%		0.21										0.16
	CV%		4.26										-

DW-Dharwad**, RC**-Raichur**, SVPR**-Srivilliputtur, **M1**-(Completely farm resources), **M2-** (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm,70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices)

* Natural Enemies include coccinellids, chrysopids, syrphids and spider mites.

Table: 291. Ent 5b: Incidence of bollworm to validate IPM module based on existing interventions for organic cotton production 2024-25 (South Zone)

S.N.	Treatments	No. of Larva of PBW (10 bolls destructive sampling)						*Helicoverpa armigera*/ Plant					
		DW		RC		SVPR		DW		RC		SVPR	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	**M-1**	9.86	3.22	6.00	2.55	-	-	3.89	2.10	0.61	0.96	-	-
2	**M-2**	8.99	3.08	4.85	2.31	-	-	3.53	2.01	0.65	0.97	-	-
3	**M-3**	7.96	2.91	4.75	2.29	-	-	3.15	1.91	0.00	0.71	-	-
4	**Control 1**-(IPM)	5.75	2.50	3.53	2.01	-	-	1.64	1.46	0.00	0.71	-	-
5	**Control-2**	6.69	2.68	3.93	2.10	-	-	1.80	1.52	0.00	0.71	-	-
	S. Em.± (T)		0.06						0.05				
	CD at 5%		0.19						0.16				
	CV%		4.45						6.19				

DW-Dharwad**, RC**-Raichur**, SVPR**-Srivilliputtur, **M1**-(Completely farm resources), **M2-** (LEISA low external 30% input), **M3**- (Intensive, 30% on-farm, 70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices)

Table: 292. Ent 5b: Incidence of bollworm to validate IPM module based on existing interventions for organic cotton production 2024-25 (South Zone)

S.N.	Treatments	Spotted bollworm/Plant						*Spodoptera litura*/Plant					
		DW		RC		SVPR		DW		RC		SVPR	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	**M-1**	-	-	0.00	0.71	-	-	-	-	1.19	1.19	-	-
2	**M-2**	-	-	0.00	0.71	-	-	-	-	1.37	1.23	-	-
3	**M-3**	-	-	0.00	0.71	-	-	-	-	0.30	0.86	-	-
4	**Control 1**-(IPM)	-	-	0.00	0.71	-	-	-	-	0.69	1.03	-	-
5	**Control-2**	-	-	0.00	0.71	-	-	-	-	0.15	0.79	-	-
	S. Em.± (T)												
	CD at 5%												
	CV%												

DW-Dharwad**, RC**-Raichur**, SVPR**-Srivilliputtur **M1**-(Completely farm resources), **M2-** (LEISA low external 30% input), **M3-** (Intensive, 30% on-farm, 70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices)

Table: 293. Ent 5b: Incidence of bollworm to validate IPM module based on existing interventions for organic cotton production 2024-25 (South Zone)

S.N.	Treatments	GBD (%) by ABW/ TC/SBW						GBD (%) by PBW (10 bolls destructive sampling)					
		DW		RC		SVPR		DW		RC*		SVPR	
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	OV	TV
1	**M-1**	8.92	3.07	0.38	1.77	-	-	30.68	33.62	42.15	40.48	0.66	4.66
2	**M-2**	7.68	2.86	0.23	1.37	-	-	25.94	30.60	42.40	40.63	0.66	4.66
3	**M-3**	6.96	2.73	0.15	1.12	-	-	23.92	29.27	39.81	35.05	0.53	4.17
4	**Control 1**-(IPM)	4.41	2.22	0.30	1.58	-	-	18.50	25.46	27.76	39.12	0.39	3.58
5	**Control-2**	5.32	2.41	0.08	0.79	-	-	20.86	27.16	32.98	31.80	0.79	5.09
	S. Em.± (T)		0.44						0.79		-		-
	CD at 5%		1.38						2.44		-		0.37
	CV%		6.03						5.42		-		-

DW-Dharwad**, RC**-Raichur**, SVPR**-Srivilliputtur **M1**-(Completely farm resources), **M2-** (LEISA low external 30% input), **M3-** (Intensive, 30% on-farm, 70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices) * Based on 20 bolls destructive sampling

Table: 294. Ent 5b: Yield obtained in the experiment to validate IPM module based on existing interventions for organic cotton production 2024-25 (South Zone)

S.N.	Treatments	Yield (q /ha.)					
		DW		RC		SVPR	
		OV	TV	OV	TV	OV	TV
1	**M-1**	-	-	10.67	-	12.41	-
2	**M-2**	-	-	11.03	-	14.60	-
3	**M-3**	-	-	12.09	-	18.75	-
4	**Control 1**-(IPM)	-	-	19.52	-	17.50	-
5	**Control-2**	-	-	17.40	-	15.20	-
	S. Em.± (T)						
	CD at 5%						
	CV%						

DW-Dharwad**, RC**-Raichur**, SVPR**-Srivilliputtur **M1**-(Completely farm resources), **M2-** (LEISA low external 30% input), **M3-** (Intensive, 30% on-farm, 70% off-farm), **Control 1**-(IPM), **Control 2**-(Farmer practices)

Table: 295. Ento 6: Evaluation of Mak-Adjuvol (Mineral Paraffin Oil) as adjuvant with insecticides—sponsored product at Bathinda (North zone) 2024-25

T.	Whitefly/3leaves					Thrips/3 leaves					Jassid/3leaves				
	Pre spray		07 DAS		ROC	Pre spray		07 DAS		ROC	Pre spray		07 DAS		ROC
	OV	TV	OV	TV	(%)**	OV	TV	OV	TV	(%)**	OV	TV	OV	TV	(%)**
1	44.67	6.75	33.67	5.88	27.34	35.33	6.02	26.00	5.20	29.73	13.00	3.74	4.00	2.23	75.51
2	45.33	6.80	35.00	6.00	24.46	37.33	6.19	25.67	5.16	30.63	13.33	3.78	6.67	2.77	59.18
3	44.00	6.70	31.33	5.69	32.37	33.67	5.88	16.67	4.20	54.95	12.67	3.69	5.33	2.50	67.35
4	42.67	6.60	31.00	5.65	33.09	38.67	6.28	14.33	3.90	61.26	13.33	3.78	9.33	3.21	42.86
5	44.00	6.70	30.33	5.59	34.53	34.33	5.93	10.67	3.41	71.17	13.33	3.78	10.33	3.35	36.73
6	43.67	6.68	29.33	5.51	36.69	34.33	5.93	15.67	4.07	57.66	12.67	3.69	7.67	2.94	53.06
7	43.67	6.68	30.67	5.63	33.81	34.67	5.97	17.33	4.26	53.15	13.67	3.83	10.00	3.30	38.78
8	44.67	6.75	31.00	5.65	33.09	35.33	6.02	16.33	4.14	55.86	12.00	3.60	10.00	3.31	38.78
9	44.33	6.73	27.33	5.32	41.01	35.67	6.05	12.67	3.69	65.77	11.67	3.55	5.67	2.56	65.31
10	44.67	6.75	24.67	5.06	46.76	35.67	6.05	18.00	4.32	51.35	13.33	3.78	6.67	2.75	59.18
11	45.67	6.83	23.00	4.89	50.36	35.00	5.99	17.67	4.31	52.25	13.00	3.74	7.00	2.81	57.14
12	43.33	6.65	16.67	4.20	64.03	34.67	5.97	13.67	3.83	63.06	11.67	3.54	6.00	2.61	63.27
13	43.00	6.63	33.67	5.89	27.34	35.00	5.99	35.33	6.02	4.50	13.67	3.83	12.67	3.68	22.45
14	44.00	6.70	35.00	5.99	24.46	34.67	5.97	36.67	6.14	0.90	13.00	3.74	11.00	3.42	32.65
15	44.33	6.73	46.33	6.80	0.00	36.33	6.11	37.00	6.16	0.00	13.67	3.83	16.33	4.16	0.00
C.D.	NS		0.37		-	NS		0.30		-	NS		0.59		-
SE(m)	0.11		0.13		-	0.12		0.20		-	0.12		0.20		-
SE(d)	0.16		0.18		-	0.18		0.60		-	0.17		0.29		-
C.V.	2.93		4.02		-	3.58		8.03		-	5.61		11.70		-

BT- Bathinda**; O.V**-Original Value, **T.V**-Transformed value**, **ROC**- Reduction over control at **7DAS**, **DAS**-day after spray.**Treatment 1**-Flonicamid 50 WG (Systemic) , **T2**-Flonicamid 50 WG (Systemic)+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T3**- Flonicamid 50 WG (Systemic)+MakAdjuvol @ 1.5 % (15 ml/L water), **T4**-Spinetoram 11.7 SC (Product of fermentation of Saccharopolyspora Sinosa),**T5**-Spinetoram 11.7 SC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T6**-Spinetoram 11.7 SC+MakAdjuvol @ 1.5 % (15 ml/L water), **T7**-Emamectin benzoate 5 SG (Translaminar), **T8**-Emamectin benzoate 5 SG (Translaminar))+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T9**- Emamectin benzoate 5 SG+MakAdjuvol @ 1.5 % (15 ml/L water), **T10**- Profenofos 50 EC (Contact), **T11**- Profenofos 50 EC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T12**- Profenofos 50 EC+MakAdjuvol @ 1.5 % (15 ml/L water), **T13**- Water+MAK HMO @ 0.75 % OR 7.5 ml/litre (Control), **T14**- Water+MAK HMO @ 1.5 % OR 15 ml/litre (Control), **T15**-Control (Water Spray)

Table: 296. Ento 6: Evaluation of Mak-Adjuvol (Mineral Paraffin Oil) as adjuvant with insecticides—sponsored product at Hisar (North zone) 2024-25

T.	Whitefly/3leaves					Thrips/3 leaves					Jassid/3leaves				
	Pre spray		07 DAS		ROC	Pre spray		07 DAS		ROC	Pre spray		07 DAS		ROC
	OV	TV	OV	TV	(%)**	OV	TV	OV	TV	(%)**	OV	TV	OV	TV	(%)**
1	16.93	4.21	9.97	3.29	50.08	28.07	5.36	16.47	4.18	32.86	2.80	1.94	2.30	1.82	60.82
2	13.93	3.84	9.00	3.16	54.93	23.87	4.93	15.40	4.04	37.22	3.20	2.04	2.10	1.76	64.22
3	15.73	4.07	8.10	3.02	59.44	26.27	5.17	14.10	3.88	42.52	3.00	1.99	1.93	1.71	67.12
4	16.13	4.13	15.60	4.05	21.88	24.07	4.95	10.60	3.40	56.79	3.40	2.09	4.60	2.36	21.64
5	15.33	4.02	14.83	3.98	25.74	24.67	5.01	9.27	3.20	62.21	3.27	2.06	4.47	2.33	23.85
6	14.87	3.98	13.83	3.85	30.75	25.00	5.08	8.37	3.06	65.88	2.60	1.89	4.30	2.30	26.75
7	13.80	3.84	16.30	4.15	18.38	24.07	4.99	12.47	3.67	49.16	3.20	2.04	4.80	2.41	18.23
8	14.53	3.91	15.50	4.06	22.38	26.47	5.19	10.47	3.37	57.32	4.00	2.23	4.60	2.36	21.64
9	13.73	3.81	14.40	3.91	27.89	25.47	5.09	9.37	3.21	61.80	3.20	2.04	4.43	2.33	24.53
10	14.93	3.97	11.97	3.60	40.06	24.47	4.99	13.13	3.76	46.47	3.00	1.99	3.43	2.10	41.57
11	16.33	4.15	11.20	3.48	43.92	26.87	5.23	12.40	3.65	49.45	3.40	2.09	3.27	2.06	44.29
12	15.13	3.99	10.53	3.40	47.27	27.67	5.31	10.97	3.45	55.28	3.40	2.09	3.07	2.02	47.70
13	15.67	4.08	17.43	4.28	12.72	28.33	5.39	21.03	4.69	14.27	3.80	2.18	5.40	2.52	8.01
14	16.53	4.16	16.73	4.21	16.22	26.47	5.19	19.80	4.55	19.28	3.60	2.14	5.20	2.49	11.41
15	16.73	4.19	19.97	4.58	0.00	27.07	5.25	24.53	5.05	0.00	4.07	2.25	5.87	2.62	0.00
C.D.	N/A		0.53			N/A		0.41			N/A		0.24		
SE(m)	0.14		0.18			0.14		0.14			0.09		0.08		
SE(d)	0.19		0.26			0.19		0.20			0.12		0.12		
C.V.	5.91		8.31			4.62		6.44			7.26		6.55		

O.V-Original Value, **T.V**-Transformed value**, **ROC**- Reduction over control at **7DAS**, **DAS**-day after spray.**Treatment 1**-Flonicamid 50 WG (Systemic) , **T2**-Flonicamid 50 WG (Systemic)+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T3**-Flonicamid 50 WG (Systemic)+MakAdjuvol @ 1.5 % (15 ml/L water), **T4**-Spinetoram 11.7 SC (Product of fermentation of Saccharopolyspora Sinosa),**T5**-Spinetoram 11.7 SC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T6**-Spinetoram 11.7 SC+MakAdjuvol @ 1.5 % (15 ml/L water), **T7**-Emamectin benzoate 5 SG (Translaminar), **T8**-Emamectin benzoate 5 SG (Translaminar))+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T9**- Emamectin benzoate 5 SG+MakAdjuvol @ 1.5 % (15 ml/L water), **T10**- Profenofos 50 EC (Contact), **T11**- Profenofos 50 EC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T12**- Profenofos 50 EC+MakAdjuvol @ 1.5 % (15 ml/L water), **T13**- Water+MAK HMO @ 0.75 % OR 7.5 ml/litre (Control), **T14**- Water+MAK HMO @ 1.5 % OR 15 ml/litre (Control), **T15**-Control (Water Spray)

Table: 297. Ento 6: Evaluation of Mak-Adjuvol (Mineral Paraffin Oil) as adjuvant with insecticides-sponsored product at Sri Ganganagar (North zone) 2024-25

T.	Whitefly/3leaves					Thrips/3 leaves					Jassid/3leaves				
	Pre spray		07 DAS		ROC	Pre spray		07 DAS		ROC	Pre spray		07 DAS		ROC
	OV	TV	OV	TV	(%)**	OV	TV	OV	TV	(%)**	OV	TV	OV	TV	(%)**
1	29.40	5.47	7.81	2.88	75.75	17.94	4.29	8.17	2.94	64.75	3.43	1.98	1.11	1.27	72.04
2	28.12	5.34	6.36	2.62	80.25	18.48	4.36	6.84	2.71	70.49	3.73	2.06	0.96	1.21	75.82
3	30.75	5.59	5.18	2.38	83.91	19.36	4.46	6.19	2.59	73.30	3.24	1.93	0.88	1.17	77.83
4	26.38	5.17	10.58	3.33	67.14	19.81	4.51	3.78	2.07	83.69	3.62	2.03	1.44	1.39	63.73
5	31.53	5.66	8.83	3.05	72.58	18.40	4.35	2.39	1.70	89.69	4.06	2.13	1.31	1.35	67.00
6	34.36	5.89	7.34	2.80	77.20	18.50	4.36	1.69	1.48	92.71	3.46	1.99	1.26	1.33	68.26
7	31.67	5.66	12.80	3.65	60.25	20.16	4.54	6.81	2.70	70.62	2.80	1.82	1.61	1.45	59.45
8	27.58	5.29	11.77	3.50	63.45	18.35	4.34	5.39	2.43	76.75	3.60	2.02	1.47	1.40	62.97
9	29.24	5.45	10.26	3.28	68.14	18.46	4.35	4.62	2.26	80.07	3.52	2.01	1.40	1.38	64.74
10	29.25	5.45	9.15	3.11	71.58	17.58	4.25	6.07	2.56	73.81	3.98	2.12	1.33	1.35	66.50
11	29.62	5.49	7.53	2.83	76.61	18.35	4.34	4.62	2.26	80.07	3.47	1.99	1.27	1.33	68.01
12	29.02	5.42	6.13	2.57	80.96	20.47	4.58	3.95	2.11	82.96	3.50	2.00	1.15	1.29	71.03
13	27.40	5.28	26.69	5.21	17.11	19.30	4.45	15.40	3.99	33.56	3.71	2.05	3.36	1.97	15.37
14	30.22	5.54	24.09	4.96	25.19	17.02	4.18	13.78	3.78	40.55	4.04	2.13	3.11	1.90	21.66
15	30.40	5.55	32.20	5.72	0.00	18.78	4.39	23.18	4.87	0.00	3.55	2.01	3.97	2.11	0.00
C.D.	0.77		0.44		-	0.54		0.30		-	0.24		0.19		-
SE(m)	-		-		-	-		-		-	-		-		-
SE(d)	0.26		0.15		-	0.18		0.10		-	0.08		0.06		-
C.V.	5.94		5.14		-	5.25		5.00		-	5.17		5.27		-

O.V-Original Value, **T.V**-Transformed value**, **ROC**- Reduction over control at **7DAS**, **DAS**-day after spray.**Treatment 1**-Flonicamid 50 WG (Systemic) , **T2**-Flonicamid 50 WG (Systemic)+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T3**-Flonicamid 50 WG (Systemic)+MakAdjuvol @ 1.5 % (15 ml/L water), **T4**-Spinetoram 11.7 SC (Product of fermentation of Saccharopolyspora Sinosa),**T5**-Spinetoram 11.7 SC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T6**-Spinetoram 11.7 SC+MakAdjuvol @ 1.5 % (15 ml/L water), **T7**-Emamectin benzoate 5 SG (Translaminar), **T8**-Emamectin benzoate 5 SG (Translaminar))+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T9**- Emamectin benzoate 5 SG+MakAdjuvol @ 1.5 % (15 ml/L water), **T10**- Profenofos 50 EC (Contact), **T11**- Profenofos 50 EC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T12**- Profenofos 50 EC+MakAdjuvol @ 1.5 % (15 ml/L water), **T13**- Water+MAK HMO @ 0.75 % OR 7.5 ml/litre (Control), **T14**- Water+MAK HMO @ 1.5 % OR 15 ml/litre (Control), **T15**-Control (Water Spray)

Table: 298. Ento 6: Evaluation of MakAdjuvol (Mineral Paraffin Oil) as adjuvant with insecticides—sponsored product (North zone)

Treatment	BT		HI		SG	
	Yield (q/ha)	Phytotoxicity	Yield (q/ha)	Phytotoxicity	Yield (q/ha)	Phytotoxicity
1	29.70	Nil	22.10	Nil	15.35	Nil
2	29.36	Nil	22.56	Nil	15.51	Nil
3	29.05	Nil	23.32	Nil	16.50	Nil
4	28.53	Nil	20.88	Nil	16.79	Nil
5	28.50	Nil	21.34	Nil	16.87	Nil
6	28.28	Nil	21.65	Nil	19.07	Nil
7	28.13	Nil	20.58	Nil	15.23	Nil
8	28.06	Nil	21.19	Nil	15.43	Nil
9	27.99	Nil	21.49	Nil	16.42	Nil
10	27.56	Nil	21.80	Nil	14.53	Nil
11	26.94	Nil	22.41	Nil	15.93	Nil
12	26.66	Nil	22.71	Nil	16.34	Nil
13	26.21	Nil	19.20	Nil	13.79	Nil
14	24.26	Nil	19.66	Nil	13.66	Nil
15	16.63	Nil	18.29	Nil	13.87	Nil
C.D.	0.96		1.41		0.48	
SE(m)	0.45		0.48		-	
SE(d)	-		0.69		0.16	
C.V.	1.66		3.94		5.04	

BT- Bathinda**; HI –** Hisar**; SG-** Sriganganagar **O.V**-Original Value, **T.V**-Transformed value**, **ROC**- Reduction over control at **7DAS**, **DAS**-day after spray. **Treatment 1**-Flonicamid 50 WG (Systemic) , **T2**-Flonicamid 50 WG (Systemic)+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T3**- Flonicamid 50 WG (Systemic)+MakAdjuvol @ 1.5 % (15 ml/L water), **T4**-Spinetoram 11.7 SC (Product of fermentation of Saccharopolyspora Sinosa),**T5**-Spinetoram 11.7 SC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T6**-Spinetoram 11.7 SC+MakAdjuvol @ 1.5 % (15 ml/L water), **T7**-Emamectin benzoate 5 SG (Translaminar), **T8**-Emamectin benzoate 5 SG (Translaminar))+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T9**- Emamectin benzoate 5 SG+MakAdjuvol @ 1.5 % (15 ml/L water), **T10**- Profenofos 50 EC (Contact), **T11**- Profenofos 50 EC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T12**- Profenofos 50 EC+MakAdjuvol @ 1.5 % (15 ml/L water), **T13**- Water+MAK HMO @ 0.75 % OR 7.5 ml/litre (Control), **T14**- Water+MAK HMO @ 1.5 % OR 15 ml/litre (Control), **T15**-Control (Water Spray)

Table: 299. Ento 6: Evaluation of MakAdjuvol (Mineral Paraffin Oil) as adjuvant with insecticides—sponsored product at Nanded (Central zone) 2024-25.

T.	Whitefly/3leaves					Thrips/3 leaves					Jassid/3leaves				
	Pre spray		07 DAS		ROC	Pre spray		07 DAS		ROC	Pre spray		07 DAS		ROC
	OV	TV	OV	TV	(%)**	OV	TV	OV	TV	(%)**	OV	TV	OV	TV	(%)**
1	1.22	1.49	1.22	1.49	72.64	24.89	5.09	8.13	3.02	73.74	4.56	2.36	1.47	1.57	72.67
2	1.07	1.44	1.07	1.43	76.12	24.60	5.06	7.69	2.95	75.18	4.27	2.29	1.24	1.50	76.81
3	1.09	1.44	1.00	1.41	77.61	24.56	5.06	7.44	2.91	75.97	4.04	2.25	1.13	1.46	78.88
4	2.29	1.81	3.22	2.05	27.86	24.09	5.01	7.00	2.83	77.40	6.09	2.66	4.27	2.29	20.50
5	2.22	1.79	3.53	2.13	20.90	23.62	4.96	6.84	2.80	77.91	6.02	2.65	4.22	2.28	21.33
6	2.07	1.75	3.22	2.05	27.86	23.49	4.95	6.40	2.72	79.34	6.00	2.65	3.93	2.22	26.71
7	2.20	1.79	3.33	2.08	25.37	25.58	5.16	9.13	3.18	70.52	6.02	2.65	3.82	2.19	28.78
8	2.00	1.73	3.16	2.04	29.35	25.31	5.13	8.84	3.13	71.45	5.93	2.63	3.60	2.15	32.92
9	2.00	1.73	3.00	2.00	32.84	25.09	5.11	8.53	3.09	72.45	5.76	2.60	3.42	2.10	36.23
10	1.60	1.61	1.93	1.71	56.72	30.40	5.60	10.98	3.46	64.56	5.00	2.45	2.22	1.79	58.59
11	1.49	1.58	1.67	1.63	62.69	29.89	5.56	10.36	3.37	66.57	4.87	2.42	2.02	1.74	62.32
12	1.40	1.55	1.53	1.59	65.67	29.80	5.55	10.24	3.35	66.93	4.69	2.38	1.73	1.65	67.70
13	2.56	1.88	4.33	2.31	2.99	35.20	6.02	30.36	5.60	2.01	6.07	2.66	5.20	2.49	3.11
14	2.40	1.84	4.13	2.27	7.46	34.98	6.00	29.96	5.56	3.30	6.00	2.65	5.04	2.46	6.00
15	2.56	1.89	4.47	2.34	0.07	35.36	6.03	30.98	5.65	0.01	6.31	2.70	5.37	2.52	0.06
C.D.	0.12		0.15		-	0.24		0.17		-	0.15		0.13		-
SE(m)	0.04		0.05		-	0.08		0.06		-	0.05		0.05		-
SE(d)	0.06		0.07		-	0.12		0.08		-	0.07		0.07		-
C.V.	4.21		4.78		-	2.65		2.89		-	3.54		3.90		-

O.V-Original Value, **T.V**-Transformed value**, **ROC**- Reduction over control at **7DAS**, **DAS**-day after spray.**Treatment 1**-Flonicamid 50 WG (Systemic) , **T2**-Flonicamid 50 WG (Systemic)+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T3**-Flonicamid 50 WG (Systemic)+MakAdjuvol @ 1.5 % (15 ml/L water), **T4**-Spinetoram 11.7 SC (Product of fermentation of Saccharopolyspora Sinosa),**T5**-Spinetoram 11.7 SC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T6**-Spinetoram 11.7 SC+MakAdjuvol @ 1.5 % (15 ml/L water), **T7**-Emamectin benzoate 5 SG (Translaminar), **T8**-Emamectin benzoate 5 SG (Translaminar))+MakAdjuvol @ 0.75 % (7.5 ml/L water),**T9**- Emamectin benzoate 5 SG+MakAdjuvol @ 1.5 % (15 ml/L water), **T10**- Profenofos 50 EC (Contact), **T11**- Profenofos 50 EC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T12**- Profenofos 50 EC+MakAdjuvol @ 1.5 % (15 ml/L water), **T13**- Water+MAK HMO @ 0.75 % OR 7.5 ml/litre (Control), **T14**- Water+MAK HMO @ 1.5 % OR 15 ml/litre (Control), **T15**-Control (Water Spray)

Table: 300. Ento 6: Evaluation of MakAdjuvol (Mineral Paraffin Oil) as adjuvant with insecticides—sponsored product at Junagadh (Central zone)

T	Whitefly/3leaves					Thrips/3 leaves				
	Pre spray		07 DAS		ROC (%)**	Pre spray		07 DAS		ROC (%)**
	OV	TV	OV	TV		OV	TV	OV	TV	
1	20.87	4.56	10.07	3.17	47.92	41.27	6.40	13.00	3.60	54.11
2	24.47	4.94	7.13	2.66	63.10	40.82	6.38	10.33	3.20	63.54
3	22.87	4.77	4.67	2.14	75.86	35.13	5.91	8.93	2.98	68.48
4	18.53	4.30	9.73	3.11	49.65	35.64	5.96	13.80	3.71	51.29
5	24.67	4.96	7.67	2.76	60.34	37.07	6.07	10.73	3.27	62.12
6	24.27	4.92	5.27	2.28	72.75	39.72	6.29	8.13	2.83	71.30
7	19.47	4.40	10.40	3.22	46.20	40.91	6.39	14.27	3.77	49.63
8	20.33	4.50	8.53	2.91	55.85	35.85	5.97	11.40	3.37	59.76
9	22.60	4.75	5.87	2.41	69.65	41.17	6.40	9.07	3.00	67.98
10	23.80	4.86	11.60	3.40	39.99	35.93	5.98	15.73	3.96	44.48
11	20.67	4.54	9.07	3.01	53.10	37.77	6.14	12.33	3.51	56.48
12	19.40	4.39	7.00	2.63	63.79	38.27	6.17	9.87	3.13	65.16
13	21.00	4.57	13.73	3.70	28.95	42.91	6.54	17.27	4.15	39.04
14	19.47	4.40	15.60	3.94	19.30	39.80	6.29	19.13	4.37	32.47
15	23.47	4.84	19.33	4.39	-0.02	37.87	6.14	28.33	5.32	0.00
C.D.	NS		0.43			NS		0.53		-
SE(m)	0.22		0.15			0.32		0.18		-
C.V.	8.02		8.42			8.95		8.86		-

O.V-Original Value, **T.V**-Transformed value**, **ROC**- Reduction over control at **7DAS**, **DAS**-day after spray. **Treatment 1**-Flonicamid 50 WG (Systemic) , **T2**-Flonicamid 50 WG (Systemic)+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T3**-Flonicamid 50 WG (Systemic)+MakAdjuvol @ 1.5 % (15 ml/L water), **T4**-Spinetoram 11.7 SC (Product of fermentation of Saccharopolyspora Sinosa),**T5**-Spinetoram 11.7 SC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T6**-Spinetoram 11.7 SC+MakAdjuvol @ 1.5 % (15 ml/L water), **T7**-Emamectin benzoate 5 SG (Translaminar), **T8**-Emamectin benzoate 5 SG (Translaminar))+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T9**- Emamectin benzoate 5 SG+MakAdjuvol @ 1.5 % (15 ml/L water), **T10**- Profenofos 50 EC (Contact), **T11**- Profenofos 50 EC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T12**- Profenofos 50 EC+MakAdjuvol @ 1.5 % (15 ml/L water), **T13**- Water+MAK HMO @ 0.75 % OR 7.5 ml/litre (Control), **T14**- Water+MAK HMO @ 1.5 % OR 15 ml/litre (Control), **T15**-Control (Water Spray)

Table: 301. Ento 6:Evaluation of MakAdjuvol (Mineral Paraffin Oil) as adjuvant with insecticides—sponsored product at Junagadh (Central zone) 2024-25.

T.	Jassid/3leaves					Aphid/3 leaves				
	Pre spray		07 DAS		ROC (%)**	Pre spray		07 DAS		ROC (%)**
	OV	TV	OV	TV		OV	TV	OV	TV	
1	25.33	5.03	9.11	2.95	52.50	29.07	5.38	15.30	3.90	48.42
2	25.07	5.00	7.27	2.62	62.10	25.20	5.01	12.60	3.54	57.43
3	23.93	4.88	4.78	2.05	75.08	24.20	4.90	9.10	3.00	69.14
4	23.27	4.81	9.64	3.04	49.74	29.07	5.38	16.90	4.11	42.79
5	26.40	5.13	6.69	2.50	65.12	28.13	5.29	13.30	3.64	54.95
6	25.27	5.02	5.29	2.20	72.42	27.07	5.18	10.10	3.15	65.99
7	26.00	5.09	10.33	3.16	46.14	23.73	4.86	17.30	4.15	41.67
8	24.53	4.94	8.02	2.76	58.19	24.47	4.93	14.10	3.75	52.25
9	28.13	5.30	5.73	2.30	70.13	28.53	5.33	11.40	3.37	61.49
10	28.93	5.37	11.31	3.31	41.03	29.00	5.37	17.70	4.20	40.32
11	27.13	5.20	8.58	2.85	55.27	32.00	5.64	16.40	4.04	44.59
12	23.47	4.84	6.18	2.39	67.78	30.87	5.54	13.70	3.70	53.60
13	28.27	5.31	13.13	3.59	31.54	30.53	5.51	22.10	4.69	25.45
14	27.00	5.19	13.91	3.70	27.48	32.87	5.72	24.40	4.94	17.57
15	26.07	5.10	19.18	4.33	0.00	31.60	5.61	29.60	5.44	0.00
C.D.	NS		0.15		-	NS		0.52		-
SE(m)	0.22		0.44		-	0.28		0.18		-
C.V.	7.42		8.97		-	9.03		7.82		-

O.V-Original Value, **T.V**-Transformed value**, **ROC**- Reduction over control at **7DAS**, **DAS**-day after spray.**Treatment 1**-Flonicamid 50 WG (Systemic) , **T2**-Flonicamid 50 WG (Systemic)+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T3**-Flonicamid 50 WG (Systemic)+MakAdjuvol @ 1.5 % (15 ml/L water), **T4**-Spinetoram 11.7 SC (Product of fermentation of Saccharopolyspora Sinosa),**T5**-Spinetoram 11.7 SC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T6**-Spinetoram 11.7 SC+MakAdjuvol @ 1.5 % (15 ml/L water), **T7**-Emamectin benzoate 5 SG (Translaminar), **T8**-Emamectin benzoate 5 SG (Translaminar))+MakAdjuvol @ 0.75 % (7.5 ml/L water),**T9**- Emamectin benzoate 5 SG+MakAdjuvol @ 1.5 % (15 ml/L water), **T10**- Profenofos 50 EC (Contact), **T11**- Profenofos 50 EC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T12**- Profenofos 50 EC+MakAdjuvol @ 1.5 % (15 ml/L water), **T13**- Water+MAK HMO @ 0.75 % OR 7.5 ml/litre (Control), **T14**- Water+MAK HMO @ 1.5 % OR 15 ml/litre (Control), **T15**-Control (Water Spray)

Table: 302. Ento 6: Evaluation of MakAdjuvol (Mineral Paraffin Oil) as adjuvant with insecticides—sponsored product at Banswara (Central zone) 2024-25.

T.	Whitefly/3leaves					Thrips/3 leaves					Jassid/3leaves				
	Pre spray		07 DAS		ROC	Pre spray		07 DAS		ROC	Pre spray		07 DAS		ROC
	OV	TV	OV	TV	(%)**	OV	TV	OV	TV	(%)**	OV	TV	OV	TV	(%)**
1	10.33	3.21	6.00	2.45	54.99	-	-	-	-	-	14.67	3.82	6.67	2.58	59.15
2	11.00	3.31	5.33	2.31	60.02	-	-	-	-	-	14.33	3.78	5.67	2.37	65.28
3	10.67	3.26	4.00	2.00	69.99	-	-	-	-	-	14.67	3.82	4.00	2.00	75.51
4	12.00	3.46	8.00	2.82	39.98	-	-	-	-	-	15.33	3.91	9.00	3.00	44.89
5	11.67	3.41	7.67	2.77	42.46	-	-	-	-	-	15.33	3.91	8.67	2.94	46.91
6	12.00	3.46	7.33	2.70	45.01	-	-	-	-	-	14.67	3.82	8.33	2.88	48.99
7	11.33	3.36	6.67	2.58	49.96	-	-	-	-	-	16.00	4.00	7.33	2.70	55.11
8	10.33	3.21	6.00	2.44	54.99	-	-	-	-	-	15.67	3.96	6.33	2.51	61.24
9	12.33	3.50	4.67	2.16	64.97	-	-	-	-	-	14.33	3.78	4.67	2.16	71.40
10	10.67	3.26	6.33	2.51	52.51	-	-	-	-	-	16.33	4.04	7.00	2.64	57.13
11	12.33	3.51	5.67	2.38	57.46	-	-	-	-	-	15.33	3.91	6.00	2.44	63.26
12	9.33	3.05	4.33	2.08	67.52	-	-	-	-	-	15.00	3.87	4.33	2.08	73.48
13	10.33	3.20	8.00	2.83	39.98	-	-	-	-	-	15.33	3.92	9.33	3.05	42.87
14	11.00	3.31	8.33	2.88	37.51	-	-	-	-	-	16.67	4.07	10.00	3.16	38.76
15	12.00	3.46	13.33	3.64	0.00	-	-	-	-	-	15.33	3.91	16.33	4.04	0.00
C.D.	-		0.28		-						-		**0.29**		-
SE(m)	-		-		-						-		-		-
C.V.	-		6.40		-						-		6.44		-

O.V-Original Value, **T.V**-Transformed value**, **ROC**- Reduction over control at **7DAS**, **DAS**-day after spray. **Treatment 1**-Flonicamid 50 WG (Systemic) , **T2**-Flonicamid 50 WG (Systemic)+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T3**-Flonicamid 50 WG (Systemic)+MakAdjuvol @ 1.5 % (15 ml/L water), **T4**-Spinetoram 11.7 SC (Product of fermentation of Saccharopolyspora Sinosa),**T5**-Spinetoram 11.7 SC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T6**-Spinetoram 11.7 SC+MakAdjuvol @ 1.5 % (15 ml/L water), **T7**-Emamectin benzoate 5 SG (Translaminar), **T8**-Emamectin benzoate 5 SG (Translaminar))+MakAdjuvol @ 0.75 % (7.5 ml/L water),**T9**- Emamectin benzoate 5 SG+MakAdjuvol @ 1.5 % (15 ml/L water), **T10**- Profenofos 50 EC (Contact), **T11**- Profenofos 50 EC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T12**- Profenofos 50 EC+MakAdjuvol @ 1.5 % (15 ml/L water), **T13**- Water+MAK HMO @ 0.75 % OR 7.5 ml/litre (Control), **T14**- Water+MAK HMO @ 1.5 % OR 15 ml/litre (Control), **T15**-Control (Water Spray)

Table: 303. Ento 6: Evaluation of MakAdjuvol (Mineral Paraffin Oil) as adjuvant with insecticides—sponsored product (Central zone) 2024-25.

Treatment	NA		JU		BA	
	Yield (q/ha)	Phytotoxicity	Yield (q/ha)	Phytotoxicity	Yield (q/ha)	Phytotoxicity
1	19.00	NIL	24.25	NIL	28.49	NIL
2	19.60	NIL	26.46	NIL	29.26	NIL
3	20.25	NIL	31.13	NIL	31.42	NIL
4	20.10	NIL	23.90	NIL	22.02	NIL
5	20.75	NIL	25.66	NIL	22.18	NIL
6	21.40	NIL	30.16	NIL	22.48	NIL
7	17.85	NIL	23.54	NIL	28.03	NIL
8	18.40	NIL	25.22	NIL	28.80	NIL
9	18.80	NIL	27.60	NIL	31.11	NIL
10	17.40	NIL	23.28	NIL	28.18	NIL
11	18.00	NIL	24.87	NIL	28.95	NIL
12	18.55	NIL	26.63	NIL	31.26	NIL
13	11.10	NIL	21.69	NIL	21.71	NIL
14	11.15	NIL	20.55	NIL	21.56	NIL
15	11.30	NIL	18.61	NIL	20.02	NIL
C.D.	3.40	-	-	-	-	-
SE(m)	1.17	-	-	-	-	-
SE(d)	1.65	-	-	-	-	-
C.V.	11.51	-	-	-	-	-

JU- Junagadh**, NA**- Nanded**, , BA**- Banswara,**Treatment 1**-Flonicamid 50 WG (Systemic) , **T2**-Flonicamid 50 WG (Systemic)+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T3**- Flonicamid 50 WG (Systemic)+MakAdjuvol @ 1.5 % (15 ml/L water), **T4**-Spinetoram 11.7 SC (Product of fermentation of Saccharopolyspora Sinosa),**T5**-Spinetoram 11.7 SC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T6**-Spinetoram 11.7 SC+MakAdjuvol @ 1.5 % (15 ml/L water), **T7**-Emamectin benzoate 5 SG (Translaminar), **T8**-Emamectin benzoate 5 SG (Translaminar)+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T9**- Emamectin benzoate 5 SG+MakAdjuvol @ 1.5 % (15 ml/L water), **T10**- Profenofos 50 EC (Contact), **T11**-Profenofos 50 EC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T12**- Profenofos 50 EC+MakAdjuvol @ 1.5 % (15 ml/L water), **T13**- Water+MAK HMO @ 0.75 % OR 7.5 ml/litre (Control), **T14**- Water+MAK HMO @ 1.5 % OR 15 ml/litre (Control), **T15**-Control (Water Spray)

Table: 304. Ento 6: Evaluation of MakAdjuvol (Mineral Paraffin Oil) as adjuvant with insecticides—sponsored product at Lam Guntur (South zone) 2024-25.

T.	Whitefly/3leaves					Thrips/3 leaves					Jassid/3leaves				
	Pre spray		07 DAS		ROC	Pre spray		07 DAS		ROC	Pre spray		07 DAS		ROC
	OV	TV	OV	TV	(%)**	OV	TV	OV	TV	(%)**	OV	TV	OV	TV	(%)**
1	3.42	1.98	1.98	1.57	62.00	10.82	3.37	4.00	2.12	69.44	6.73	2.69	1.35	1.36	86.73
2	3.36	1.96	1.12	1.27	78.44	10.74	3.35	3.76	2.06	71.27	6.84	2.71	1.17	1.29	88.51
3	3.43	1.98	0.96	1.21	81.64	10.84	3.37	3.22	1.93	75.39	6.75	2.69	0.93	1.20	90.80
4	3.42	1.98	3.08	1.89	40.95	10.98	3.39	2.97	1.86	77.35	7.47	2.82	7.17	2.77	29.39
5	3.43	1.98	3.07	1.89	41.07	10.94	3.38	2.84	1.83	78.35	6.75	2.69	7.06	2.75	30.48
6	3.50	2.00	2.93	1.85	43.70	10.72	3.35	2.27	1.66	82.70	6.71	2.69	6.61	2.67	34.84
7	3.38	1.97	4.00	2.12	23.22	11.06	3.40	11.98	3.53	8.55	6.71	2.69	8.57	3.01	15.60
8	3.52	2.01	3.92	2.10	24.70	11.01	3.39	11.45	3.46	12.57	6.72	2.69	8.10	2.93	20.20
9	3.46	1.99	3.87	2.09	25.78	10.87	3.37	11.07	3.40	15.50	6.82	2.71	7.65	2.85	24.66
10	3.40	1.97	2.72	1.80	47.73	10.92	3.38	5.10	2.37	61.04	6.65	2.67	4.35	2.20	57.18
11	3.39	1.97	2.35	1.69	54.83	11.04	3.40	4.73	2.29	63.87	6.93	2.73	4.11	2.15	59.51
12	3.40	1.97	1.91	1.55	63.34	10.45	3.31	4.43	2.22	66.16	6.56	2.66	3.73	2.06	63.22
13	3.39	1.97	4.82	2.31	7.42	10.45	3.31	12.63	3.62	3.56	6.77	2.70	9.25	3.12	8.90
14	3.40	1.97	4.69	2.28	10.04	10.59	3.33	12.23	3.57	6.62	5.99	2.55	8.66	3.03	14.71
15	3.45	1.99	5.21	2.39	0.00	10.76	3.36	13.10	3.69	0.00	6.91	2.72	10.15	3.26	0.00
C.D.	NS		0.19		-	NS		0.11		-	NS		0.14		-
SE(m)	0.18		0.07		-	0.13		0.04		-	0.25		0.05		-
C.V.	13.64		12.18		-	11.25		10.28		-	9.87		13.69		-

O.V-Original Value, **T.V**-Transformed value**, **ROC**- Reduction over control at **7DAS**, **DAS**-day after spray.**Treatment 1**-Flonicamid 50 WG (Systemic) , **T2**-Flonicamid 50 WG (Systemic)+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T3**-Flonicamid 50 WG (Systemic)+MakAdjuvol @ 1.5 % (15 ml/L water), **T4**-Spinetoram 11.7 SC (Product of fermentation of Saccharopolyspora Sinosa),**T5**-Spinetoram 11.7 SC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T6**-Spinetoram 11.7 SC+MakAdjuvol @ 1.5 % (15 ml/L water), **T7**-Emamectin benzoate 5 SG (Translaminar), **T8**-Emamectin benzoate 5 SG (Translaminar))+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T9**- Emamectin benzoate 5 SG+MakAdjuvol @ 1.5 % (15 ml/L water), **T10**- Profenofos 50 EC (Contact), **T11**- Profenofos 50 EC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T12**- Profenofos 50 EC+MakAdjuvol @ 1.5 % (15 ml/L water), **T13**- Water+MAK HMO @ 0.75 % OR 7.5 ml/litre (Control), **T14**- Water+MAK HMO @ 1.5 % OR 15 ml/litre (Control), **T15**-Control (Water Spray)

Table: 305. Ento 6: Evaluation of MakAdjuvol (Mineral Paraffin Oil) as adjuvant with insecticides—sponsored product at Raichur (South zone) 2024-25.

T	Whitefly/3leaves					Thrips/3 leaves					Jassid/3leaves				
	Pre spray		07 DAS		ROC	Pre spray		07 DAS		ROC	Pre spray		07 DAS		ROC
	OV	TV	OV	TV	(%)**	OV	TV	OV	TV	(%)**	OV	TV	OV	TV	(%)**
1	4.25	2.18	2.59	1.76	81.97	25.58	5.11	7.59	2.84	83.53	17.58	4.25	2.76	1.80	94.52
2	4.58	2.25	1.92	1.56	86.61	18.25	4.33	4.26	2.18	90.66	11.58	3.48	5.59	2.47	89.49
3	3.91	2.10	2.26	1.66	84.63	21.58	4.70	4.14	2.15	92.24	10.58	3.33	4.92	2.33	90.38
4	5.08	2.36	4.09	2.14	71.57	11.91	3.52	6.92	2.72	84.38	11.08	3.40	9.09	3.10	81.94
5	3.91	2.10	2.42	1.71	82.84	12.91	3.66	5.81	2.51	86.40	6.91	2.72	9.42	3.15	81.94
6	4.25	2.18	3.76	2.06	73.55	15.75	4.03	8.98	3.08	82.44	10.91	3.38	9.42	3.15	81.94
7	3.91	2.10	6.26	2.60	57.90	10.75	3.35	5.14	2.38	88.81	8.91	3.07	17.92	4.29	66.08
8	4.41	2.22	5.92	2.53	57.83	17.58	4.25	11.70	3.49	69.45	8.08	2.93	12.59	3.62	74.78
9	4.41	2.22	7.92	2.90	45.48	13.75	3.77	3.76	2.06	92.43	6.75	2.69	12.76	3.64	75.40
10	4.08	2.14	8.42	2.99	40.80	14.08	3.82	6.26	2.60	86.95	9.25	3.12	13.09	3.69	73.85
11	4.25	2.18	6.59	2.66	54.09	12.58	3.62	4.09	2.14	92.80	8.41	2.99	21.42	4.68	58.72
12	4.75	2.29	5.92	2.53	59.65	12.41	3.59	5.92	2.53	86.34	10.41	3.30	17.42	4.23	64.88
13	4.25	2.18	6.59	2.66	55.34	18.75	4.39	6.09	2.57	89.36	12.25	3.57	13.09	3.69	73.85
14	4.25	2.18	4.09	2.14	72.25	14.58	3.88	7.42	2.81	84.47	25.25	5.07	17.42	4.23	65.95
15	4.89	2.32	14.42	3.86	0.01	18.00	4.30	46.76	6.87	0.00	17.24	4.21	59.26	7.73	0.00
C.D.	0.08		0.71		-	0.92		1.05		-	0.62		1.05		-
SE(m)	0.03		0.24		-	0.32		0.36		-	0.22		0.32		-
C.V.	2.25		17.92		-	13.85		22.58		-	11.48		22.48		-

O.V-Original Value, **T.V**-Transformed value**, **ROC**- Reduction over control at **7DAS**, **DAS**-day after spray.**Treatment 1**-Flonicamid 50 WG (Systemic) , **T2**-Flonicamid 50 WG (Systemic)+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T3**-Flonicamid 50 WG (Systemic)+MakAdjuvol @ 1.5 % (15 ml/L water), **T4**-Spinetoram 11.7 SC (Product of fermentation of Saccharopolyspora Sinosa),**T5**-Spinetoram 11.7 SC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T6**-Spinetoram 11.7 SC+MakAdjuvol @ 1.5 % (15 ml/L water), **T7**-Emamectin benzoate 5 SG (Translaminar), **T8**-Emamectin benzoate 5 SG (Translaminar))+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T9**- Emamectin benzoate 5 SG+MakAdjuvol @ 1.5 % (15 ml/L water), **T10**- Profenofos 50 EC (Contact), **T11**- Profenofos 50 EC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T12**- Profenofos 50 EC+MakAdjuvol @ 1.5 % (15 ml/L water), **T13**- Water+MAK HMO @ 0.75 % OR 7.5 ml/litre (Control), **T14**- Water+MAK HMO @ 1.5 % OR 15 ml/litre (Control), **T15**-Control (Water Spray)

Table: 306. Ento 6: Evaluation of MakAdjuvol (Mineral Paraffin Oil) as adjuvant with insecticides—sponsored product (South zone)

Treatment	LG		RC	
	Yield (q./ha)	Phytotoxicity	Yield (q./ha)	Phytotoxicity
1	16.75	0.00	11.38	Nil
2	17.55	0.00	11.65	Nil
3	18.18	0.00	12.46	Nil
4	22.95	0.00	11.55	Nil
5	24.09	0.00	13.75	Nil
6	25.26	0.00	15.68	Nil
7	20.66	0.00	13.08	Nil
8	21.76	0.00	13.87	Nil
9	22.75	0.00	12.01	Nil
10	16.11	0.00	12.96	Nil
11	16.42	0.00	13.38	Nil
12	17.03	0.00	14.19	Nil
13	10.48	0.00	11.38	Nil
14	10.60	0.00	11.01	Nil
15	9.64	0.00	9.13	Nil
C.D.	0.42	-	0.09	-
SE(m)	1.24	-	0.03	-
C.V.	-	-	2.59	-

LG-Lam Guntur,**RC-**Raichur**, Treatment 1-**Flonicamid 50 WG (Systemic) , **T2-**Flonicamid 50 WG (Systemic)+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T3-** Flonicamid 50 WG (Systemic)+MakAdjuvol @ 1.5 % (15 ml/L water), **T4-**Spinetoram 11.7 SC (Product of fermentation of Saccharopolyspora Sinosa),**T5-**Spinetoram 11.7 SC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T6-**Spinetoram 11.7 SC+MakAdjuvol @ 1.5 % (15 ml/L water), **T7-**Emamectin benzoate 5 SG (Translaminar), **T8-**Emamectin benzoate 5 SG (Translaminar))+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T9-** Emamectin benzoate 5 SG+MakAdjuvol @ 1.5 % (15 ml/L water), **T10-** Profenofos 50 EC (Contact), **T11-** Profenofos 50 EC+MakAdjuvol @ 0.75 % (7.5 ml/L water), **T12-** Profenofos 50 EC+MakAdjuvol @ 1.5 % (15 ml/L water), **T13-** Water+MAK HMO @ 0.75 % OR 7.5 ml/litre (Control), **T14-** Water+MAK HMO @ 1.5 % OR 15 ml/litre (Control), **T15-**Control (Water Spray)

Table: 307.Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on jassid/3 leaves

(Factor-I) Planting system	**FA**	**BT**	**HI**	**SR**
	OV	**OV**	**OV**	**OV**
HDPS	2.44 (1.84)	8.88 (2.90)	2.01 (1.73)	2.42 (1.85)
HDPS with IPM	2.29 (1.81)	10.02 (3.07)	1.52 (1.59)	2.11 (1.76)
S.E (m)	**0.03**	**0.04**	**0.02**	**0.02**
C.D. *(Factor-I)*	**NS**	**0.12**	**0.06**	**0.05**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	2.58 (1.89)	6.78 (2.78)	1.56 (1.60)	2.96 (1.99)
HDPS (90X15cm)	2.37 (1.82)	0.75 (1.32)	1.63 (1.62)	1.96 (1.72)
De-topping (105cm or 20 nods)	2.53 (1.87)	14.97 (3.99)	1.95 (1.71)	1.68 (1.64)
MC @45PPM at square initiation	2.11 (1.76)	1.19 (1.48)	1.97 (1.72)	1.97 (1.72)
Cyclanilide2.10% w/w+MC 8.40SC @8 to 10 ml	2.43 (1.84)	19.08 (4.47)	1.73 (1.65)	2.22 (1.79)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	2.16 (1.79)	13.93 (3.86)	1.74 (1.65)	2.85 (1.96)
S.E. (m)	**0.04**	**0.07**	**0.03**	**0.03**
C.D. *(Factor-II)*	**NS**	**0.21**	**NS**	**0.08**
C.D. ***(Factor-I)* X *(Factor-II)***	0.18	**NS**	**NS**	**NS**

FA-Faridkot, BT-Bathinda, HI-Hisar, SR-Sirsa, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are square root transformed values.

Table: 308. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on whitefly/per 3 leaves

(Factor-I) Planting system	**FA**	**BT**	**HI**	**SR**
	OV	**OV**	**OV**	**OV**
HDPS	57.04 (7.60)	10.59 (3.39)	12.19 (3.62)	8.33 (3.05)
HDPS with IPM	32.69 (5.79)	11.89 (3.58)	10.22 (3.34)	7.34 (2.88)
S.E (m)	**0.10**	**0.04**	**0.04**	**0.04**
C.D. *(Factor-I)*	**0.30**	**0.10**	**0.11**	**0.11**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	42.73 (6.58)	7.86 (2.97)	9.03 (3.16)	8.84 (3.14)
HDPS (90X15cm)	42.89 (6.57)	13.61 (3.82)	9.45 (3.23)	7.52 (2.91)
De-topping (105cm or 20 nods)	42.79 (6.55)	10.06 (3.32)	11.50 (3.52)	6.68 (2.77)
MC @45PPM at square initiation	45.75 (6.75)	12.02 (3.60)	12.84 (3.72)	7.40 (2.90)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	48.99 (6.97)	11.64 (3.55)	11.85 (3.57)	7.82 (2.97)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	46.03 (6.74)	12.25 (3.63)	12.55 (3.67)	8.76 (3.12)
S.E. (m)	**0.18**	**0.06**	**0.06**	**0.06**
C.D. *(Factor-II)*	**NS**	**0.18**	**0.19**	**0.18**
C.D. ***(Factor-I) X (Factor-II)***	NS	**NS**	**NS**	**NS**

FA-Faridkot, BT-Bathinda, HI-Hisar, SR-Sirsa, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are square root transformed values.

Table: 309. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on thrips (per 3 leaves)

(Factor-I) Planting system	**FA**	**BT**	**HI**	**SR**
	OV	**OV**	**OV**	**OV**
HDPS	50.81 (7.18)	19.58 (4.50)	39.08 (6.30)	8.66 (3.10)
HDPS with IPM	27.36 (5.31)	20.61 (4.61)	28.45 (5.41)	7.39 (2.89)
S.E (m)	**0.08**	**0.06**	**0.15**	**0.05**
C.D. *(Factor-I)*	**0.24**	**NS**	**0.44**	**0.14**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	43.27 (6.56)	13.80 (3.84)	38.81 (6.27)	9.10 (3.17)
HDPS (90X15cm)	39.61 (6.29)	27.87 (5.36)	31.03 (5.64)	7.70 (2.94)
De-topping (105cm or 20 nods)	41.84 (6.47)	17.62 (4.31)	35.73 (6.01)	7.15 (2.85)
MC @45PPM at square initiation	38.48 (6.19)	20.65 (4.62)	30.99 (5.61)	7.64 (2.93)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	33.39 (5.28)	18.02 (4.35)	34.85 (5.95)	7.82 (2.96)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	37.96 (6.15)	22.62 (4.85)	31.19 (5.64)	8.75 (3.12)
S.E. (m)	**0.142**	**0.10**	**0.26**	**0.08**
C.D. *(Factor-II)*	**0.42**	**0.31**	**NS**	**NS**
C.D. ***(Factor-I)* X *(Factor-II)***	NS	**NS**	**NS**	**NS**

FA-Faridkot, BT-Bathinda, HI-Hisar, SR-Sirsa, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are square root transformed values.

Table: 310. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on green boll damage % due to PBW

(Factor-I) Planting system	**FA**	**BT**	**HI**	**SR**
	OV	**OV**	**OV**	**OV**
HDPS	3.33 (6.14)	-	20.28 (26.72)	10.00 (18.14)
HDPS with IPM	1.67 (3.07)	-	12.96 (20.94)	8.33 (16.59)
S.E (m)	**1.96**	-	**0.38**	**0.77**
C.D. *(Factor-I)*	**NS**	-	**1.11**	**NS**
(Factor-II) Detopping and Growth regulators		**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	1.67 (3.07)	-	19.18 (25.86)	11.67 (19.83)
HDPS (90X15cm)	1.67 (3.07)	-	15.28 (22.81)	8.75 (16.92)
De-topping (105cm or 20 nods)	3.33 (6.14)	-	18.32 (25.26)	7.08 (15.06)
MC @45PPM at square initiation	1.67 (3.07)	-	14.17 (21.88)	7.92 (16.31)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	3.33 (6.14)	-	18.35 (25.25)	9.17 (17.54)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	3.33 (6.14)	-	14.43 (21.92)	10.42 (18.54)
S.E. (m)	**3.40**	-	**0.65**	**1.33**
C.D. *(Factor-II)*	**NS**	-	**1.92**	**NS**
C.D. ***(Factor-I) X (Factor-II)***	NS	-	**NS**	**NS**

FA-Faridkot, BT-Bathinda, HI-Hisar, SR-Sirsa, SG-Sriganganagar, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are angular transformed values.

Table: 311. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on fruiting body retention percent

(Factor-I) Planting system	**FA**	**BT**	**HI**	**SR**
	OV	**OV**	**OV**	**OV**
HDPS	**45.53 (42.40)**	83.84 (66.40)	-	59.75 (50.61)
HDPS with IPM	**47.14 (43.33)**	85.73 (67.80)	-	61.65 (51.73)
S.E (m)	**0.64**	**0.30**	**-**	**0.24**
C.D. *(Factor-I)*	**NS**	**0.89**	**-**	**0.70**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	48.45 (44.09)	86.75 (68.68)	-	58.14 (49.67)
HDPS (90X15cm)	41.73 (40.21)	84.25 (66.66)	-	64.01 (53.12)
De-topping (105cm or 20 nods)	40.90 (39.72)	85.25 (67.64)	-	63.93 (53.08)
MC @45PPM at square initiation	47.68 (43.64)	81.65 (64.76)	-	60.34 (50.95)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	51.18 (45.66)	85.32 (67.46)	-	59.68 (50.96)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	48.07 (43.87)	85.20 (67.38)	-	58.12 (49.66)
S.E. (m)	**1.11**	**0.52**	**-**	**0.41**
C.D. *(Factor-II)*	**3.26**	**1.54**	**-**	**1.21**
C.D. ***(Factor-I) X (Factor-II)***	**NS**	**2.18 (S)**	-	**NS**

FA-Faridkot, BT-Bathinda, HI-Hisar, SR-Sirsa, SG-Sriganganagar, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are angular transformed values.

Table: 312. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on open boll damage percent

(Factor-I) Planting system	**FA**	**BT**	**HI**	**SR**
	OV	**OV**	**OV**	**OV**
HDPS	1.39 (4.49)	-	8.59 (16.92)	5.66 (13.54)
HDPS with IPM	1.58 (5.63)	-	6.56 (14.74)	3.95 (11.39)
S.E (m)	0.78	-	**0.42**	**0.04**
C.D. *(Factor-I)*	**NS**	-	**1.23**	**0.12**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	0.37 (2.82)	-	9.95 (18.29)	5.65 (13.64)
HDPS (90X15cm)	0.00		8.33 (16.72)	3.83 (11.25)
De-topping (105cm or 20 nods)	2.04 (7.42)	-	6.34 (14.48)	2.73 (9.50)
MC @45PPM at square initiation	0.87 (3.70)	-	6.93 (15.14)	4.53 (12.27)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	0.72 (4.82)	-	6.60 (14.78)	4.58 (12.34)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	4.96 (11.62)	-	7.30 (15.54)	7.53 (15.76)
S.E. (m)	**1.37**	-	**0.72**	**0.07**
C.D. *(Factor-II)*	**4.03**	-	**2.13**	**0.21**
C.D. ***(Factor-I)* X *(Factor-II)***	NS	-	**NS**	**0.29 (S)**

FA-Faridkot, BT-Bathinda, HI-Hisar, SR-Sirsa, SG-Sriganganagar, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are angular transformed values.

Table: 313. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on locule damage percent

(Factor-I) Planting system	**FA**	**BT**	**HI**	**SR**
	OV	**OV**	**OV**	**OV**
HDPS	0.77 (3.28)	-	2.45 (8.93)	2.68 (9.32)
HDPS with IPM	0.84 (4.02)	-	1.87 (7.79)	1.94 (7.94)
S.E (m)	**0.59**	**-**	**0.25**	**0.03**
C.D. *(Factor-I)*	**NS**	**-**	**0.73**	**0.09**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	0.19 (2.05)	-	2.84 (9.63)	2.70 (9.37)
HDPS (90X15cm)	0.00	-	2.32 (8.71)	1.94 (7.97)
De-topping (105cm or 20 nods)	1.09 (5.37)	-	1.75 (7.53)	1.40 (6.77)
MC @45PPM at square initiation	0.40 (2.45)	-	2.05 (8.16)	2.09 (8.30)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	0.34 (3.28)	-	1.84 (7.71)	2.34 (8.78)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	2.82 (8.74)	-	2.17 (8.44)	3.41 (10.61)
S.E. (m)	**1.03**	**-**	**0.43**	**0.05**
C.D. *(Factor-II)*	**3.04**	**-**	**1.26**	**0.15**
C.D. ***(Factor-I)* X *(Factor-II)***	NS	-	**NS**	**0.21 (S)**

FA-Faridkot, BT-Bathinda, HI-Hisar, SR-Sirsa, SG-Sriganganagar, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are angular transformed values.

Table: 314. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on yield (QT) per hectare

(Factor-I) Planting system	**FA**	**BT**	**HI**	**SR**
	OV	**OV**	**OV**	**OV**
HDPS	15.52	23.93	23.45	17.46
HDPS with IPM	18.97	25.51	25.67	20.94
S.E (m)	**1.01**	**0.02**	**0.02**	**0.02**
C.D. *(Factor-I)*	**NS**	**NS**	**0.06**	**0.04**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	25.27	25.95	21.90	17.17
HDPS (90X15cm)	23.08	25.23	24.01	20.71
De-topping (105cm or 20 nods)	14.69	24.70	26.01	21.54
MC @45PPM at square initiation	20.50	24.48	25.08	18.04
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	21.27	24.03	25.48	19.82
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	10.64	20.62	24.89	17.94
S.E. (m)	**1.76**	**0.04**	**0.04**	**0.03**
C.D. *(Factor-II)*	**5.18**	**0.12**	**0.11**	**0.08**
C.D. ***(Factor-I) X (Factor-II)***	NS	**NS**	**NS**	**0.11**

FA-Faridkot, BT-Bathinda, HI-Hisar, SR-Sirsa, SG-Sriganganagar, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are square root transformed values.

Table1: 315. Ent.7. Interaction effects of HDPS and HDPS with IPM on jassid, fruiting bodies retention, open boll & locule damage and yield.

Treatment *(Factor-I) -Planting system (Factor-II) -HDPS Treatments*	**FA**		**BT**		**SR**					
	Jassid/per 3 leaves		**Fruiting bodies retention percent**		**Locule damage percent**		**Open boll damage percent**		**Yield (QT) per hectare**	
	HDPS	**HDPS + IPM**	**HDPS**	**HDPS + IPM**	**HDPS**	**HDPS + IPM**	**HDPS**	**HDPS + IPM**	**HDPS**	**HDPS + IPM**
	OV	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**
Conventional planting	2.83 (1.96)	2.33 (1.83)	88.27 (69.97)	85.22 (67.39)	3.45 (10.70)	1.96 (8.04)	7.06 (15.40)	4.25 (11.89)	16.85	17.48
90 x 15 cm planting	3.17 (2.04)	1.59 (1.61)	81.82 (64.75)	86.67 (68.57)	2.26 (8.64)	1.61 (7.29)	4.28 (11.94)	3.37 (10.57)	20.48	20.94
Detopping	2.07 (1.74)	3.00 (2.00)	85.98 (68.00)	85.11 (67.29)	1.60 (7.27)	1.19 (6.26)	3.02 (10.01)	2.44 (8.99)	19.61	23.48
Mepiquat chloride	1.80 (1.67)	2.42 (1.85)	77.46 (61.64)	85.84 (67.88)	2.23 (8.58)	1.95 (8.02)	4.88 (12.75)	4.18 (11.79)	15.55	20.53

Cyclanilide 2+ MC	2.60 (1.89)	2.25 (1.80)	84.35 (66.68)	86.28 (68.25)	2.58 (9.23)	2.10 (8.33)	5.07 (13.01)	4.09 (11.66)	16.00	23.63
Chlormequat chloride	2.20 (1.79)	2.13 (1.78)	85.12 (67.34)	85.28 (67.42)	3.97 (11.49)	2.85 (9.72)	9.67 (18.11)	5.38 (13.41)	16.28	19.60
C.D. *(Factor-I)*	**NS**		**0.89**		**0.09**		**0.12**		**0.04**	
C.D. *(Factor-II)*	**NS**		**1.54**		**0.15**		**0.21**		**0.08**	
C.D. ***(Factor-I)* X *(Factor-II)***	**0.18 (S)**		**2.18 (S)**		**0.21 (S)**		**0.29 (S)**		**0.11 (S)**	

FA-Faridkot, BT-Bathinda, SR-Sirsa, HDPS-High density planting system, IPM-Integrated pest management, , S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are square root/angular transformed values**.**

Table: 316. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on jassid/ 3 leaves

(Factor-I) Planting system	**SU**	**AK**	**NA**	**JU**	**RA**
	OV	**OV**	**OV**	**OV**	**OV**
HDPS	5.95 (2.54)	4.43 (2.33)	4.92 (2.43)	10.21 (3.20)	4.05 (2.25)
HDPS with IPM	3.62 (2.03)	2.77 (1.93)	1.64 (1.62)	5.81 (2.41)	2.30 (1.82)
S.E (m)	**0.04**	**0.09**	**0.03**	**0.009**	**0.002**
C.D. *(Factor-I)*	**0.27**	**NS**	**0.21**	**0.052**	**0.011**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	6.95 (2.73)	3.41 (2.07)	3.12 (1.99)	9.78 (3.13)	3.44 (2.10)
HDPS (90X15cm)	7.34 (2.80)	3.47 (2.10)	3.55 (2.09)	8.96 (2.99)	3.06 (2.00)
De-topping (105cm or 20 nods)	5.70 (2.49)	3.23 (2.05)	3.44 (2.07)	8.16 (2.86)	3.19 (2.03)
MC @45PPM at square initiation	3.30 (1.95)	4.05 (2.24)	3.18 (2.00)	12.79 (3.58)	3.13 (2.02)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	2.49 (1.73)	3.80 (2.18)	3.21 (2.01)	10.35 (3.22)	3.19 (2.04)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	3.62 (2.03)	3.63 (2.14)	3.17 (2.00)	11.56 (3.40)	3.06 (2.00)
S.E. (m)	**0.06**	**0.06**	**0.02**	**0.093**	**0.024**
C.D. *(Factor-II)*	**0.19**	**NS**	**0.06**	**0.274**	**NS**
C.D. ***(Factor-I)* X *(Factor-II)***	**NS**	**NS**	**NS**	**NS**	**NS**

SU-Surat, Ak-Akola, NA-Nanded, JU-Junagadh, RA-Rahuri, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are square root transformed values.

Table: 317. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on whitefly/per 3 leaves

(Factor-I) Planting system	**SU**	**AK**	**NA**	**JU**	**RA**
	OV	**OV**	**OV**	**OV**	**OV**
HDPS	4.12 (2.15)	4.83 (2.40)	2.80 (1.95)	10.87 (3.30*)	2.02 (**1.73**)
HDPS with IPM	2.12 (1.62)	2.29 (1.81)	0.54 (1.24)	4.53 (2.13)	0.72 (**1.30**)
S.E (m)	**0.04**	**0.08**	**0.01**	**0.002**	**0.012**
C.D. *(Factor-I)*	**0.27**	**0.52**	**0.04**	**0.013**	**0.079**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	4.30 (2.19)	3.30 (2.03)	1.57 (1.57)	10.56 (3.25)	1.17 (1.447)
HDPS (90X15cm)	4.93 (2.33)	3.17 (2.03)	1.90 (1.65)	9.36 (3.06)	1.47 (1.554)
De-topping (105cm or 20 nods)	4.12 (2.15)	3.97 (2.19)	1.69 (1.59)	8.74 (2.96)	1.46 (1.550)
MC @45PPM at square initiation	1.84 (1.53)	3.03 (2.00)	1.64 (1.59)	13.57 (3.68)	1.44 (1.544)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	1.60 (1.45)	3.80 (2.16)	1.61 (1.58)	10.98 (3.31)	1.39 (1.528)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	2.19 (1.64)	4.10 (2.22)	1.59 (1.57)	12.39 (3.52)	1.26 (1.479)
S.E. (m)	**0.04**	**0.06**	**0.03**	**0.095**	**0.050**
C.D. *(Factor-II)*	**0.12**	**NS**	**NS**	**0.280**	**NS**
C.D. ***(Factor-I) X (Factor-II)***	**0.16**	**0.42**	**NS**	**NS**	**NS**

SU-Surat, Ak-Akola, NA-Nanded, JU-Junagadh, RA-Rahuri, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are square root transformed values.

Table: 318. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on thrips (per 3 leaves)

(Factor-I) Planting system	**SU**	**AK**	**NA**	**JU**	**RA**
	OV	**OV**	**OV**	**OV**	**OV**
HDPS	19.84 (4.51)	4.38 (2.31)	2.39 (1.84)	17.25 (4.15*)	15.40 (**4.04**)
HDPS with IPM	4.61 (2.26)	3.89 (2.20)	1.88 (1.70)	10.24 (3.20)	6.10 (**2.63**)
S.E (m)	**0.03**	**0.06**	**0.02**	**0.007**	**0.06**
C.D. *(Factor-I)*	**0.21**	**NS**	**0.14**	**0.04**	**0.40**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	17.65 (4.26)	4.00 (2.23)	1.87 (1.69)	15.89 (3.99)	9.91 (3.205)
HDPS (90X15cm)	18.51 (4.36)	4.10 (2.24)	2.21 (1.79)	14.49 (3.81)	12.04 (3.534)
De-topping (105cm or 20 nods)	14.25 (3.84)	4.03 (2.24)	2.15 (1.77)	13.32 (3.65)	11.04 (3.401)
MC @45PPM at square initiation	5.90 (2.53)	4.03 (2.23)	2.24 (1.80)	21.34 (4.62)	10.02 (3.197)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	5.36 (2.42)	4.07 (2.24)	2.18 (1.78)	18.72 (4.33)	10.91 (3.371)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	7.97 (2.91)	4.57 (2.35)	2.17 (1.78)	20.55 (4.53)	10.57 (3.303)
S.E. (m)	**0.12**	**0.09**	**0.05**	**0.138**	**0.11**
C.D. *(Factor-II)*	**0.35**	**NS**	**NS**	**0.407**	**NS**
C.D. ***(Factor-I) X (Factor-II)***	**0.49**	**NS**	**NS**	**NS**	**NS**

SU-Surat, Ak-Akola, NA-Nanded, JU-Junagadh, RA-Rahuri, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are square root transformed values.

Table: 319. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on green boll damage % due to PBW

(Factor-I) Planting system	**SU**	**AK**	**NA**	**JU**	**RA**
	OV	**OV**	**OV**	**OV**	**OV**
HDPS	12.90 (21.05)	39.03 (29.56)	46.11 (42.71)	11.90 (20.18)	22.78 (28.32)
HDPS with IPM	10.85 (19.25)	17.22 (24.02)	18.61 (25.25)	10.17 (18.60)	9.38 (17.59)
S.E (m)	**0.28**	**0.75**	**2.07**	**0.063**	**1.07**
C.D. *(Factor-I)*	**1.70**	**4.89**	**13.54**	**0.384**	**7.04**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	16.43 (23.91)	32.08 (34.19)	35.83 (36.25)	11.24 (19.59)	19.17 (25.25)
HDPS (90X15cm)	13.49 (21.55)	36.67 (36.90)	40.00 (38.87)	10.44 (18.85)	17.08 (23.82)
De-topping (105cm or 20 nods)	12.61 (20.80)	22.50 (26.86)	25.00 (29.03)	9.27 (17.72)	13.13 (20.51)
MC @45PPM at square initiation	10.76 (19.15)	25.83 (30.39)	35.00 (35.71)	14.50 (22.38)	17.50 (24.17)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	8.47 (16.92)	26.67 (30.09)	25.83 (29.70)	12.64 (20.83)	15.83 (22.82)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	10.09 (18.52)	25.00 (29.30)	32.50 (34.02)	13.69 (21.71)	13.75 (21.16)
S.E. (m)	**0.68**	**1.73**	**2.92**	**0.511**	**1.53**
C.D. *(Factor-II)*	**2.01**	**5.13**	**NS**	**1.506**	**NS**
C.D. ***(Factor-I) X (Factor-II)***	**NS**	**NS**	**NS**	**NS**	**NS**

SU-Surat, Ak-Akola, NA-Nanded, JU-Junagadh, RA-Rahuri, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are angular transformed values.

Table: 320. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on fruiting body retention percent

(Factor-I) Planting system	**SU**	**AK**	**NA**	**JU**	**RA**
	OV	**OV**	**OV**	**OV**	**OV**
HDPS	86.58 (68.51)	75.20 (60.39)	83.86 (66.56)	-	85.08 (**67.49**)
HDPS with IPM	88.31 (70.01)	77.76 (62.22)	86.63 (68.86)	-	87.95 (70.09)
S.E (m)	**0.78**	**0.92**	**0.56**	**-**	**0.014**
C.D. *(Factor-I)*	**NS**	**NS**	**NS**	**-**	**0.092**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	79.92 (63.38)	67.60 (55.34)	82.28 (65.12)	-	83.28 (65.89)
HDPS (90X15cm)	78.15 (62.13)	74.94 (60.05)	79.61 (63.16)	-	80.59 (63.87)
De-topping (105cm or 20 nods)	79.68 (63.21)	84.04 (66.77)	81.94 (64.88)	-	83.12 (65.77)
MC @45PPM at square initiation	93.42 (75.14)	78.06 (62.31)	87.78 (69.59)	-	89.19 (70.88)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	95.37 (77.58)	75.03 (60.33)	89.39 (71.14)	-	90.98 (72.73)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	92.49 (74.10)	79.20 (63.02)	90.78 (72.40)	-	91.94 (73.62)
S.E. (m)	**2.31**	**2.18**	**0.82**	**-**	**0.056**
C.D. *(Factor-II)*	**6.81**	**6.48**	**2.43**	**-**	**NS**
C.D. ***(Factor-I) X (Factor-II)***	**NS**	**NS**	**NS**	-	**NS**

SU-Surat, Ak-Akola, NA-Nanded, JU-Junagadh, RA-Rahuri, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are angular transformed values.

Table: 321. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on open boll damage percent

(Factor-I) Planting system	**SU**	**AK**	**NA**	**JU**	**RA**
	OV	**OV**	**OV**	**OV**	**OV**
HDPS	11.44 (19.77)	35.11 (36.21)	29.36 (32.54)	15.60 (23.27)	11.82 (20.046)
HDPS with IPM	8.20 (16.64)	15.81 (23.05)	12.03 (19.99)	13.26 (21.36)	11.28 (19.54)
S.E (m)	**0.69**	**0.27**	**2.03**	**0.061**	**0.27**
C.D. *(Factor-I)*	**NS**	**1.8**	**13.33**	**0.373**	**NS**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	15.00 (22.79)	26.71 (30.77)	22.18 (27.40)	14.19 (22.13)	12.20 (20.41)
HDPS (90X15cm)	10.46 (18.87)	33.19 (34.73)	25.66 (29.66)	13.93 (21.92)	12.19 (20.32)
De-topping (105cm or 20 nods)	12.60 (20.79)	20.06 (25.26)	16.48 (22.98)	11.82 (20.11)	9.96 (18.34)
MC @45PPM at square initiation	7.42 (15.81)	25.18 (29.85)	22.33 (27.62)	19.83 (26.44)	11.88 (20.07)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	6.24 (14.47)	24.09 (28.45)	16.68 (23.43)	16.46 (23.93)	11.72 (19.98)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	8.06 (16.49)	23.50 (28.73)	20.84 (26.49)	17.96 (25.08)	11.36 (19.63)
S.E. (m)	**0.43**	**1.59**	**1.89**	**0.730**	**0.65**
C.D. *(Factor-II)*	**1.28**	**4.71**	**NS**	**2.154**	**NS**
C.D. ***(Factor-I) X (Factor-II)***	**NS**	**NS**	**NS**	**NS**	**NS**

SU-Surat, Ak-Akola, NA-Nanded, JU-Junagadh, RA-Rahuri, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are angular transformed values.

Table: 322. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on locule damage percent

(Factor-I) Planting system	**SU**	**AK**	**NA**	**JU**	**RA**
	OV	**OV**	**OV**	**OV**	**OV**
HDPS	5.98 (14.16)	17.69 (24.76)	16.23 (23.55)	10.97 (19.34)	5.29 (13.19)
HDPS with IPM	3.84 (11.30)	4.90 (12.58)	6.79 (14.90)	8.62 (17.08)	4.76 (12.52)
S.E (m)	**0.22**	**0.08**	**1.25**	**0.034**	**0.26**
C.D. *(Factor-I)*	**1.33**	**0.53**	**8.19**	**0.209**	**NS**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	8.24 (16.68)	11.14 (18.86)	12.40 (20.10)	10.08 (18.52)	5.45 (13.37)
HDPS (90X15cm)	4.55 (12.32)	15.14 (21.99)	14.49 (21.72)	9.68 (18.13)	5.22 (13.13)
De-topping (105cm or 20 nods)	6.92 (15.25)	8.79 (15.93)	9.16 (16.94)	8.80 (17.25)	4.29 (11.84)
MC @45PPM at square initiation	3.38 (10.59)	11.21 (18.97)	12.54 (20.29)	13.76 (21.78)	5.31 (13.24)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	2.84 (9.71)	11.66 (18.55)	9.06 (17.06)	11.34 (19.68)	5.15 (13.05)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	4.21 (11.84)	9.83 (17.72)	11.41 (19.24)	12.49 (20.69)	4.72 (12.52)
S.E. (m)	**0.46**	**0.64**	**1.17**	**0.600**	**0.44**
C.D. *(Factor-II)*	**1.36**	**1.89**	**NS**	**1.771**	**NS**
C.D. ***(Factor-I) X (Factor-II)***	**NS**	**2.71**	**NS**	**NS**	**NS**

SU-Surat, Ak-Akola, NA-Nanded, JU-Junagadh, RA-Rahuri, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are angular transformed values.

Table: 323. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on yield (Qt.) per hectare

(Factor-I) Planting system	**SU**	**AK**	**NA****	**JU****	**RA**
	OV	**OV**	**OV**	**OV**	**OV**
HDPS	19.95	14.92	1642	2592	25.17
HDPS with IPM	22.81	19.98	2217	2746	30.77
S.E (m)	**1.95**	**0.48**	**15.15**	**0.007**	**0.074**
C.D. *(Factor-I)*	**NS**	**3.14**	**99.28**	**0.041**	**0.49**
(Factor-II) Detopping and Growth regulators	**OV**		**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	13.75	14.90	1610	2700	23.52
HDPS (90X15cm)	22.19	15.43	1815	2755	26.50
De-topping (105cm or 20 nods)	20.51	20.15	2075	2910	29.75
MC @45PPM at square initiation	23.49	18.44	2010	2248	29.20
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	26.10	18.36	2020	2513	29.30
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	22.22	17.41	2045	2425	29.55
S.E. (m)	**1.21**	**1.55**	**29.58**	**0.266**	**0.07**
C.D. *(Factor-II)*	**3.58**	**NS**	**87.87**	**0.784**	**0.21**
C.D. ***(Factor-I) X (Factor-II)***	**NS**	**NS**	**NS**	**NS**	**NS**

SU-Surat, Ak-Akola, NA-Nanded, JU-Junagadh, RA-Rahuri, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are square root transformed values. Data in kg/ha.

Table: 324. Ent.7. Interaction effects of HDPS and HDPS with IPM on whitefly, thrips & locule damage

Treatment *(Factor-I) Planting system* *(Factor-II) Detopping and Growth regulators*	**SU**				**AK**			
	Whitefly/3 leaves		**Thrips/3 leaves**		**Whitefly/3 leaves**		**Locule damage percent**	
	HDPS	**HDPS + IPM**	**HDPS**	**HDPS + IPM**	**HDPS**	**HDPS + IPM**	**HDPS**	**HDPS + IPM**
	OV	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**
Conventional planting	5.60 (2.47)	3.15 (1.91)	34.31 (5.90)	6.36 (2.62)	4.40 (2.42)	1.60 (1.63)	16.69 (24.09)	5.60 (13.64)
90 x 15 cm planting	5.95 (2.54)	3.99 (2.12)	36.22 (6.06)	6.52 (2.65)	4.60 (2.15)	3.20 (1.91)	23.47 (28.94)	6.80 (15.05)
Detopping	4.88 (2.32)	3.46 (1.99)	26.33 (5.18)	5.80 (2.51)	6.60 (2.58)	2.20 (1.80)	15.09 (22.83)	2.48 (9.03)
Mepiquat chloride	3.00 (1.87)	0.94 (1.20)	9.61 (3.18)	3.07 (1.89)	3.60 (2.18)	2.40 (1.81)	16.58 (23.99)	5.83 (13.94)
Cyclanilide 2+ MC	2.53 (1.74)	0.87 (1.17)	9.23 (3.12)	2.46 (1.72)	6.60 (2.45)	2.00 (1.88)	19.90 (26.47)	3.42 (10.63)
Chlormequat chloride	3.30 (1.95)	1.27 (1.33)	12.68 (3.63)	4.30 (2.19)	7.00 (2.61)	2.60 (1.82)	14.42 (22.23)	5.24 (13.20)
C.D. *(Factor-I)*	**0.27**		**0.21**		**0.52**		**0.53**	
C.D. *(Factor-II)*	**0.12**		**0.35**		**NS**		**1.89**	
C.D. ***(Factor-I) X (Factor-II)***	**0.16 (S)**		**0.49 (S)**		**0.42 (S)**		**2.71 (S)**	

SU-Surat, Ak-Akola, NA-Nanded, JU-Junagadh, RA-Rahuri, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are square root transformed values.

Table: 325. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on Jassid/ 3 leaves

(Factor-I) Planting system	**CBE**	**LG**	**DH**	**RC**	**ND**	**CN**
	OV	**OV**	**OV**	**OV**	**OV**	**OV**
HDPS	2.16 (1.47)	8.97 (3.07)	7.02 (2.81)	8.85 **(**3.06**)**	8.30 (2.97)	8.92 (3.11)
HDPS with IPM	2.03 (1.42)	5.70 (2.48)	3.42 (1.97)	3.38 **(**1.97**)**	6.40 (2.63)	4.53 (2.30)
S.E (m)	**0.06**	**0.16**	**0.022**	**0.01**	**0.008**	**0.02**
C.D. *(Factor-I)*	**0.048**	**0.51**	**0.066**	**0.06**	**0.02**	**0.19**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	2.78 (1.67)	3.57 (2.02)	3.25 (1.93)	5.68 **(**2.49**)**	7.40 (2.80)	7.42 (2.79)
HDPS (90X15cm)	1.5 (1.22)	3.72 (2.05)	3.47 (1.99)	6.73 **(**2.69**)**	7.30 (2.79)	8.92 (3.02)
De-topping (105cm or 20 nods)	2.31 (1.52)	2.87 (1.84)	3.20 (1.92)	6.06 **(**2.56**)**	7.20 (2.77)	4.75 (2.35)
MC @45PPM at square initiation	1.79 (1.34)	3.09 (1.89)	3.15 (1.91)	6.28 **(**2.60**)**	7.30 (2.79)	6.96 (2.79)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	2.38 (1.54)	3.92 (2.10)	3.13 (1.90)	5.21 **(**2.39**)**	7.40 (2.81)	6.33 (2.67)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	1.81 (1.35)	3.79 (2.07)	3.15 (1.91)	6.74 **(**2.69**)**	7.70 (2.86)	5.98 (2.60)
S.E. (m)	**0.08**	**0.09**	**0.03**	**0.01**	**0.013**	**0.06**
C.D. *(Factor-II)*	**0.083**	**0.26**	**0.11**	**0.05**	**0.04**	**0.20**
C.D. ***(Factor-I) X (Factor-II)***	**NS**	**NS**	**0.07**	**0.07**	**0.05**	**0.31**

CBE-Coimbatore, LG- Lam Guntur, DH- Dharwad, RC- Raichur, ND- Nandyal, CN- Chamarajanagar, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are square root transformed values.

Table: 326. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on whitefly/per 3 leaves

(Factor-I) Planting system	**CBE**	**LG**	**DH**	**RC**	**ND**	**CN**
	OV	**OV**	**OV**	**OV**	**OV**	**OV**
HDPS	0.55 (0.74)	3.40 (1.97)	3.33 (1.95)	4.37 **(**2.21**)**	18.30 (4.30)	4.99 (2.42)
HDPS with IPM	0.47 (0.69)	2.77 (1.81)	3.28 (1.94)	1.11 **(**1.27**)**	12.80 (3.65)	3.25 (2.03)
S.E (m)	**0.006**	**0.05**	**0.01**	**0.03**	**0.02**	**0.01**
C.D. *(Factor-I)*	**0.017**	**0.14**	**0.05**	**0.18**	**0.08**	**0.05**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	0.6 (0.77)	3.27 (1.94)	1.67 (1.47)	2.95 **(**1.86**)**	15.50 (4.00)	4.31 (2.27)
HDPS (90X15cm)	0.4 (0.63)	3.92 (2.10)	1.18 (1.29)	2.95 **(**1.86**)**	15.60 (4.01)	5.58 (2.54)
De-topping (105cm or 20 nods)	0.5 (0.71)	2.97 (1.86)	1.19 (1.3)	2.60 **(**1.76**)**	15.50 (4.00)	3.10 (2.00)
MC @45PPM at square initiation	0.515 (0.72)	3.32 (1.95)	1.24 (1.32)	1.81 **(**1.52**)**	15.40 (3.99)	3.69 (2.14)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	0.58 (0.76)	4.12 (2.15)	1.15 (1.28)	3.15 **(**1.91**)**	14.90 (3.93)	4.13 (2.23)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	0.48 (0.69)	3.34 (1.96)	1.18 (1.29)	2.96 **(**1.86**)**	14.90 (3.94)	3.90 (2.18)
S.E. (m)	**0.004**	**0.05**	**0.01**	**0.02**	**0.04**	**0.05**
C.D. *(Factor-II)*	**0.029**	**0.14**	**0.07**	**0.11**	**NS**	**0.15**
C.D. ***(Factor-I) X (Factor-II)***	**NS**	**NS**	**NS**	**NS**	**NS**	0.19

CBE-Coimbatore, LG- Lam Guntur, DH- Dharwad, RC- Raichur, ND- Nandyal, CN- Chamarajanagar, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are square root transformed values.

Table: 327. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on thrips (per 3 leaves)

(Factor-I) Planting system	**CBE**	**LG**	**DH**	**RC**	**ND**	**CN**
	OV	**OV**	**OV**	**OV**	**OV**	**OV**
HDPS	0.24 (0.50)	13.30 (3.71)	4.60 (2.25)	4.79 **(**2.30**)**	30.40 (5.58)	11.79 (3.55)
HDPS with IPM	0.31 (0.56)	11.93 (3.53)	0.91 (1.18)	1.28 **(**1.33**)**	21.50 (4.64)	7.01 (2.79)
S.E (m)	**0.005**	**0.06**	**0.07**	**0.03**	**0.03**	**0.03**
C.D. *(Factor-I)*	**0.012**	**0.19**	**0.05**	**0.15**	**0.10**	**0.21**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	0.33 (0.58)	11.59 (3.48)	2.53 (1.74)	2.22 **(**1.65**)**	24.70 (5.02)	9.81 (3.20)
HDPS (90X15cm)	0.20 (0.45)	11.79 (3.50)	2.66 (1.77)	3.45 **(**1.99**)**	26.00 (5.15)	11.57 (3.47)
De-topping (105cm or 20 nods)	0.285 (0.53)	10.47 (3.31)	2.78 (1.81)	2.83 **(**1.82**)**	25.50 (5.10)	7.03 (2.79)
MC @45PPM at square initiation	0.27 (0.52)	11.12 (3.41)	2.87 (1.83)	2.97 **(**1.86**)**	26.00 (5.15)	9.85 (3.28)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	0.33 (0.57)	11.00 (3.39)	2.87 (1.83)	3.60 **(**2.02**)**	25.8 (5.13)	9.28 (3.18)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	0.26 (0.51)	11.95 (3.53)	2.84 (1.82)	3.12 **(**1.90**)**	25..70 (5.12)	8.88 (3.11)
S.E. (m)	**0.003**	**0.03**	**0.03**	**0.02**	**0.06**	**0.08**
C.D. *(Factor-II)*	**0.020**	**0.09**	**NS**	**0.10**	**NS**	**0.26**
C.D. ***(Factor-I) X (Factor-II)***	**NS**	**NS**	**0.12**	**0.14**	**NS**	**0.39**

CBE-Coimbatore, LG- Lam Guntur, DH- Dharwad, RC- Raichur, ND- Nandyal, CN- Chamarajanagar, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are square root transformed values.

Table: 328. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on green boll damage % due to PBW

(Factor-I) Planting system	**CBE**	**LG**	**DH**	**RC**	**ND**	**CN**
	OV	**OV**	**OV**	**OV**	**OV**	**OV**
HDPS	5.41 (2.33)	16.67 (24.09)	25.66 (30.42)	38.10 **(**38.12**)**	26.00 (30.14)	15.26 (22.95)
HDPS with IPM	5.26 (2.29)	13.30 (21.39)	32.66 (34.84)	18.94 **(**25.80**)**	12.00 (19.97)	6.25 (14.43)
S.E (m)	**0.095**	**1.04**	**0.32**	**0.09**	**0.84**	**0.15**
C.D. *(Factor-I)*	**0.189**	**NS**	**NS**	**0.55**	**2.47**	**0.98**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	5.63 (2.37)	21.67 (27.74)	26 (30.64)	28.17 **(**32.06**)**	18.00 (24.91)	11.70 (19.52)
HDPS (90X15cm)	4.67 (2.16)	24.17 (29.44)	30 (33.19)	32.59 **(**34.81**)**	19.00 (25.81)	12.95 (20.66)
De-topping (105cm or 20 nods)	5.18 (2.28)	22.00 (27.97)	27.67 (31.72)	28.03 **(**31.97**)**	21.00 (27.26)	8.85 (16.86)
MC @45PPM at square initiation	5.17 (2.27)	22.33 (28.20)	28.66 (32.35)	29.78 **(**33.07**)**	18.00 (25.61)	10.46 (18.48)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	5.91 (2.43)	25.00 (30.00)	29.67 (32.990	26.21 **(**30.79**)**	15.00 (22.60)	10.39 (18.39)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	5.46 (2.34)	25.00 (30.00)	33 (35.04)	26.34 **(**30.88**)**	17.00 (24.15)	10.17 (18.23)
S.E. (m)	**0.120**	**1.90**	**0.11**	**0.04**	**1.46**	**0.31**
C.D. *(Factor-II)*	**0.327**	**NS**	**0.18**	**0.20**	**NS**	**0.93**
C.D. ***(Factor-I) X (Factor-II)***	**NS**	**NS**	**0.20**	**0.28**	**NS**	**NS**

CBE-Coimbatore, LG- Lam Guntur, DH- Dharwad, RC- Raichur, ND- Nandyal, CN- Chamarajanagar, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are angular transformed values.

Table: 329. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on fruiting body retention percent

(Factor-I) Planting system	**CBE**	**LG**	**DH**	**RC**	**ND**	**CN**
	OV	**OV**	**OV**	**OV**	**OV**	**OV**
HDPS	84.07 (9.17)	61.40 (51.59)	56.37 (48.71)	53.82 **(**47.19**)**	58.80 (50.09)	62.08 (52.03)
HDPS with IPM	84.56 (9.20)	68.67 (55.96)	68.46 (56.01)	77.70 **(**61.82**)**	64.70 (53.58)	68.30 (55.80)
S.E (m)	**1.328**	**0.67**	**0.24**	**0.95**	**0.29**	**0.06**
C.D. *(Factor-I)*	**3.656**	**1.98**	**0.71**	**1.36**	**0.86**	**0.35**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	81.41 (9.02)	60.72 (51.19)	58.97 (50.15)	53.24 **(**46.86**)**	46.30 (42.90)	63.03 (52.61)
HDPS (90X15cm)	87.57 (9.36)	69.35 (56.38)	57.07 (49.04)	60.98 **(**51.34**)**	54.30 (47.94)	64.93 (53.74)
De-topping (105cm or 20 nods)	84.3 (9.18)	70.19 (56.90)	56.65 (48.80)	65.93 **(**54.29**)**	55.30 (48.07)	68.48 (55.92)
MC @45PPM at square initiation	86.12 (9.28)	69.19 (56.28)	66.80 (54.79)	72.96 **(**58.67**)**	58.10 (49.69)	63.74 (53.05)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	81.99 (9.05)	69.93 (56.75)	66.32 (54.50)	71.80 **(**57.92**)**	57.20 (43.42)	64.82 (53.69)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	84.49 (9.19)	70.54 (57.12)	68.69 (55.95)	67.77 **(**55.41**)**	59.10 (50.27)	66.13 (54.47)
S.E. (m)	**2.354**	**0.08**	**0.24**	**0.60**	**0.51**	**1.51**
C.D. *(Factor-II)*	**6.332**	**0.23**	**1.23**	**3.05**	**NS**	**NS**
C.D. ***(Factor-I) X (Factor-II)***	**NS**	**NS**	**1.74**	**4.31**	**NS**	**NS**

CBE-Coimbatore, LG- Lam Guntur, DH- Dharwad, RC- Raichur, ND- Nandyal, CN- Chamarajanagar, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are angular transformed values.

Table: 330. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on open boll damage percent

(Factor-I) Planting system	**CBE**	**LG**	**DH**	**RC**	**ND**	**CN**
	OV	**OV**	**OV**	**OV**	**OV**	**OV**
HDPS	8.31 (2.88)	24.33 (29.55)	39.61 (38.87)	47.99 **(**43.85**)**	9.90 (18.38)	17.06 (24.35)
HDPS with IPM	8.41 (2.9)	20.47 (26.90)	22.31 (28.17)	17.56 **(**24.77**)**	10.50 (18.96)	7.83 (16.22)
S.E (m)	**0.095**	**0.56**	**0.18**	**0.22**	**0.18**	**0.15**
C.D. *(Factor-I)*	**0.290**	**1.79**	**0.54**	**1.36**	**0.52**	**1.01**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	8.89 (2.98)	21.67 (27.74)	21.68 (27.74)	31.20 **(**33.96**)**	10.90 (19.27)	13.91 (21.44)
HDPS (90X15cm)	7.78 (2.79)	24.17 (29.44)	18.99 (25.83)	36.93 **(**37.42**)**	10.70 (19.15)	14.45 (21.99)
De-topping (105cm or 20 nods)	8.32 (2.88)	22.00 (27.97)	19.18 (25.96)	33.48 **(**35.35**)**	11.00 (19.34)	10.43 (18.51)
MC @45PPM at square initiation	8.39 (2.9)	22.33 (28.20)	20.07 (26.61)	32.80 **(**34.94**)**	10.60 (19.00)	12.20 (20.12)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	8.845 (2.97)	25.00 (30.00)	20.05 (26.59)	31.38 **(**34.07**)**	8.70 (17.16)	11.92 (19.85)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	7.95 (2.82)	25.00 (30.00)	18.84 (25.72)	30.87 **(**33.75**)**	9.70 (18.10)	11.78 (19.79)
S.E. (m)	**0.184**	**0.22**	**0.31**	**0.12**	**0.31**	**0.41**
C.D. *(Factor-II)*	**0.502**	**0.65**	**0.67**	**0.61**	**0.91**	**1.22**
C.D. ***(Factor-I) X (Factor-II)***	**NS**	**0.56**	**1.17**	**0.87**	**1.29**	**NS**

CBE-Coimbatore, LG- Lam Guntur, DH- Dharwad, RC- Raichur, ND- Nandyal, CN- Chamarajanagar, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are angular transformed values**.**

Table: 331. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on locule damage percent

(Factor-I) Planting system	**CBE**	**LG**	**DH**	**RC**	**ND**	**CN**
	OV	**OV**	**OV**	**OV**	**OV**	**OV**
HDPS	6.83 (2.61)	23.47 (28.98)	25.7 (30.44)	41.20 **(**39.93**)**	5.20 (13.16)	18.18 (25.20)
HDPS with IPM	6.55 (2.56)	20.20 (26.71)	17.87 (24.99)	15.85 **(**23.46**)**	6.20 (14.49)	8.92 (17.34)
S.E (m)	**0.068**	**0.25**	**0.05**	**0.23**	**0.23**	**0.12**
C.D. *(Factor-I)*	**0.213**	**0.77**	**0.163**	**1.37**	**0.70**	**0.81**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	7.75 (2.78)	24.45 (29.63)	21.26 (27.44)	28.59 **(**32.32**)**	5.30 (13.27)	15.03 (22.41)
HDPS (90X15cm)	5.71 (2.39)	27.47 (31.61)	25.15 (30.08)	32.12 **(**34.52**)**	5.90 (14.10)	15.57 (22.93)
De-topping (105cm or 20 nods)	6.55 (2.56)	24.22 (29.48)	24.31 (29.52)	29.27 **(**32.75**)**	6.50 (14.77)	11.55 (19.59)
MC @45PPM at square initiation	6.54 (2.56)	24.69 (29.79)	22.08 (28.01)	28.28 **(**32.13**)**	5.90 (14.10)	13.53 (21.32)
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	7.15 (2.67)	25.85 (30.56)	18.48 (25.44)	26.51 **(**30.99**)**	4.60 (12.41)	13.04 (20.87)
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	6.45 (2.54)	25.83 (30.55)	19.45 (26.15)	25.37 **(**30.24**)**	6.10 (14.30)	12.60 (20.49)
S.E. (m)	**0.081**	**0.12**	**0.09**	**0.04**	**0.41**	**0.42**
C.D. *(Factor-II)*	**0.370**	**0.37**	**0.28**	**0.20**	**1.21**	**1.25**
C.D. ***(Factor-I) X (Factor-II)***	**NS**	**0.48**	**0.40**	**0.28**	**1.72**	**NS**

CBE-Coimbatore, LG- Lam Guntur, DH- Dharwad, RC- Raichur, ND- Nandyal, CN- Chamarajanagar, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are angular transformed values.

Table: 332. Ent.7. Effect of agronomic intervention (HDPS and HDPS with IPM) on yield (Qt.) per hectare

(Factor-I) Planting system	**CBE****	**LG****	**DH**	**RC**	**ND**	**CN**
	OV	**OV**	**OV**	**OV**	**OV**	**OV**
HDPS	1028	1775	15.82	11.91	-	14.71
HDPS with IPM	1047.83	2025	21.10	15.86	-	20.14
S.E (m)	**5.689**	**53**	**0.50**	**0.18**	**-**	**0.003**
C.D. *(Factor-I)*	**34.268**	**162**	**1.49**	**0.56**	**-**	**0.018**
(Factor-II) Detopping and Growth regulators	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**
Conventional Planting (90x60cm)	1012.5	1488	15.15	11.80	-	15.98
HDPS (90X15cm)	1067.5	1597	18.33	14.26	-	18.01
De-topping (105cm or 20 nods)	1043	1865	18.66	14.41	-	18.93
MC @45PPM at square initiation	1047	1775	19.29	14.10	-	16.67
Cyclanilide 2.10% w/w+MC 8.40SC @8 to 10 ml	1006	1728	19.71	14.18	-	17.45
Chlormequat chloride 50% SL (Cycocil) @ 60ppm.	1051.5	1728	19.63	14.57	-	17.51
S.E. (m)	**8.698**	**12**	**-**	**0.09**	**-**	**0.08**
C.D. *(Factor-II)*	**59.384**	**38**	**2.58**	**0.46**	**-**	**NS**
C.D. ***(Factor-I) X (Factor-II)***	**NS**	**94**	**1.12**	**0.65**	**-**	**NS**

CBE-Coimbatore, LG- Lam Guntur, DH- Dharwad, RC- Raichur, ND- Nandyal, CN- Chamarajanagar, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, **Data in kg/ha.

Table: 333. Ent.7. Interaction effects of HDPS and HDPS with IPM on Jassid & Whitefly

Treatment *(Factor-I)- Planting system (Factor-II) -HDPS Treatments*	Jassid/3 leaves						Jassid/3 leaves		Whitefly/3 leaves	
	DH		RC		ND		CN			
	HDPS	HDPS + IPM	HDPS	HDPS + IPM	HDPS	HDPS + IPM	HDPS	HDPS + IPM	HDPS	HDPS + IPM
	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV
Conventional planting	7.48 (2.82)	3.13 (1.91)	8.47 (3.00)	2.89 (1.84)	8.07 (2.93)	6.67 (2.68)	11.49 (3.52)	3.34 (2.06)	5.58 (2.56)	3.04 (1.99)
90 x 15 cm planting	7.11 (2.76)	4.96 (2.34)	9.46 (3.16)	4.00 (2.12)	8.20 (2.95)	6.47 (2.64)	13.59 (3.81)	4.25 (2.24)	6.83 (2.79)	4.33 (2.29)
Detopping	7.08 (2.75)	3.18 (1.92)	9.08 (3.09)	3.05 (1.88)	8.37 (2.97)	6.10 (2.56)	5.94 (2.61)	3.56 (2.09)	3.75 (2.16)	2.45 (1.83)
Mepiquat chloride	6.80 (2.70)	3.18 (1.92)	9.18 (3.11)	3.39 (1.97)	8.40 (2.98)	6.27 (2.60)	7.95 (2.98)	5.98 (2.61)	4.15 (2.25)	3.22 (2.03)
Cyclanilide 2+ MC	6.89 (2.72)	2.95 (1.86)	7.76 (2.87)	2.66 (1.78)	8.43 (2.99)	6.50 (2.64)	7.22 (2.86)	5.44 (2.48)	5.04 (2.43)	3.22 (2.03)
Chlormequat chloride	6.79 (2.70)	3.17 (1.92)	9.17 (3.11)	4.31 (2.19)	8.73 (3.03)	6.77 (2.69)	7.34 (2.87)	4.61 (2.32)	4.57 (2.34)	3.23 (2.03)
C.D. *(Factor-I)*	**0.08**		**0.03**		**0.08**		**0.19**		**0.05**	
C.D. *(Factor-II)*	**0.14**		**0.05**		**0.14**		**0.20**		**0.15**	
C.D. ***(Factor-I) X (Factor-II)***	**0.07 (S)**		**0.07 (S)**		**0.07 (S)**		**0.31 (S)**		**0.19 (S)**	

CBE-Coimbatore, LG- Lam Guntur, DH- Dharwad, RC- Raichur, ND- Nandyal, CN- Chamarajanagar, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are square root transformed values.

Table: 334. Ent.7. Interaction effects of HDPS and HDPS with IPM on thrips & Green boll damage percent due to PBW

Treatment *(Factor-I) Planting system (Factor-II) Detopping and Growth regulators*	**DH**				**RC**				**ND**		**CN**	
	GBD%		**Thrips/3 leaves**		**Thrips/3 leaves**		**GBD%**		**Thrips/3 leaves**		**Thrips/3 leaves**	
	HDPS	**HDPS + IPM**	**HDPS**	**HDPS + IPM**	**HDPS**	**HDPS + IPM**	**HDPS**	**HDPS + IPM**	**HDPS**	**HDPS + IPM**	**HDPS**	**HDPS + IPM**
	OV	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**	**OV**
Conventional planting	29.33 (32.78)	22.67 (28.42)	4.20 (2.17)	0.86 (1.16)	3.52 (2.01)	0.92 (1.19)	36.81 (37.35)	19.53 (26.23)	30.23 (5.53)	19.80 (4.50)	14.37 (3.91)	5.28 (2.48)
90 x 15 cm planting	32.67 (34.84)	27.33 (31.51)	4.28 (2.19)	1.04 (1.24)	4.97 (2.34)	1.94 (1.56)	39.50 (38.94)	25.67 (30.44)	31.90 (5.68)	20.87 (4.62)	16.03 (4.12)	7.10 (2.82)
Detopping	30.67 (33.61)	24.67 (29.77)	4.71 (2.28)	0.85 (1.16)	4.58 (2.25)	1.08 (1.26)	37.03 (37.48)	19.02 (25.86)	29.90 (5.50)	21.63 (4.70)	8.96 (3.15)	5.10 (2.43)
Mepiquat chloride	32.00 (34.44)	25.33 (30.21)	4.81 (2.31)	0.93 (1.20)	4.81 (2.30)	1.14 (1.28)	38.78 (38.52)	20.77 (27.12)	31.13 (5.62)	21.43 (4.68)	10.84 (3.43)	8.85 (3.12)
Cyclanilide 2+ MC	32.67 (34.84)	26.67 (31.08)	4.87 (2.32)	0.87 (1.17)	5.60 (2.47)	1.60 (1.45)	37.67 (37.86)	14.75 (22.59)	30.47 (5.56)	21.67 (4.70)	10.19 (3.33)	8.36 (3.02)
Chlormequat chloride	38.67 (38.43)	27.33 (31.51)	4.77 (2.29)	0.91 (1.19)	5.27 (2.40)	0.97 (1.21)	38.78 (38.52)	13.90 (21.89)	30.87 (5.58)	21.37 (4.67)	10.37 (3.36)	7.38 (2.86)
C.D. *(Factor-I)*	**0.32**		**0.05**		**0.06**		**0.11**		**0.05**		**0.21**	
C.D. *(Factor-II)*	**0.20**		**NS**		**0.10**		**0.20**		**NS**		**0.26**	
C.D. ***(Factor-I)* X *(Factor-II)***	**0.23 (S)**		**0.12 (S)**		**0.14 (S)**		**0.28 (S)**		**0.12 (S)**		**0.39 (S)**	

DH- Dharwad, RC- Raichur, ND- Nandyal, CN- Chamarajanagar, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are square root/ angular transformed values.

Table: 335. Ent.7. Interaction effects of HDPS and DPS with IPM on open boll damage & fruiting body retention

Treatment *(Factor-I) Planting system (Factor-II) Detopping and Growth regulators*	LG		DH				RC				ND	
	Open boll damage (%)		Fruiting body retention percent		Open boll damage (%)		Open boll damage (%)		Fruiting body retention percent		Open boll damage (%)	
	HDPS	HDPS +IPM	HDPS	HDPS + IPM	HDPS	HDPS + IPM	HDPS	HDPS + IPM	HDPS	HDPS + IPM	HDPS	HDPS + IPM
	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV
Conventional planting	26.67 (31.09)	16.67 (24.10)	56.03 (48.45)	61.92 (51.87)	37.69 (44.44)	32.18 (34.54)	45.67 (42.52)	16.73 (24.14)	51.20 (45.69)	55.27 (48.03)	11.10 (19.46)	10.70 (19.08)
90 x 15 cm planting	28.33 (32.16)	20.00 (26.67)	54.81 (47.74)	59.32 (50.35)	43.35 (41.16)	22.38 (28.22)	49.67 (44.81)	24.19 (29.46)	54.97 (47.85)	67.00 (54.94)	10.43 (18.85)	11.10 (19.46)
Detopping	25.67 (30.44)	18.33 (25.35)	54.01 (47.28)	59.28 (50.33)	37.99 (38.03)	24.95 (29.65)	48.54 (44.16)	18.41 (25.41)	52.48 (46.42)	79.39 (63.00)	11.27 (19.62)	10.67 (19.07)
Mepiquat chloride	26.33 (30.87)	18.33 (25.35)	58.78 (50.04)	74.82 (59.86)	38.36 (38.25)	18.53 (25.48)	47.66 (43.66)	17.94 (25.06)	55.64 (48.24)	90.29 (71.84)	10.37 (18.78)	10.87 (19.23)
Cyclanilide 2+ MC	28.33 (32.16)	21.67 (27.74)	56.67 (48.81)	75.98 (60.63)	40.14 (39.30)	17.97 (25.07)	48.45 (44.11)	14.30 (22.22)	53.41 (46.95)	90.19 (71.74)	7.33 (15.71)	10.20 (18.61)
Chlormequat chloride	26.67 (31.09)	23.33 (28.88)	57.94 (49.55)	79.44 (63.01)	40.10 (39.28)	17.85 (24.98)	47.94 (43.82)	13.79 (21.80)	55.23 (48.00)	80.31 (63.66)	9.43 (17.89)	9.87 (18.31)
C.D. *(Factor-I)*	**0.20**		**0.71**		**2.80**		**0.35**		**1.76**		**0.52**	
C.D. *(Factor-II)*	**0.16**		**1.23**		**0.67**		**0.61**		**3.05**		**0.91**	
C.D. ***(Factor-I)* X *(Factor- II)***	**0.43 (S)**		**1.74 (S)**		**1.17 (S)**		**0.87 (S)**		**4.31 (S)**		**1.29 (S)**	

CBE-Coimbatore, LG- Lam Guntur, DH- Dharwad, RC- Raichur, ND- Nandyal, CN- Chamarajanagar, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are angular transformed values.

Table: 336. Ent.7. Interaction effects of HDPS and HDPS with IPM on locule damage percent

Treatment *(Factor-I) Planting system* *(Factor-II) Detopping and Growth regulators*	LG		DH		RC		ND	
	HDPS	HDPS + IPM	HDPS	HDPS + IPM	HDPS	HDPS + IPM	HDPS	HDPS + IPM
	OV	OV	OV	OV	OV	OV	OV	OV
Conventional planting	31.00 (33.83)	17.90 (28.98)	23.49 (28.98)	19.04 (25.86)	40.95 (39.78)	16.23 (23.76)	6.33 (14.54)	4.33 (12.00)
90 x 15 cm planting	32.17 (34.55)	22.77 (26.71)	32.85 (34.95)	17.46 (24.69)	42.39 (40.63)	21.86 (27.87)	7.00 (15.32)	5.00 (12.89)
Detopping	30.33 (33.42)	18.10 (25.18)	29.47 (32.87)	19.16 (25.95)	41.16 (39.91)	17.38 (24.64)	6.33 (14.57)	6.67 (14.96)
Mepiquat chloride	30.50 (33.52)	18.87 (25.75)	25.49 (30.31)	18.67 (25.59)	41.58 (40.15)	16.98 (24.33)	5.00 (12.89)	7.00 (15.32)
Cyclanilide 2+ MC	31.93 (34.41)	19.77 (26.40)	21.11 (27.34)	15.86 (23.46)	41.18 (39.92)	11.85 (20.13)	2.33 (8.75)	7.67 (16.08)
Chlormequat chloride	32.93 (35.02)	18.73 (25.64)	21.82 (27.84)	17.08 (24.40)	39.92 (39.18)	10.82 (19.20)	5.00 (12.89)	7.33 (15.71)
C.D. *(Factor-I)*	**0.14**		**0.16**		**0.12**		**0.70**	
C.D. *(Factor-II)*	**0.20**		**0.28**		**0.20**		**1.21**	
C.D. ***(Factor-I) X (Factor-II)***	**0.34 (S)**		**0.40 (S)**		**0.28 (S)**		**1.72 (S)**	

LG- Lam Guntur, DH- Dharwad, RC- Raichur, ND- Nandyal, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, *Data in parentheses are angular transformed values.

Table: 337. Ent.7. Interaction effects of HDPS and HDPS with IPM on yield (Qt.) per hectare

Treatment *(Factor-I)* *Planting system* *(Factor-II) Detopping and Growth regulators*	LG**		DH		RC	
	HDPS	HDPS + IPM	HDPS	HDPS + IPM	HDPS	HDPS + IPM
	OV	OV	OV	OV	OV	OV
Conventional planting	1295	1681	13.66	16.64	10.40	13.19
90 x 15 cm planting	1325	1869	15.91	20.74	12.63	15.89
Detopping	1498	2231	16.03	21.29	12.31	16.52
Mepiquat chloride	1437	2113	16.13	22.45	11.99	16.20
Cyclanilide 2+ MC	1410	2046	16.81	22.61	12.15	16.22
Chlormequat chloride	1435	2021	16.39	22.86	11.99	17.16
C.D. *(Factor-I)*	**32**		**1.48**		**0.27**	
C.D. *(Factor-II)*	**108**		**2.58**		**0.46**	
C.D. ***(Factor-I) X (Factor-II)***	**144 (S)**		**1.12 (S)**		**0.65 (S)**	

LG- Lam Guntur, DH- Dharwad, RC- Raichur, HDPS-High density planting system, IPM-Integrated pest management, S.E.-Standard error, C.D.- Critical difference, MC-Mepiquat Chloride, OV-Overall value, **Data in kg/ha.

Plant Protection
Plant Pathology Results

PLANT PATHOLOGY: 2024-25

The following experiments were conducted in the discipline of Plant Pathology under the All India Coordinated Research Project (AICRP) on Cotton at different centers in North Zone (Faridkot, Bathinda, Hisar, ICAR-CICR, RS Sirsa, Sriganganagar), in Central Zone (Akola, Nanded, Surat, Bharuch, Junagadh, Khandwa, Bhawanipatna, ICAR-CICR-Nagpur) and South Zone (Lam Guntur, Dharwad, Coimbatore):

Project	Title of the project	Participating Centers
Path.1	**Observations on the occurrence of the diseases (in farmer's fields and research farms)**	
Path.1(a)	Observations on the occurrence of various diseases (in farmer's fields and research farms)	All centers of the North, Central, and South zones
Path.1(b)	Disease progress in relation to weather factors	North (Faridkot, Sriganganagar, Hisar, Sirsa); Central (Nanded, Akola, Surat, Junagarh, Khandwa); South (Dharwad, Lam-Guntur, Coimbatore)
Path.1(d)	Survey and epidemiology of TSV	All centers- Guntur, Coimbatore
Path.1(e)	Studies on the variability in *Corynespora* leaf spot in cotton	All centers- Junagarh, Khandwa, Lam-Guntur
Path. 2	**Screening of AICRP entries for disease reaction and confirmation**	
Path.2(a)	Screening of breeding lines for disease reaction	All centers
Path.2(b)	Confirmation and maintenance of disease-resistant lines	All centers
Path.2(c)	Monitoring of resistance against CLCuD in cotton	North (Sriganganagar, Hisar, Bathinda)
Path. 3	**Management of cotton diseases**	
Path.3(j)	Management of boll rot and foliar diseases of Cotton through CIB&RC recommended new chemical pesticides and their Combinations	North (Sriganganagar); Central (Khandwa, Nanded); South (Coimbatore)
Path.3(k)	Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil-borne disease management	North (Sirsa, Bathinda, Hisar); Central (Junagarh, Nanded); South (Dharwad, Lam-Guntur, Coimbatore)
Path.3(L)	Field evaluation of Endophytic BCAs along with chemicals for seed and soil-borne diseases	North (Hisar, Faridkot, Bathinda) Central (Junagarh, Nanded), South, (Coimbatore, Dharwad, Guntur)
Path.3(m)	Management of TSV disease on cotton through its vector management	All centers (Nanded, Guntur)
Path. 4	**Crop loss estimation and distribution pattern of cotton diseases**	
Path.4(e)	Exp. 1a. Crop loss estimation due to CLCuD	North (Hisar, Faridkot, Sriganganagar)
Path.4(e)	Exp. 1a-1. Crop loss estimation due to TSV	Rahuri, Nanded, Guntur

Path.4(e)	Exp. 1b. Study on the distribution pattern of cotton leaf curl virus disease on local popular Bt hybrid at farmer's fields	North Zone (Hisar, Faridkot, Sriganganagar)
Path.4(e)	Exp. 1c. Study on distribution pattern of TSV disease on local popular Bt hybrid at farmer's field.	South Zone (Guntur, Coimbatore)
Path 5.	**Organic cotton cultivation**	
Path 5.	Developing and testing of organic nutrient, pest, and disease management modules in cotton-based cropping system	North Zone (Sirsa, Bathinda), Central Zone (Surat, Akola, Khandwa, Junagarh)
Concluding Experiments-recommendations		
Path.3(j)	Management of boll rot and foliar diseases of Cotton through CIB&RC recommended new chemical pesticides and their combinations.	Coimbatore
Path.3(k)	Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil-borne disease management	North Zone (Hisar, Sirsa, Bathinda); Central Zone (Junagarh, Surat); South Zone (Dharwad, Guntur, Coimbatore)

Research Findings:
AICRP on Cotton: Plant Pathology (2024-25)

Path.1 Observations on the occurrence of cotton diseases (in farmers' fields & research farms)

Path.1 (a): Observations on the occurrence of various diseases (in the farmer's field and research farms)

Farmer's field surveys were conducted by the designated AICRP on cotton- Research Centers to record the occurrence of various diseases in various cotton varieties/ hybrids (about 10 locations in each village). The surveys in the farmer's fields were conducted thrice at regular intervals during the early/vegetative stage, mid/flowering, and late cropping /boll development stage in the defined cotton-growing farmer's fields. However, at on-station trials (research farm), the occurrence of various diseases in various cotton varieties/ hybrids was recorded five times during the season at monthly intervals in all three cotton-growing zones.

NORTH ZONE

District Faridkot, Fazilka, Muktsar (Punjab)

Farmer's field survey was conducted by PAU Regional Station, Faridkot during the early, mid, and late cropping seasons thrice at regular intervals in three cotton-growing districts of Punjab. The data from cotton hybrids (RCH-926, RCH-846, ACH-177, Diggaz, ACH 777, RCH-776, RCH-773, Balraj, and Sim Sim) were recorded from Faridkot, Fazilka, and Muktsar (Table 1a). During the early (20-30 DAS) and mid-season (60-80 DAS) bacterial leaf blight (BLB), fungal foliar spots (FFS), were not observed. During mid-season (60-80 DAS) the percent disease index (PDI) of CLCuD was observed to be in the range of 8.3-14.7%. During the late season (120-150 DAS) the PDI of FFS and CLCuD were observed to be in the range of 3.5-10.0% and 29.7-44.0%, respectively. When comparing the disease incidence in the popular hybrids, the highest CLCuD PDI was recorded in RCH-926, RCH-846, while FFS PDI was recorded highest in the hybrid RCH-926 and ACH-177 in the Fazilka and Faridkot districts. In Muktsar, the average CLCuD PDI was observed to be 11.6% and 35.6% during mid and late-season, respectively. While in-district Fazilka the average CLCuD PDI ranged from 12.2 to 37.3%, respectively while in Faridkot it ranged from 10.6 to 33.3%, respectively. Overall average CLCuD PDI was observed to be 11.5 and 35.4% during the mid and the late seasons, respectively in all three districts. Overall, the PDI of FFS was observed to be 6.0% during the late season in these districts **(Table 1a).**

At Faridkot research station farm, the disease incidence and severity were recorded five times at research farms on the hybrid PAU Bt 2, PAU Bt 3, F 1861, F 846, F 1378, F 2164, F 2383, F 505, F 1054, F 2381 F2228, RST 9, HS 6, RCH 926, RCH 773, RCH 776, ACH 177, US 51, NCS 9013 and Ankur 3028. The severity of CLCuD was recorded at 60 DAS (PDI 5.0%) and it reached its peak at 120 DAS (52.0%) **(Table 1b).**

District Bathinda (Blocks: Maur, Talwandi sabo, Sangat, Nathana & Rampura) Punjab

The cotton farmers' field survey was conducted by PAU, Regional Station, Bathinda thrice at regular intervals and at research farms five times to record the incidence and severity of the cotton diseases. The majority of BGII cotton hybrids grown in blocks of Bathinda district (Blocks: Bathinda, Maur, Talwandi Sabo, Sangat, and Rampura) were RCH-926 BG II, RCH-773 BG II, Balraaj, Tata Diggaj, RCH 776 BG II, Teja+, SP-7272 BG II, ACH-777 BG II, and Parinda. The incidence and the severity of the CLCuD were

found to be comparatively higher in *Kharif* in 2024 than in the previous year (2023). An initial incidence (Grade I) of CLCuD was noticed in a farmer's field in the village Kuti Kishan pura (Bathinda District) in VICH-308 BG II (Teja+) in the second fortnight of July 2024. CLCuD severity ranged from 6.5 to 30% and 16.5 to 43.3% during mid and late seasons, respectively. The highest average CLCuD incidence (34.7%) was recorded in the Sangat block in the late season. The average CLCuD incidence in district Bathinda was observed to be 21.6% and 31.5% during mid and late-season, respectively **(Table 2a).**

An incidence of root rot was observed in the 2-3 scattered isolated spots in the farmer's field after the first irrigation. The incidence of Parawilt was also noticed in the farmer's field at very few locations due to the water stagnation during the late season in Bathinda, Talwandi, Sangat and Nathana Block. An incidence of the fungal foliar spot caused by the fungi viz. *Myrothecium*/*Cercospora* spp. was observed both at the farmer's field and in the experimental research trials after 125-130 DAS. Internal/external boll rot incidence was almost negligible during the season **(Table 2a).**

At RRS research farm Bathinda, the disease incidence was recorded on the hybrid RCH-773, ACH 177, RCH 926 and RCH 846. The CLCuD incidence was observed on ACH 177 in 3rd week of July and it reached its peak in September in all the test hybrids RCH-773, ACH 177, RCH 926 and RCH 846 (73.3, 48.3, 36.7, and 16.6%, respectively). Comparatively, the MLS PDI (2.5, 2.5, and 2.5) respectively, was also observed on tested cultivars during September while RCH-846 was free from MLS (**Table 2b**).

Sriganganagar and Hanumangarh (Rajasthan)

The farmer's fields data on disease intensity of CLCuD was recorded during *Kharif* 2024 by ARS Sriganganagar in the cotton-growing districts of Rajasthan (Sriganganagar and Hanumangarh). In the Sriganganagar district, the average PDI of the CLCuD during the late season was found to be 26.2 and 30.3% during the mid and late season, respectively with the highest (44.8%) in the village Kaliyan, and the highest incidence (88%) in Khakha village. In the Hanumangarh district, the CLCuD PDI ranged from 7.8 to 18.2% with the highest in the village Jandawali (18.2%) during late season, however, the incidence ranged between 37 to 55%. Overall in Sriganganagar district, the incidence and PDI of CLCuD were not recorded during the early season but during the mid- and late season, PDI of CLCuD were 26.2 and 30.3%, respectively.

During the late season, the incidence and PDI of CLCuD were recorded to be in the range of 56 to 88% and 16.8% to 44.8% in Sriganganagar. In the Hanumangarh district also, the incidence and PDI of CLCuD were not recorded during the early season but during the mid-season, the incidence and PDI of CLCuD were in the range of 15-40% and 5.0-16.2%. In the late season, the incidence and PDI of CLCuD were recorded to be in the range of 37.0-55.0% and 7.8-19.3%. Overall, in these districts, the average CLCuD incidence and PDI were recorded at 18.4% during the mid and 22.4% during the late season, respectively **(Table 3a).**

At the research farm of ARS SKRAU, Sriganganagar, the disease incidence, and PDI were recorded on all hybrids namely, RCH773, RCH926, RCH650, US 51, NCS 9013, ACH 177, RS2013, RST-9, HS-6, F846, RS 2818, PAU Bt 3. The incidence and PDI of CLCuD were observed from 60 DAS to 105 DAS in the range of 8.3-25.0% and 25.0-58.3%, respectively. While, the peak incidence and PDI of CLCuD were observed after 105 days after sowing and these were recorded as 94.0% and 40.6%, respectively **(Table 3b).**

Hisar, Fatehabad, Sirsa, Jind, Bhiwani and Mahendergarh (Haryana)

The intensive field survey was conducted in major cotton-growing districts of Haryana (Hisar, Fatehabad, Sirsa, Jind, Bhiwani and Mahendergarh) to record the incidence and severity of different diseases in various cotton varieties/ hybrids. During the early season, diseases were not observed. During

mid-season, the CLCuD, Myrothecium Leaf Spot (MLS) and root rot (RR) were observed in the range of 0.0-1.6%, 0.1-1.0% and 0.0-6.2%, respectively. During the late season, the CLCuD, sooty mold (SM), MLS and RR were observed to be in the range of 1.7-33.3%, 0.0-2.0%, 5.5-17.6% and 0.0-9.2%, respectively. The average PDI of CLCuD, MLS and RR in district Hisar during the mid-season was 0.25, 0.62, and 2.01%, respectively. During the late season, the increased PDI of CLCuD, SM, MLS and RR observed was 17.74, 0.63%, 11.57%, and 4.25%, respectively. In district Fatehabad, the average PDI of CLCuD, SM, MLS and root rot was observed during mid-season, 0.5%, 0.0%, 0.6% and 2.5%, while during late-season it was 22.5%, 0.9%, 10.3% and 4.9%, respectively. In district Sirsa, the average PDI of CLCuD, MLS, and root rot during mid-season was observed at 0.27%, 0.70% and 1.65%, while it was increased to 21.29%, 0.83%, 12.7% and 3.72% during the late season, respectively. In district Jind, the average PDI of CLCuD, MLS and RR was observed at 0.7%, 0.6% and 1.7% during mid-season and 18.3%, 0.6%, 9.5% and 3.2% during late-season, respectively. In district Bhiwani, the average PDI of CLCuD, SM, MLS and RR was observed to be 0.0%, 0.0%, 0.4% and 0.8% during mid-season and 4.9%, 0.0%, 9.9% and 1.5% during late-season, respectively. While in district Mahendergarh, the average PDI of CLCuD, SM, MLS and RR were recorded 0.0%, 0.0% 0.3% and 0.2% during mid-season and 3.3%, 0.0%, 7.7% and 0.4%, during late-season, respectively. Comparatively, the highest average CLCuD PDI (22.5%) was observed in the Fatehabad district followed by the Sirsa district (21.29%) during the late season. Overall, in these districts, the highest CLCuD, SM, MLS and RR were recorded to be 14.7%, 0.5%, 10.3% and 3.0% during the late season. Comparatively, the highest CLCuD, SM MLS and root rot were recorded in the hybrid RCH-776, BIO-6488 and RCH-773 compared to other popular BGII hybrids **(Table 4a)**.

At the research farm (HAU, Hisar) the disease incidence was observed on the BGII hybrids- RCH-773, NCS-9013, ACH-177 and US51. The CLCuD, SM, MLS and root rot were observed in RCH-773, NCS-9013, ACH-177 and US51 with the PDI of 10.1, 0.3, 7.0 and 7.8% with the highest CLCuD PDI of 22.3% during October **(Table 4b).**

CENTRAL ZONE

Path.1 (a): Observations on the occurrence of various diseases (in the farmer's field and research farms).

Nanded, Jalna, Parbhani and Aurangabad (Maharashtra).

Regular surveys were conducted by Cotton Research Station, VNMKV Nanded, in the farmers' fields in four cotton-growing districts of Maharashtra (Nanded, Jalna, Parbhani and Aurangabad). The data were recorded from cotton hybrids (Rasi 659, Moksh, Kaweri, Jadoo, Swift, NH 1904 Bt, NH 1901 Bt, NH 1902 Bt, Dhandev, Navneet,). In Nanded, during the early season, bacterial leaf blight (BLB) was recorded in the range of 0.0-0.5%. During the mid-season, *Alternaria* leaf spot, bacterial leaf blight (BLB), grey mildew, parawilt and TSV were recorded in the range of 0.0-5.0, 0.5-5.0, 0.0-1.0, 0.0-0.5 and 0.0-5.5% in the Nanded district. During the late season, ALS, BLB GM and boll rot were recorded in the range of 5.0-15.50, 5.0-13.0, 8.0-27.50 and 0.0-1.0%. When comparing the disease incidence in the popular BGII hybrids, the highest BLB (15.0%), ALS (15.50%), were recorded in the hybrid Jadoo, Swift, Kaweri, Rasi 659 and GM (27.50%) was the highest in Kaweri, Rasi 659 respectively, in the Nanded district. The ALB, and root rot were not observed during the early season in districts Jalna, Parbhani and Aurangabad. However, the average incidence of BLB and root rot was recorded to be 0.5-5.0% in all districts. In Jalna, Nanded parawilt was observed during the mid-season (0.50%). TSV was observed only in Nanded with 0.50% PDI. Overall, in these districts, the highest PDI of ALS BLB and GM were recorded during the late season as 8.17, 8.83 and

16.8%, respectively. The highest disease incidence in Nanded and Aurangabad was recorded in Jadoo, Swift, Kaweri, Rasi 659 popular hybrids (BLB-15.00%), ALS-15.50% and GM-27.50%) (Table 5a). Overall, the average TSV 2.75% during mid and ALS 9.41%, BLB 11.52%, and grey mildew 15.52% during late season were recorded.

At the research farm (CRS Nanded), the disease incidence was recorded on the cotton hybrids (Rasi 659, Moksh, Kaweri, Jadoo, Swift, NH 1904 Bt, NH 1901 Bt, NH 1902 Bt, Dhandev, Navneet,). The incidence of ALS, GM, BLB, parawilt and TSV was recorded during September and reached its maximum of 18.20, 27.25, 15.00, 0.50 and 5.50% in November and December. However, the PDI of BLB ranged from 0.50 to 15.00% from August to December. The incidence of TSV was observed in September but it reached its peak of 5.50% in September **(Table 5b).**

Akola and Buldhana district (Maharashtra)

The survey was conducted in the farmer's fields of Akola and Buldhana districts of Maharashtra and the data were recorded from different cotton hybrids (Ajeet 155 Bt II, Swift Bt BG II, Jadoo Bt, First class BG II, Neo Bt BG II, Bhakti Bt, Rajat Bt, Mallika Bt and PDKV, JKAL-116). The three diseases namely BLB, GM and MLS were observed during the late season and their incidence was recorded in the range of 3.75-13.75%, 8.75-16.75% and 6.25-15.00%, respectively. The average PDI of BLB, GM and MLS in district Akola during the late season was 8.19, 12.19 and 8.75%, respectively. While, in district Buldhana, the average PDI of BLB, GM and MLS were observed at 10.63, 10.29 and 13.13 %, respectively. Overall, in these districts, the average PDI of BLB, GM and MLS were 8.94, 11.56 and 11.25%, respectively. Comparatively, the GM was found higher in Akola and MLS was found in Buldhana. When comparing the disease incidence in the popular hybrids, the highest BLB (13.75%) and GM (16.25%) in Swift Bt BG II were observed **(Table 6a).**

At research farm MPKV Akola, among six cotton BGII hybrids, BLB was observed in all six hybrids while GM was observed in four hybrids. The highest PDI of BLB (13.75%) in Bhakti Bt and GM in the hybrid Rajat Bt (12.66%) was recorded during the boll-development stage. The average PDI of BLB and GM in all the cultivars was recorded to be **7.92** and 10.70%, respectively **(Table 6b).**

Surat, Bharuch and Narmada (Gujarat)

The survey was conducted on farmer’s fields as well as in the Research farm at CRS Surat Bharuch and Narmada. The Bacterial leaf blight (BLB) was observed as a major disease in the farmer’s field. The data from farmers’ fields were recorded from cotton hybrid (BG II). Only BLB and ALS diseases were observed during the flowering stage and the PDI was recorded in the range of 0.0-16.5% and 0.0-10.5%, respectively. During the boll developing stage, the PDI of BLB and ALS was ranged from 0.0 to 25.5% and 0.0 to 13.5%, respectively. Overall, in these districts, the average PDI of BLB and ALS was between 0.0-20.9% and 5.8%, respectively at the boll developing stage **(Table 7a).**

At research farm CRS, Surat, the susceptible cultivar LRA 5166 showed the highest Bacterial leaf blight intensity to the tune of 0.0 to 58.5%. The average PDI of BLB and ALS was recorded to be 0.0-6.6% and 4.4% in all the cultivars at the boll development stage **(Table 7b).**

Junagarh, Rajkot, Jamnagar, Amreli and Surendranagar (Gujarat)

The survey conducted in major cotton-growing districts (Junagarh, Rajkot, Jamnagar Amreli and Surendranagar) of Gujarat revealed that the disease Phoma was observed during the early season, while BLB, Parawilt and *Verticillium* wilt was recorded during mid-season-and-*Corynespora* leaf-spot, boll rot, GM and ALS were observed during late-season in different cotton hybrids (Neo, ATM, Navab, Bhakti, Platinum, RCH-659, Ajeet-5, Super Gold, Buyer First Class, Buyer7576, Surpass, Ajeet-1155, Navakar, Supab). During the early season, the PDI of the Phoma leaf spot ranged from 1.5-35.5%. In mid-season, the PDI of BLB, Parawilt and *Verticillium* wilt was observed in the range of 0.0-18.5%, 0.0-25.0%, and 0.0-20%, respectively. Whereas, in the late season *Corynespora* leaf spot (CoLS), boll rot, GM and ALS ranged from 0.5-36.0%, 0.0-21%, 0.5-41.5% and 0.5-41.0% in Junagarh district, respectively. Compared to other districts, BLB was higher in Junagarh during mid-season. When comparing the PDI of popular hybrids, the highest PDI of Phoma (35.5%) was recorded in ATM at Chhadavavadar during the early season and BLB (18.5%) in Neo during the mid-season. During the late season, the highest PDI of ALS (41%) was observed in Bhakti, CoLS (36%) in Neo, GM (41.5%) in Ajeet-1155 and Boll rot (21%) in Super Gold. Phoma disease during the early season in Rajkot, BLB during mid-season in Junagarh and grey mildew (41.5%) during the late season were comparatively higher in Junagarh district. The overall average PDI of Phoma during the early season was 12.1%. The average PDI of BLB, Parawilt and Verticillium wilt in mid-season was 2.6%, 5.9% and 2.2% and CoLS, boll rot, GM and ALS during the late season in all these districts were observed at 7.4%, 7.6%, 11.6% and 13%, respectively **(Table 8a).**

At the CRS JAU research farm, the observations were recorded on RCH-2, G. Cot. Hy. 8 and the incidence of Phoma and BLB was initiated during July, Parawilt during August, Boll rot and GM during September. The highest incidence of boll rot (30.5%) was observed in the cultivars G. Cot. Hy. 8 (BG-II) in October, however, the highest PDI of BLB (42%) was recorded in RCH-2 during November, ALS (54%) in G. Cot. Hy. 8 in December, CoLS (25.5%) in G. Cot. Hy. 8 in October, the highest grey mildew (54.5%) in G Cot-8 during November were recorded **(Table 8b).**

Khandwa (Madhya Pradesh)

The survey conducted in major cotton-growing blocks of the district of Khandwa in Madhya Pradesh revealed that the bacterial leaf blight, *Alternaria* leaf spot, grey mildew and *Corynespora* leaf spot (CoLS) were observed. The average PDI of bacterial leaf blight, *Alternaria* leaf spot and grey mildew and CoLS was 3.7, 7.2, 12.3 and 9.5%, respectively. BLB ranged from 0.0 to 7.5%, ALS from 0- 17.0%, grey mildew ranged from 2.5 to 17.50% and CoLS ranged from 5.5-17.6% during the late season **(Table 9a).**

At the research farm, the observations were recorded on different cultivars and the incidence of BLB, GM and CoLS was initiated during August, while ALB was initiated during September. The highest incidence of CoLS (18.6%) in November, BLB (5.5%) in September (5.5%), while the ALB was recorded during December (12.8%). The highest grey mildew was observed during October (18.5%) **(Table 9b).**

SOUTH ZONE

Path.1 (a): Observations on the occurrence of various diseases (in the farmer's field and research farms)

Belagavi, Gadag, Haveri and Uttar Kannada (Dharwad, Karnataka)

Regular surveys were conducted by UAS, Dharwad in farmers' fields thrice at a regular interval in five cotton-growing districts of Karnataka (Belagavi, Dharwad, Gadag, Haveri and Uttar Kannada). During the survey observations on several major diseases (ALS, BLB, GM, Boll rot and Rust) were recorded on

different popular cotton hybrids at different plant development stages. In mid-season, the PDI of ALS, BLB, GM and Boll rot were recorded. During the early season, these diseases' incidence were not observed. Whereas, during mid-season PDI of ALS, BLB and GM were recorded in the range of 8.5-20.0%, 1.0-8.6% and 1.2-8.9%, respectively. The PDI of ALS, BLB, GM, Rust and Boll rot in the late season ranged from 15.5-35.8%, 2.0-13.5%, 6.5-13.7%, 5.6-26.7% and 6.6-20.0%, respectively. When compared to the PDI in the popular hybrids during the late season, the highest ALS was recorded in the hybrid Puli (35.8%) in Savanur of Haveri district. However, the highest GM (13.7%) was observed in Benal in the Uttra Kannanda district and the highest BLB (13.5%) in the Haveri district was observed in MRC7351 (**Table 10a**).

In the Belagavi district, the highest average PDI of ALS, BLB, GM, Rust and Boll rot during the late-season recorded were 20.0, 9.7, 9.0, 17.0 and 12.6%, respectively followed by average PDI of ALS (13.9%), BLB (4.2%) and GM (3.7%) in mid-season. In the Dharwad district, the higher average PDI of ALS, BLB, GM, Rust and Boll rot recorded were 22.3, 10.7, 10.1, 21.4 and 14.7% in the late season, respectively. The average PDI of ALS (13.0%), BLB (5.2%) and GM (6.7%) in mid-season were lower than in the late season. In the Gadag district, the higher average PDI of ALS, BLB, GM, Rust and Boll rot observed were 18.0, 10.9, 10.0, 13.8 and 9.0% in the late season, respectively. Lower PDI of ALS (9.9%), BLB (5.8%) and GM (3.8%) was recorded in mid-season. In the Haveri district, the average PDI of ALS, BLB, GM, Rust and Boll rot were recorded at 27.4, 11.1, 10.3, 10.3 and 14.1%, respectively in the late season and it was followed by the average PDI of ALS (11.5%), BLB (7.5%) and GM (5.1%) in mid-season. In Uttar Khannada district, the higher average PDI of ALS, BLB, GM, Rust and Boll rot were recorded at 18.3, 3.6, 11.5, 7.6 and 15.3%, respectively in the late season and this was followed by average PDI of ALS (12.7%), BLB (1.8%) and GM (7.3%) in mid-season. Comparatively, the higher PDI of ALS and BLB were found in Haveri district and GM was found in the Uttar Kannada districts. The highest PDI of Rust was in Dharwad district and the highest PDI of Boll rot was in Uttar Kannada district. Overall average PDI of ALS, BLB, GM, Rust and Boll rot in these districts was recorded to be 21.2, 9.2, 10.2, 14.0 and 13.1%, respectively during the boll developing stage **(Table 10a).**

At UAS Dharwad research farm, the incidence and PDI of root rot, boll rot, ALS, MLS, BLB GM and Rust were recorded on the hybrids (MRC-7373, Rashi magic, KCH-144, Moneymaker, Malini, Raja NCS-954, Indam, Anand, Jadoo, First class, Vittal, KCH-36, Mahadev, Esha, Ankur Jai, DPC-7065, MRC-7017, Navaneethan and gold Kuber). However, the incidence of Helminthosporium leaf spot (HLS), *Cercospora* leaf spot (CLS), anthracnose (ATN), CoLS and MLS were not observed during the season at the Dharwad research farm. The incidences of root rot, ALS, BLB and GM were initiated in August, while boll rot incidence was observed in September. However, the highest PDI of ALS (20.5%) and BLB (10.3%) were recorded in December and November respectively, while the GM (12.50%) was observed in December. **(Table. 10b).**

Guntur, Palande and Krishna (Andhra Pradesh)

The survey was conducted in major cotton-growing districts (Guntur, Palande and Krishna) of Andhra Pradesh for observation of different diseases and diseases namely *Alternaria* leaf spot (ALS), *Corynespora* leaf spot (CoLS), *Myrothecium* leaf spot (MLS), bacterial blight (BLB), root rot (RR), wilt, boll rot (BR), grey mildew (GM) and rust in different cotton hybrids from July to December 2024 in cotton growing mandals of Guntur, Palnadu, Krishna districts in Andhra Pradesh. During the early stage of the crop, BLB was nil. *Alternaria* and *Corynespora* leaf spots were in the traces. Traces of *Corynespora*, Cercospora and Alternaria leaf spot and grey mildew were observed during mid-stage. Wilt, root rot and boll rot were recorded in few plants during the boll development stage. Disease severity (PDI) was

recorded in the range of Bacterial leaf blight (0.0 to 2.5%); ALS (0.0 to 9.0%); CoLS (Traces to 39.5%); GM (0.0 to 9.6%) and rust (0.0 to 20.25%) were recorded during late stage. The overall average of Bacterial leaf blight, ALS, CoLS, GM and rust was recorded to be 0.4, 1.4, 12.5, 1.1 and **4.7%** respectively during the late stage among all the districts **(Table 11a).**

Incidence of diseases was also observed in different cotton hybrids at the Research farm in Guntur Varieties and hybrids of cotton trials were free from diseases during August 2024; Traces of *Corynespora* leaf spot was observed in non-plan breeding trials in September. During October, traces of *Alternaria* leaf spot and *Corynespora* leaf spot (Traces-2.5 PDI) and bacterial blight (0.0 to 9.0 PDI) were observed in Chemistry and NSP breeding trials. Traces of ALS, *Corynespora* leaf spot (2.5 to 7.5 PDI), bacterial blight (9.0 to 10.0 PDI) during November; bacterial blight (10-11.5 PDI), *Corynespora* leaf spot (8.5-29.25 PDI), grey mildew (18.75 PDI) and rust (4.4 to 16.6 PDI) were observed during December 2024 at Regional Agricultural Research Station, Lam, Guntur (**Table 11a).**

During the surveys conducted in Cotton growing districts viz., Guntur, Palnadu and Krishna and TSV disease was recorded from July to November. The incidence in different hybrids was recorded in traces at farmer fields (**Table 11b**).

Coimbatore, Dindigul, Virudhnagar, Tuticorin, Tirunelveli, Salem, Perambalur (Tamil Nadu)

The roving survey was carried out in seven cotton-growing districts of Tamil Nadu *viz.*, Coimbatore, Dindigul, Virudhunagar, Tuticorin, Tirunelveli, Salem and Perambalur assess the status of incidence of major diseases of cotton during three crop growth periods. In the surveyed villages most of the farmers are growing hybrids and few farmers grow varieties. During the seedling stage, the incidence of collar rot was recorded in all the villages surveyed with an average of 4.9, 5.3, 5.5, 5.0, 4.8, 5.1 and 5.2 percent in Coimbatore, Dindigul Virudhunagar, Tuticorin, Tirunelveli, Salem and Perambalur, respectively. In cotton, during the flowering period the diseases *viz.,* ALB, BB, GM and RR were recorded. The highest mean disease severity of ALB (12.3%) was recorded in the Dindigul district followed by Salem where PDI was (11.4%). The PDI of ALB in Coimbatore, Virudhunagar, Tuticorin, Tirunelveli, Salem and Perambulur were 6.7, 12.3, 5.0, 7.8, 8.6, 11.4 and 8.3%, respectively (**Table 12a**).

The mean BLB incidence was found to be high (13.5 PDI) in Perambalur district followed by Salem district which exhibited 12.8 PDI. The percent disease index of BLB in Coimbatore, Dindigul, Virudhnagar, Tuticorin, Tirunelveli, Salem and Perambulur districts was 12.7, 8.3, 12.5, 7.9, 12.1, 12.8 and 13.5% respectively. The average PDI of GM 14.0 and 12.4% was recorded in Salem and Perambalur districts respectively. The percent disease index of GM in Coimbatore, Dindigul, Virudhunagar, Tuticorin and Tirunelveli districts was 10.3, 9.9, 9.6, 7.2 and 4.1%, respectively. The RR incidence of surveyed districts ranged from 3.8 to 15.3%. The mean incidence of RR was found to be 6.5, 5.7, 14.1, 5.9, 8.2, 6.9 and 6.5% in Coimbatore, Dindigul, Virudhunagar, Tuticorin, Tirunelveli, Salem and Perambalur, respectively. The highest average root rot incidence of 14.1% was observed in the Virudhunagar district. All the diseases that occurred during the flowering stage were also recorded during the boll development stage. During the later stage of the crop growth average PDI of ALB in Coimbatore, Dindigul, Virudhunagar, Tuticorin, Tirunelveli, Salem and Perambalur was 7.5, 13.1, 6.2, 8.8, 9.0, 12.3 and 9.1%, respectively (**Table 12a**). The PDI of BLB was recorded in Coimbatore, Dindigul, and Virudhunagar. Tuticorin, Tirunelveli, Salem and Perambalur districts were 14.1, 8.9, 14.6, 9.3, 12.9, 14.1 and 13.8%, respectively during the boll development stage. In the districts, Dindigul, Virudhunagar. Tuticorin, Tirunelveli, Salem and Perambalur the mean disease index of grey mildew incidence recorded was 11.6, 11.2, 10.4, 8.4, 4.8, 15.1 and 13.5%, respectively. During the boll development stage, the average PDI of Root rot was observed to be 7.3, 6.8, 14.8, 8.1, 8.8, 7.7 and 7.1%, in Coimbatore, Dindigul, and Virudhunagar, Tuticorin, Tirunelveli, Salem and Perambalur districts, respectively. During this period average boll rot in surveyed districts varied between

3.9 to 5.5% and the incidence of 4.9, 5.5, 5.1, 5.1, 4.8, 5.4 and 5.0% was found in Coimbatore, Dindigul, Virudhunagar, Tuticorin, Tirunelveli, Salem and Perambalur, respectively (**Table 12a)**. Overall, the average ALB, BB, GM RR and boll rot during late season were recorded to be 9.4, 12.5, 10.7, 8.7 and 5.1%, respectively.

The progress of TSV incidence was recorded in each four villages of Coimbatore and Dindugal district and TNAU farm from October 2024 to January 2025. In the farmer's fields Ayyapparettipudur of Coimbatore district, TSV incidence of 5.5 percent was observed during October 2024 and increased to 8.8 percent during December 2024. In Dindigul districts incidence of 4.3 percent was recorded during October 2024 in Kuyanayakkanpatti village and the maximum incidence of 14.0 percent was noticed during December 2024. During 2024, TSV incidence was comparatively higher in TNAU research farm as compared to farmers' fields and it ranged from 7.0-18.0 percent. The TSV incidence showed a decreasing trend during January 2025 at all the locations (**Table 12b)**.

In the TNAU Research farm, the diseases *viz*., collar rot, root rot, boll rot, ALB, *Cercospora* leaf spot, *Myrothecium* leaf spot, bacterial blight, GM and rust diseases were recorded during the different growth stages. Soil-borne disease collar rot (CR) was observed in all the experimental fields during the seedling stage. The incidence of CR initiated during August with 3.0% incidence and the intensity of the disease increased and reached up to 7.3% during October. The root rot incidence (10.0%) was observed during November and the intensity of the disease was increased up to 17.5% during December 2024. The incidence of BR initiated during November with 4.0% incidence and the intensity of the disease increased and reached up to 7.3% during October. The incidence of ALS on the TNAU research farm ranged from 2.5- 18.7% (PDI) and the highest incidence was recorded during December. For other leaf spot diseases *viz*., CLS and MLS, PDI ranged from 5.0-8.3% and 2.0 –7.3% respectively. Initially, bacterial blight was recorded to be 3.5% (PDI) during September and it reached its peak of 20.6% (PDI) during the boll maturation phase (December 2024). The severity of grey mildew was high (19.0 PDI) during December. The rust severity (2.4% PDI) was recorded in November 2024 and it was raised to 8.5% PDI in December 2024 **(Table 12 c).**

Path.1 (b): Disease progress in relation to weather factors.

NORTH ZONE

The observations on the appearance and progress of Cotton leaf curl disease (CLCuD) were recorded at weekly intervals starting from 23rd to 39th standard meteorological week (SMW) i.e., June to September at **Faridkot, Punjab**. CLCuD was first observed in cultivars namely F846, HS6, RS921, and RST9 in 23rd SMW (4-10th June). Later CLCuD incidence increased up to 30th SMW and reached 100% in RST9 (37.7% PDI) and RS921 (33.6% PDI), whereas it reached 100% in 31st SMW in F846 and HS6. Maximum PDI 67.06% 66.39%, 60.07% and 59.3% were recorded in HS6, RS921, RST-9 and F846, respectively**.** The range of the minimum and maximum temperature during the study period was 23.7 (38 SMW) to 29.8°C (29 SMW) and 32.9°C (35 SMW) to 43.1°C (24 SMW). The mean minimum and maximum temperatures were 26.5 and 35.8 °C, respectively. Similarly, the average of the minimum and maximum relative humidity was ranging from 56.3 to 79.1%. A total rainfall of 308.4 mm has been recorded on 27 rainy days. The mean sunshine duration was 5.9 hours whereas; the wind speed was 5.3 km/hour **(Table 13a)**.

Both the disease incidence and the PDI of CLCuD were negatively associated with the minimum, maximum and mean temperatures. The correlation of CLCuD DI and PDI with mean temperature was r=-

-0.78 and r-0.47, respectively. The mean relative humidity was found to be highly favorable with the observed DI with a respective correlation coefficient of r= 0.78 while PDI showed a negative correlation with a correlation coefficient of r= -0.11 (**Table 13b**).

A susceptible variety HS-6 of cotton was sown at **ARS, Sriganganagar** following recommended package of practices and weekly progress of CLCuD was recorded. CLCuD first appeared in 21st SMW (21-27th May) with an incidence of 0.1% during this the whitefly population was 2.4 per 3 leaves. However, in the subsequent period, the CLCuD incidence progressed faster and reached its maximum level of 100% during 27th SMW (2-8th July). The whitefly population ranged from 2.4 to 22.9 per three leaves during the whole crop season and remained above ETL from 26th to 27th SMW. The overall relative humidity from May to July (vegetative phase) during this year was 39.9 to 75.0%. The average weekly temperature during this period remained at 39.1 to 46.0^{o}C (Maximum), and 25.8 to 31.4^{o}C (minimum) **(Table 14a).** The correlation analysis between weather factors and incidence and PDI showed a positive correlation with minimum temperature, a negative correlation with maximum temperature and a positive correlation with morning and evening RH **(Table. 14b).**

At CCS HAU, **Hisar, Haryana,** CLCuD susceptible cultivar HS-6 was sown in a 500 sq meter area with a spacing of 67.5 x 30 cm. All the recommended agronomical practices were followed for raising the crop variety HS-6. The observations on disease progress were recorded at an interval of 7 days till the third week of October (42 SMW) under field conditions. CLCuD appeared in the 28th SMW (9- 15 July) (2.1% incidence) during this the whitefly population was 3.8 per 3 leaves. The incidence increased from 2.1 to 29.7% in the 42nd SMW (15-21 October). The PDI increased from 0.2% to up to 24.4% in the 42nd SMW, during this period the average whitefly population varied from 2.5 to 3.2 per three leaves. The whitefly population remained above ETL during 33rd SMW **(Table 15a).**

The correlation between weekly weather parameters with incidence and PDI showed the highest significant positive correlation with morning and evening relative humidity. However, maximum & minimum temperatures showed a significant negative correlation with incidence and PDI. In the case of rainfall, it was positively correlated with disease incidence while it was negatively correlated with PDI. In the case of the whitefly population, rainfall, relative humidity, and minimum temperature were positively correlated, while maximum temperature, sunshine hours and wind speed were negatively correlated. Whitefly population was positively correlated with CLCuD disease incidence and PDI (**Table. 15b**).

CLCuD susceptible cultivar HS-6 was sown on 18 May 2024 with a spacing of 67.5 x 30 cm at **ICAR-CICR RS Sirsa, Haryana**. All the recommended agronomical practices were followed for raising the crop variety HS-6. The cotton leaf curl virus disease at ICAR-CICR Regional Station, Sirsa, Haryana was initiated in 24th SMW (11-17th June) on cultivar HS-6 (06 % incidence) during this period the whitefly population was 3.0 per 3 leaves. The incidence reached 100% during 36th SMW (3-9 September). A whitefly incidence ranged from 0.5 per 3 leaves up to 24.0 whiteflies per 3 leaves during the season. The whitefly population remained around and above ETL during 28th SMW. The CLCuD PDI reached 80.0% in the 41st SMW (8-14 October). The maximum temperature during the season ranged from 32.1 to 46.7^{0}C, whereas the minimum temperature ranged from 19.7 to 29.4^{0}C. Relative humidity morning and evening ranged between 44.1-84.9% and 23.4-67.4%, respectively. The total rainfall received during this period was 200.7 mm in 13 rainy days from 23 to 41 SMW (**Table 16a**).

The analysis of the correlation coefficient between weather data, whitefly population, and CLCuD (incidence & PDI) revealed that minimum and maximum RH showed a positive correlation with CLCuD incidence, PDI and whiteflies whereas, maximum and minimum temperature, rainfall and rainy days showed a negative correlation with CLCuD incidence, PDI whiteflies **(Table 16b).**

CENTRAL ZONE

The first incidence of Bacterial leaf blight was noticed during 34th and 36th SMW at **Nanded** in RCH 2 and LRA-5166, respectively and PDI was found in the range of 0.0 to 15.0% and 0.0 to 12.25%, respectively, while the incidence of *Alternaria* leaf spot (ALS) was observed during 36th SMW with a range of 0-18.20% and 0.0-18.0% in RCH 2 and LRA-5166, respectively. The grey mildew (GM) was observed during 36th and 38th SMW, and the PDI ranged from 0.0 to 27.3 and 0.0 to 27.25% in RCH 2 and LRA-5166, respectively. The highest PDI (15.0, 18.20 and 27.3%) of BLB, ALS and GM were recorded during 48th, 48th and 52nd SMW in RCH 2 BG II and LRA-5166 cultivar, respectively **(Table 17a).**

There is a negative correlation of rainfall, maximum and minimum temperatures and relative humidity with PDI of BLB, ALS and GM in RCH 2 BG II and ALS, GM and Parawilt in LRA 5166, whereas positive correlation of rainfall, minimum temperature and relative humidity was recorded with Parawilt in RCH 2 BG II**.** In PA 255, rainfall, minimum temperature and evening relative humidity was negatively correlated whereas maximum temperature and morning RH were positively correlated with GM **(Table 17b).**

The study on disease progression about the weather factors was undertaken on cultivated susceptible *G. hirsutum* variety LRA-5166, hybrid Bhakti Bt at **PDKV, Akola**. Observations were recorded on the initiation of major diseases such as BLB (0.28 and 3.92%), ALB (5.83 and 3.89%) and GM (2.22 and 3.75%) in LRA-5166 and Bhakti Bt, respectively in 36th, 37th and 38th SMW. The BLB incidence reached its maximum (16.66%) during 42nd SMW when the maximum and minimum temperatures were 33.3 and 18.6°C and the relative humidity ranged between the range of 53-85%. The ALB incidence reached its maximum (16.67%) on cultivar LRA 5166 during 43rd and 18.89% during 42nd SMW in Bhakti Bt. However, Grey mildew was recorded at maximum (17.50%) on cultivar LRA-5166 during 41st SMW when the maximum temperature and relative humidity were around 33.3°C and 87%, respectively **(Table 18a).**

The bacterial blight disease progress during the season was recorded on G. Cot. Hy.12 Non-Bt at **MCRS-NAU Surat (Gujarat)**. The incidence of Bacterial leaf blight disease was noticed in 30th SMW (23-29 July). BLB severity increased and reached its maximum (46.5%) during 42nd SMW (15-21 October), thereafter, the BLB decreased up to 8.50% in the 51st SMW **(Table 19a).** Incidence of Bacterial leaf blight had a positive correlation with the maximum temperature and sunshine hours, while minimum temperature, morning and evening humidity, rainfall and rainy days had a negative correlation with disease development **(Table 19b)**.

The incidence and disease progress of bacterial leaf blight disease (BLB), *Alternaria* leaf spot, *Corynespora* leaf spot and grey mildew were recorded at **CRS JAU, Junagarh.** BLB was first noticed from the 30th SMW (23-29 July) and thereafter the incidence remained up and down and its peak disease intensity was observed in the 45th SMW (42.0% PDI). *Corynespora* leaf spot was observed during 39th SMW and maximum severity (53.3%) during 44th SMW. *Alternaria* leaf spot disease incidence was observed in the 45th SMW with the maximum PDI in 49th SMW (54.5%). The grey mildew was first observed in 41st SMW and reached its maximum PDI in 47th SMW (59.0%) and thereafter it gradually decreased up to 7.0% in 52nd SMW (**Table 20a**).

Correlation coefficient studies for bacterial leaf blight disease incidence revealed a positive correlation with rainfall, maximum and minimum temperature, relative humidity (morning and evening)

and sunshine hours however; the BLB incidence was negatively correlated with wind speed. The ALB incidence showed a significant negative correlation with rainfall, minimum and maximum temperature, morning RH and sunshine hours while, ALB showed a positive correlation with relative humidity (evening) and wind speed. Grey mildew disease had a positive correlation with maximum temperature and sunshine hours, while a negative correlation with minimum temperature, relative humidity, wind speed and rainfall. **(Table 20b).**

The bacterial blight, *Alternaria* leaf blight, grey mildew and *Corynespora* leaf spot (CoLS) disease progress during the season was recorded on JK-4 at **RARS-RVSKV Khandwa (Madhya Pradesh)**. *Corynespora* leaf spot (CoLS) was recorded during 31st SMW **(**30 July-5 August**)** in traces and reached up to 18.50% during 42nd SMW (15-21 Oct). Bacterial blight was first observed in traces during the second week of Aug **(**32-33 SMW) and reached up to 7.5**%** during 35th SMW and then decreased gradually. The grey mildew was first noticed in **38th SMW (**17-23 September**)** and reached up to 20.03% during 45th SMW (5-11 Nov.). The Alternana leaf blight disease was observed in the research farm during 8-14 Oct. (41st SMW) in trace incidence and reached up to 12.57 percent during 49th SMW **(Table 21a).**

The incidence of bacterial leaf blight had a positive correlation with the rainfall, minimum temperature and evening relative humidity and a negative correlation with maximum temperature and morning RH. *Alternaria* leaf spot showed a positive correlation with morning relative humidity and negative with all other weather parameters, grey mildew showed a positive correlation with temperature maximum and morning RH and negative with others. CoLS showed a positive correlation only with maximum temperature **(Table 21b)**.

SOUTH ZONE

At the research station of **UAS, Dharwad**, the observation of diseases namely *Alternaria* leaf blight, BLB, Grey mildew and rust diseases were recorded. ALB was observed during the 33rd SMW on the cultivars namely varieties Abhaditha, Jayadhar, MRC-7373 Bt and KCH-144 Bt, it reached its peak during 44th SMW in Abhaditha and Jayadhar while it was at peak during 45th and 43rd SMW in MRC-7373 Bt and KCH-144 Bt, respectively. The incidence of Bacterial blight was observed in the cultivar Abhaditha and KCH-144 Bt during 37th SMW while the disease was not recorded on Jayadhar and MRC-7373 Bt. BLB reached its peak in 45th SMW in KCH-144 cultivar. The BLB reached its highest 13.0 and 18.3% in Abhaditha and KCH-144 during 42nd and 45th SMW, respectively. The incidence of grey mildew diseases appeared in 37th SMW in Jayadhar while, it appeared during 38th SMW on Abhaditha, MRC-7373 Bt and KCH-144 Bt. The highest grey mildew (60.3%) was recorded in variety Jayadhar during 46th SMW. The incidence of rust appeared during 45th SMW in all of the cultivars **(Table 22a)**.

A significant positive correlation was observed between the maximum temperature and ALB, BLB, GM and rust disease incidence in all the genotypes. A significant negative correlation was observed between minimum temperature with all the diseases in all the varieties under study while other weather parameters such as relative humidity, total rainfall and rainy days also showed a negative correlation with all the varieties **(Table 22b).**

At the research farm of **Lam, Guntur (Andhra Pradesh)** disease progress was observed on BG II cotton hybrids, Siri and Akira and cotton varieties L 1060 and NDLH 1938, which were sown on 02 August 2024 in an area of 500 sq. m. each. Weekly observations were recorded on the percent intensity of *Corynespora* leaf spot, grey mildew and rust diseases after the appearance of the disease. *Corynespora* leaf spot was observed in 40th SMW (first week of October 2024) when the mean maximum temperature was 34.7°C; mean minimum temperature was 26.3°C; mean morning relative humidity of 98.0% (RH I);

mean evening relative humidity of 59.0% (RH II); rainfall was 10.2 mm; sunshine hours were 7.0; wind speed 5.2 kmph and evaporation was 6.4 mm. *Corynespora* leaf spot attained a maximum PDI of 40.25% on L1060 during 04th standard week i.e., last week of January 2025, during which the mean maximum temperature was 32.1°C; the mean minimum temperature was 19.1°C; mean RH I of 99%; mean RH II of 68.0%; rainfall was nil; sunshine hours were 6.9; wind speed 3.8 kmph and evaporation was 4.6 mm. Grey mildew disease appeared in 42nd SMW (second fortnight of October) on all the hybrids and varieties under study, when the mean maximum temperature was 29.9°C; mean minimum temperature was 25.1°C; mean RH I was 99.0%; mean RH II was 70%, rainfall was 81.2 mm; sunshine hours were 0.9; wind speed was 4.0 kmph and evaporation was nil. However, the highest PDI of 51.25 was recorded during 05th SMW (1st week of February) on Akira, and NDLH 1938, Siri, L1060 recorded 42.0, 34.25 and 27.17 PDI, respectively **(Table 23a & 23b).**

Rust disease appeared in 47th SMW (2nd fortnight of December 2024) on all the hybrids and varieties under study, when the mean maximum temperature was 30.7°C; mean minimum temperature was 20.4°C; mean RH I was 98.0%; mean RH II was 68.0%, rainfall was nil; sunshine hours was 2.6; wind speed was 3.5 kmph and evaporation was 2.9 mm. (Table 1b). The disease reached PDI of 53.25 on Akira during 05th standard week (first week of February 2025) during which the mean maximum temperature was 33.4°C; the mean minimum temperature was 19.3°C, the mean RH I was 99% mean RH II of 67.0%, rainfall was nil, sunshine hours were 7.7, wind speed 3.3 kmph and evaporation was 5.7 mm. Siri, NDLH 1938, and L 1060 recorded 51.75, 40.25 and 39.25 PDI, respectively (**Table 23 a & 23b**).

There was a positive correlation of relative humidity (morning and evening), sunshine hours and evaporation with CLS, GM and Rust disease in NDLH 1938, Siri, L 1060 and Akira whereas a negative correlation was recorded with rainfall, temperature (minimum and maximum) and wind speed **(Table 23 c).**

At the research station **TNAU, Coimbatore (Tamil Nadu),** the disease incidence and progress of disease development in relation to weather variables were studied in hybrids RCH 659 and the varieties CO17, MCU5 and Jadoo. Sowing of selected cultivars was taken with the above hybrids/ varieties on 8 August 2024 and the progress of diseases viz. ALB, BLB, TSV, GM and crown and root rot (CR / RR) diseases were studied. ALB incidence was observed in all the varieties and the hybrids. In the variety CO17 ALB incidence started during 36th SMW, it gradually increased and attained the peak of 18.3% (PDI) during 49th SMW. In the hybrid MCU5 it appeared during 36th SMW and maximum ALB incidence (13.9%) was recorded during 49th SMW. In the hybrid Jadoo during 49th SMW, ALB incidence of 10. 5 PDI was recorded. During this period the maximum and minimum temperatures of 30.2 ^{0}C and 22.0^{0}C and maximum RH 92% were recorded. *Alternaria* leaf blight incidence was negatively correlated with maximum temperature and sunshine hours and positively correlated with RH (morning). ALB incidence can be predicted by using the following equation. From the equation, it was inferred that the maximum temperature and RH have a major influence on ALB incidence. In the variety, MCU 5 the incidence of BLB initiated during 35th SMW with 4.3% PDI and gradually increased and showed the maximum incidence of 22.9% PDI during 44th SMW, thereafter the intensity of the disease slowly declined. In the hybrid RCH 659, the BB incidence of 1.7 to 17.9% PDI was observed and the highest incidence (17.9% PDI) was recorded during 44th SMW. The results of the correlation analysis showed the BB incidence was positively correlated with the minimum temperature, RH and rainfall. BB incidence can be predicted by using the following regression equation. The disease TSV was observed in the hybrids *viz.*, RCH 659 and Jadoo the varieties *viz.,* CO17 and MCU 5. Both hybrids and the varieties' TSV incidence initiated during 37th SMW and reached the maximum during 46th SMW. Initially, TSV incidence of 1.5 and 2.5 % was recorded in CO 17 and Jadoo and during 46th SMW

9.8 and 19.7 % TSV incidence was found in CO 17 and Jadoo, respectively. TSV incidence was negatively correlated with the maximum temperature, wind speed, and sunshine hours and it was positively correlated with the RH (morning). TSV prediction equation is represented by the following equation and the equation depicted that the TSV incidence was influenced by maximum temperature and RH (morning).

The incidence of GM was recorded in all the hybrids and varieties. The disease infection started during 37thSMW with 3.7 PDI and reached the peak of 22.9 PDI in Jadoo during 49 thSMW (first week of December). In CO17, GM incidence of 17.0 PDI was observed during 49 SMW. From the results, it was inferred that the last week of November to the first week of December was favorable for the development of GM at Coimbatore condition. GM incidence of was negatively correlated with the maximum temperature and sunshine hours and wind speed and positively correlated with the RH (morning). GM incidence can be predicted through the following equation and from this it was inferred that GM incidence was influenced by maximum temperature and RH. The incidence of collar rot was observed in all the varieties and hybrids. The disease was found to infect the crop from the seedling stage up to 40- 50 DAS. In CO17, CR incidence of 1.3 – 4.0% was recorded and in Jadoo the incidence was found to be 1.7 - 6.4%. Root rot infected all the varieties/hybrids during the flowering to boll maturity stage and its intensity ranged from 0.6 to 15.0% in CO17 and 3.0 -18.3 % in Jadoo

Collar/root rot incidence was positively correlated with the maximum temperature RH (morning) and sunshine hours and negatively correlated with the rainfall (**Table 24a, b, c**).

Correlation

ALB incidence = 35.70 – 1.00 Max T +1.773 Mini T + 0.527 Morn RH - 1.073 Eve RH+ 2.68, R^2 = 0.861 (**Table 24a, b**).

BB incidence = 44.896 + 0.910 Max T- 2.713 9 Mini T + 1.37 Morn RH - 0.349 Eve RH + 2.880, R^2 = 0.785

GM incidence = 2.392 –1.249 Max T + 0.144 Mini T + 0.703 Morn RH - 0.051 Eve RH + 2.804 R^2 = 0.901 (**Table 24a, b, c**).

TSV incidence = 92. 539 – 1.206 Max T+ 3.165 Mini T + 0.744 Morn RH - 1.397Eve RH +3.959, R^2 = 0.659 (**Table 24a, b, c**).

Path 1 (d): Survey and Epidemiology of TSV

The progress of TSV at the research farm on NDLH 1938, Siri, L 1060 and Akira was observed from 38th to 02nd SMW and it ranged from 0.0 to 30.50 percent. However, the TSV incidence was recorded to be highest during 49th-02nd SMW (**Table 25**).

Path 1 (e) Studies on variability of *Corynespora l*eaf spot

The experiment was carried out during *Kharif*-2024 at Junagarh to confirm the variability in *Corynespora* species of cotton. The disease samples were collected from different locations of cotton-growing regions. The samples were processed for isolation of *Corynespora* from blighted leaves of cotton using standard method. The fungus culture was purified and morphological characters were recorded using a compound microscope. Conidia are produced either solitarily or acropetally in chains and are variable in shape, obclavate to cylindrical, straight to curve. The conidia can be subhyaline to pale olivaceous-brown or brown, (pseudoseptate). The spore's hilum is often dark with a slight rim, having thick, colorless exospores with dark prominent basal scars. Samples were sent to Cotton Research Station, ANGRU, Guntur (Table 26). The samples of *Corynespora* leaf spot of cotton were collected from farmers'

fields and experimental plots at Khandwa station and observed for the presence of Corynespora based on the spore structure. 3 samples were isolated and the morphological variables of purified cultures were evaluated such as colour, pigmentation of mycelia, and number of septa in conidia. All the isolates were recorded with septate brown mycelium whereas conidial septation ranged 5-9 (Table 27). During the survey in Andhra Pradesh, samples infected with *Corynespora* leaf spot were collected from farmers' field and experimental plots at RARS Lam and observed microscopically for the presence of conidia which confirmed it as *Corynespora cassiicola* (**Table 28**).

Path. 2: Screening of AICRP entries for disease reaction

Path.2(a). Screening of AICCIP breeding lines for disease reaction

The breeding lines in various national and zonal trials were screened against important diseases at the selected locations/sites/centers. In each screening trial, susceptible checks for the diseases were maintained and their reaction is presented at the end of each table where data from different locations of a trial is pooled. The reaction of a particular entry is considered valid provided there is either a susceptible or moderately susceptible reaction in the susceptible check.

The results of the National trials are given in Tables - 29 to 35.

The results of Zonal trials (North Zone) are given in Tables - 36 to 37.

The results of Zonal trials (Central Zone) are given in Tables - 38 to 41

The results of Zonal trials (South Zone) are given in Tables- 42 to 46

Path.2 (b): Confirmation and maintenance of disease-resistant lines

NORTH ZONE

Faridkot, Punjab: Fifteen Bt varieties were evaluated under field evaluation conditions among which ARC 91 showed a resistant reaction against CLCuD while ARCV 22 Bt showed a moderately resistant reaction against CLCuD **(Table 47).** However, ARCV 22 Bt showed continuous resistant reaction at ICAR-CICR Regional Station, Sirsa **(Table 47b).**

CENTRAL ZONE

At CRS Surat, 11 entries were evaluated and found disease-free from BLB and Alternaria leaf spot except GJHV 605 which was MR to BLB (Table 48). **CRS JAU, Junagarh:** Different 18 breeding lines were evaluated against Alternaria leaf spot, bacterial leaf blight and grey mildew diseases under field conditions at CRS JAU, Junagarh for the last three years. These entries were also evaluated at CRS NAU and Surat for further confirmation & under artificial screening conditions. The result revealed that entries (GJHV-592, GJHV-598, GJHV-600 and GJHV-604) were found resistant to bacterial leaf and grey mildew. In the case of Alternaria leaf spot, entries GJHV-592, GJHV-598, and GJHV-600 were found resistant and GJHV-604 and GJHV-605 were found moderately resistant (**Table 49c**).

SOUTH ZONE

UAS Dharwad (Karnataka): Different breeding lines were evaluated against grey mildew and *Alternaria* leaf spot diseases under field and artificial inoculation conditions during the last years. Two genotypes of *G. barbadense* i.e., CCB-06 and SBSD-5-6 and two genotypes of *G. arboreum* i.e., SVA-1118 and NDLA-3118-3 exhibited a high degree of resistance to ALS both under field and artificial inoculation conditions. Two genotypes of *G. arboreum* i.e., SVA-1118 and NDLA-3104-4 and two genotypes of *G. barbadense* i.e., DB-40 and CCB-06 exhibited a high degree of resistance to grey mildew (**Table 50a, 50b**).

Thirty-two different entries were evaluated at RARS, Guntur *G. hirsutum* entries viz. CNH 20-31, RHC 1409, DHCC 1801, DHCC 1902, RHC-HD 1312, Sivanandi (LC) found resistant to grey mildew and Corynespora leaf spot disease **(Table 51).** Different entries of *G. barbadense* were evaluated against ALS at **TNAU, Coimbatore** under field and artificial conditions. *G. barbadense* entries DB 1901 and CCB 6, showed resistance (R) against Alternaria leaf spot (**Table 52a**). A summary of the resistant and multiple resistant entries is mentioned below in Table 1.

Table 1. Resistant and multiple resistant entries of *Gossypium* species

Disease	Entry Name	Species	Location
CLCuD	ARCV-22 Bt	*G. hirsutum*	ICAR-CICR Sirsa, PAU Faridkot
ALS	SVA-1118	*G. arboreum*	UAS, Dharwad
	CCB-06	*G. barbadense*	UAS, Dharwad
	SBSD-5-6	*G. barbadense*	UAS, Dharwad
BLB, ALB, GM	GJHV-592, GJHV-598, GJHV-600, GJHV-604	*G. hirsutum*	CRS JAU- Junagarh, Surat
GM, CoLS	CNH 20-31, RHC 1409, DHCC 1801, DHCC 1902, RHC-HD 1312, Sivanandi (LC),	*G. hirsutum*	RARS, Lam, Guntur

Path.2(C) Monitoring of resistance against CLCuD in cotton.

In this experiment, tolerant and susceptible varieties against CLCuD and one each of tolerant and susceptible BGII Bt cotton hybrid were selected and sown at three locations to see how they react against CLCuD changes over the years. The PDI in the case of tolerant varieties/hybrids was much less compared to susceptible varieties at Bathinda and Sriganaganagar. The cumulative reaction results revealed that all the susceptible verities showed S and HS, whereas the tolerant varieties showed MR to S reaction and tolerant BGII hybrids showed R to MR reaction (**Table 53**).

Path.3: Management of Diseases of cotton

Path 3(j): Management of boll rot and foliar diseases of Cotton through CIB&RC recommended new chemical pesticides and their Combinations

For the management of boll rot and foliar diseases caused location specific pathogens, 12 chemical treatments including new fungicides, and insecticides (CIB&RC recommended) against foliar and boll rot diseases in cotton. and control were evaluated under open-field conditions. Two to three prophylactic need-based sprays were applied at the time of insect-pest infestation and the percent disease incidence was recorded in the treatments (**Table 54**).

North Zone:

At Sriganganagar. The highest reduction of boll rot (40.61%) after 2rd spray after was recorded with T-4 (Fluxapyroxad 167 g/Litre + Pyraclostrobin 333 g/Litre SC @ 0.6 g/Litre of water) followed by T-5 (Metiram 55% + Pyraclostrobin 5% WG @ 2 g/Litre of water) (39.26%), and T-3 (Propineb 70% WP @ 2.5 g/Litre of water) & T-6 (Azoxystrobin 18.2% w/w + Difenoconazole 11.4% w/w SC @ 1 ml/ litre of water). The highest seed cotton yield (20.69 Q/ha) was recorded in the treatment T-4 (Fluxapyroxad 167 g/Litre + Pyraclostrobin 333 g/Litre SC @ 0.6 g/Litre of water) followed by T-5 (Metiram 55% + Pyraclostrobin 5% WG @ 2 g/Litre of water) (20.45 Q/ha) and T-3 (Propineb 70% WP @ 2.5 g/litre of water). These treatments were not par with each other in terms of boll rot control and seed cotton yield (**Table 55).**

Central Zone:

At Khandwa the highest reduction in boll rot (78.3%) % after the second spray was observed in the treatment T-3 (Propineb 70% WP @ 2.5 g/Litre of water) followed by 66.7% in T4 (Fluxapyroxad 167 g/Litre + Pyraclostrobin 333 g/Litre SC @ 0.6 g/Litre of water) and 60.0% with T-7 (copper sulfate 47.15% + Mancozeb 30% WDG (13.3%). The lowest *Corynespora* leaf spot severity (9.1%) after 2nd spray was recorded with T-4 (Fluxapyroxad 167 g/L + Pyraclostrobin 333g/L SC (20.0%) followed by T-6 (Azoxystrobin 18.2% w/w + Difenoconazole 11.4% w/w SC @ 1 ml/ litre of water) (9.2%) and T-2 (Propiconazole 25% EC (20.0%) (9.4%). The lowest grey mildew disease severity (9.2%) was recorded in the treatment of T-4 (Fluxapyroxad 167 g/L + Pyraclostrobin 333g/L SC (13.0%) and in T-1 (Kresoxim methyl 44.3% SC @ 1 ml/Litre of water) (10.1%) followed by T-2 (Propiconazole 25% EC @ 1 ml/Litre of water) (11.2%) after s second spray. The highest seed cotton yield was recorded in T-3 (Propineb 70% WP @ 2.5 g/Litre of water) (20.9Q/ha) flowed by T-4 compared to control T-12 (14.6 Q/ha) **(Table 56).**

At Nanded: the lowest *Alternaria* leaf blight was observed in the treatment T-4 (Fluxapyroxad 167 g/L + Pyraclostrobin 333g/L SC) followed by T-5 (Metiram 55% + Pyraclostrobin 5%) and T-6 (Azoxystrobin 18.2% w/w + Difenoconazole 11.4% w/w SC). The highest reduction in grey mildew was observed with the treatment by T-4 (Fluxapyroxad 167 g/L + Pyraclostrobin 333g/L SC) followed by T-1 (Kresoxim methyl 44.3% SC @ 1 ml/Litre of water) and T-5 (Metiram 55% + Pyraclostrobin 5%). The highest seed cotton yield was recorded in T-4 (Fluxapyroxad 167 g/L + Pyraclostrobin 333g/L SC) followed by T-1 (Kresoxim methyl 44.3% SC @ 1 ml/Litre of water) and T-2 (Propiconazole 25% EC) (**Table 57**).

South Zone:

At TNAU, Coimbatore, among 12 treatments evaluated against major disease on RCH 659. Two sprays of Propineb70%WP @ 2.5 g/litre of water (T_3) at 60 and 75 DAS recorded the lowest PDI of Alternaria leaf spot (5.3%) as against 18.7 PDI in the control which accounted to 71.7 % disease reduction. It was on par with Fluxapyroxad 167 g/l + Pyraclostrobin 333 g/l SC @ 0.6g/litre of water (T_4) which reduced the disease incidence by 67.4 %. Treatment with Azoxystrobin 18.2% w/w + Difenoconazole 11.4% w/w SC @1 ml/ litre of water(T_6) and Kresoxim-methyl 44.3% SC @1 ml/litre of water(T_1) reduced the ALB incidence by 64.1 and 63.1 % respectively.

Among the nine fungicides evaluated, spraying of with Kresoxim-methyl 44.3% SC @1 ml/litre of water (T_1) twice at 60 and 75 DAS was found to be significantly superior against grey mildew by recording the lowest PDI of 5.8 and the highest disease reduction of 73.9 %. This was followed by Azoxystrobin

18.2% w/w + Difenoconazole 11.4% w/w SC @1 ml/ litre of water (T_6) and Metiram 55% + Pyraclostrobin 5% WG @2 g / litre of water (T_5) which respectively reduced the grey mildew incidence by 65.0 and 62.7 %. Spraying of COC 50 %WP @ 2.5g of water + Salicylic acid (200 ppm one spray at 60 DAS) ($T_{9)}$ reduced the disease incidence to an extent of 41.7 % (**Table 58**).

Two sprays with copper sulfate 47.15% + Mancozeb 30% WDG) @5 g/ litre of water (T_7) at 60 and 75 DAS recorded the lowest Bacterial leaf blight PDI of 13.4 as against 27.3 PDI in the control. This accounted for the disease reduction of 51.0 %. It was on par with Fluxapyroxad 167 g/l + Pyraclostrobin 333 g/l SC @ 0.6g/litre of water (T_4) which reduced the bacterial blight incidence by 47.3 %. Spraying of COC 50 %WP @2.5g of water + Salicylic acid (200 ppm one spray at 60 DAS) (T_9) showed 45.6 % boll rot disease reduction. Among the 11 different treatments, spraying of Fluxapyroxad 167 g/l + Pyraclostrobin 333 g/l SC @ 0.6g/litre of water (T_4) twice at 60 and 75 DAS was found to be highly effective in controlling the boll rot incidence. This treatment recorded the lowest boll rot incidence of 2.9 % and the highest disease reduction of 71.8 % It was on par with Metiram 55% + Pyraclostrobin 5% WG @2 g / litre of water(T_5) spray which reduced the boll rot incidence by 66.0 %. In the untreated control plot boll rot incidence of 10.3% was recorded. The highest seed cotton yield of 18. 8 q/ ha was recorded in Fluxapyroxad 167 g/l + Pyraclostrobin 333 g/l SC @ 0.6g/litre of water (T_4) spray and it was on par with Metiram 55% + Pyraclostrobin 5% WG @2 g / litre of water (T_5) which gave seed cotton yield of 17.5 q/ ha. Spraying of Propineb70%WP @ 2.5 g/litre of water(T_3) and Azoxystrobin 18.2% w/w + Difenoconazole 11.4% w/w SC @1 ml/ litre of water (T_6) recorded the yield of 17.0 and 16.4 q/ ha, respectively (**Table 58**).

Path 3 (K): Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil-borne disease management

To evaluate the efficacy of rhizospheric fungi and chemicals on the incidence of seed and soil-borne diseases, field experiments were conducted with 13 treatments including untreated control and three replications using RBD design at eight designated centers in North, Center and South Zones (**Table 59**).

Recommended cultivar RCH-926 (untreated seeds) was sown at **ICAR-CICR, RS Sirsa** on 7th May, 2024. The treatments were applied as per the technical programme including seed treatment, soil application and foliar spray. The observations were also disease incidence, especially root rot, plant height, number of monopodial and sympodial branches and seed cotton yield. The highest germination was recorded with T-6 (Trichoderma spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L) (68.3%) and this was statistically at par with T-5 (Trichoderma spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L + Mak Adjuvol mineral paraffin oil) @1.5% 15 ml/L), T-4 (Trichoderma spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L) and T-3 (Trichoderma spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time). The lowest plant mortality at 145 days after sowing was recorded with the treatment T-6 *(Trichoderma asperellum* isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L)) followed by T-5 *Trichoderma* spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L), T-3 *Trichoderma* spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time and T-4 *Trichoderma* spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment

at sowing time and FS at 60 and 90 DAS @ 2 ml/L. The highest seed cotton yield was recorded with T-6, followed by T-4 and T-5 **(Table 60).**

At HAU Hisar, the highest germination was recorded with T-7 (Seed treatment with carboxin 37.5% + thiram 37.5% @ 3.5g/kg) (82.67%) followed by T-6 (82.33%) followed by T-5 (80.67%) treatments. The lowest plant mortality (highest root rot reduction) at 120 days after sowing was recorded with the treatment T-5 (Trichoderma spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L + Mak Adjuvol mineral paraffin oil) @1.5% 15 ml/L) followed by T-4 (Trichoderma spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L) and T-6 (*Trichoderma* spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L). The lowest fungal foliar spot disease incidence was recorded with the treatment T-6 *(Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L)) followed by T-5 *(Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L)) and T3 *(Trichoderma* spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time). The highest seed cotton yield was recorded in T-5 (*Trichoderma* spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L + Mak Adjuvol mineral paraffin oil) @1.5% 15 ml/L), T-6, T-4 and T-3 **(Table 61).**

At RRS PAU, Bathinda, the cultivar PAU Bt-2 was sown during the first fortnight of May 2024 and the treatments were provided as per the schedule. The highest germination was recorded with T-7 (Seed treatment with carboxin 37.5% + thiram 37.5% @ 3.5g/kg), (86.0%) followed by T-5 (Trichoderma spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time) (85.3%). The lowest plant mortality up to 120 days after sowing was recorded in treatment T-7 (Seed treatment with carboxin 37.5% + thiram 37.5% @ 3.5g/kg) with highest disease reduction of 33.3% followed by T-5 (Trichoderma spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L)) and T-2 (Trichoderma spp. isolate (CICR Rf-B/Th-11) as soil treatment @ 1 kg/acre with 100 kg well-decomposed FYM/Compost at sowing time). At 120 DAS, the lowest BLB and fungal foliar spots were recorded in T-9 (Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L) at 60 and 90 DAS) followed by T-10 (Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L) at 60 and 90 DAS) & T-8 (Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/L at 60 and 90 DAS). The highest seed cotton yield was recorded in T-9 followed by T-10 and T-8 **(Table 62).**

At CRS Junagarh: G cot-8 Hy. (BGII) was sown on 26 June 2024 and the results revealed a non-significant effect on germination at 7 DAS. However, maximum germination (97.5%) was recorded in treatment T-3 (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment @ 1 kg/acre with 100 kg well-decomposed FYM/Compost at sowing time) followed by T-1 (*Trichoderma* spp. isolate (CICR-Rf-B/Th-11) as seed treatment @ 5 g/kg seed. No plant mortality was observed at 30 and 60. Also, non-significant results were obtained on plant mortality at 120 DAS in terms of mortality. However, the highest plant mortality reduction (62.8%) over control was recorded in the treatment T-5 (*Trichoderma* spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L)). This was followed by T-4 *Trichoderma* spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L. (60.1%), T-3 (53.4%) and T-2 (52.2%)

(Trichoderma spp. isolate (CICR Rf-B/Th-11) as soil treatment @ 1 kg/acre with 100 kg well-decomposed FYM/Compost at sowing time. The disease intensity of fungal foliar disease at 120 DAS was significantly lower (16.44%) in the treatment T-10 (Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @1.5% (7.5 ml/L) at 60 and 90 DAS) and T-9 (Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L) followed by T-8 (Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/L at 60 and 90 DAS) and T-12. The results on plant growth parameters (Monopodial, sympodial branches, no. of boll, boll weight and yield) showed a non-significant effect for all treatments. However, the highest yield (1984 kg/ha) was recorded with the treatment T-8 (Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/L at 60 and 90 DAS) followed by T-9, T-10, T-1 and T-3 (**Table 63**).

At CRS Nanded: RCH 659 (BGII) was sown on 22 June 2024. Among all other treatments, higher seed germination was recorded in T-7 (Seed treatment with carboxin 37.5% + thiram 37.5% @ 3.5g/kg) (97.0%) which was statistically at par with other treatments except T-12 and T13. Among the different treatments, compared to the control (19.7 % mortality), the minimum plant mortality at 120 DAS (6.1%) was recorded with treatment T-7 (Seed treatment with carboxin 37.5% + thiram 37.5% @ 3.5g/kg) with highest disease reduction of up to 69.0% which was followed by T-8 (Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/L at 60 and 90 DAS). The reduction in plant mortality was statistically at par with other treatments except T-12 and T13. A higher reduction in *Alternaria* leaf spot was recorded in treatment T-10 (Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L) at 60 and 90 DAS) (74.7%) followed by T-9 (73.5%), T8 (71.08%), and T-11 (71.08%) compared to the control. A significant reduction in grey mildew disease was recorded with Treatment T9 (87.01%) followed by treatments T-8 (85.83%) and T-11 (83.46%) compared to the control (21.17 PDI). Treatment T-9 (Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L) at 60 and 90 DAS) recorded the highest seed cotton yield (18.1 Q/ha) which was followed by treatment T-7 (18.0 Q/ha) and T10 (17.9 Q/ha). Untreated control recorded the lowest seed cotton yield (13.9 Q/ha) (**Table 64**).

At UAS Dharwad, among all other treatments, the highest reduction in plant mortality (85.3%) was recorded with the treatment T-7 (Seed treatment with carboxin 37.5% + thiram 37.5% @ 3.5g/kg) at 120 DAS followed by T-5 (*Trichoderma* spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L)) which was on par with each other. In case of Alternaria leaf blight, highest reduction of up to 64.6% was recorded with the treatment T-10 (Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L) at 60 and 90 DAS) which was followed by T-9 (Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L) at 60 and 90 DAS). A similar trend was recorded in the case of bacterial leaf blight disease. Among all, the highest seed cotton yield (18.9 Q/ha) was recorded with treatment T-10 (Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L) at 60 and 90 DAS) followed by T-8 *(*Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/Lt at 60 and 90 DAS) (17.3 Q/ha) and T-9 (Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml + Mak adjuvol (mineral paraffin oil) @ 1.5% (15 ml/lt) @ 60 and 90 DAS) (17.1 Q/ha) as compared to lowest seed cotton yield in untreated control (10.5 Q/ha) (**Table 65**).

At Lam Guntur, a cotton hybrid, Akira was sown on 9 August 2024 with the scheduled treatments. Germination was observed in the range of 64.0 to 87.3% in different treatments at 7 DAS with the highest

in T-6 (87.3%) (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment) followed by T3, T4, T-2 and T7. The highest disease reduction of 100% was recorded with treatment T-4, T5, T-6 and T-10 up to 120 DAS (*Trichoderma* spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L), T-5 (*Trichoderma* spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L)), T-6 (*Trichoderma* spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L)) and T-10 (Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L) at 60 and 90 DAS). The lowest CoLS was recorded in T_5 (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L) followed by T4, (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L (6.75 PDI) T6. The lowest grey mildew and rust PDI were recorded in treatment T5 (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L) followed by T-4, (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L and T-6. The highest plant height of 172.67 cm was recorded in T6, (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L) as against 144.50 cm in control. The highest seed cotton yield of 22.7 Q/ha was recorded in T-8 (Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/L at 60 and 90 DAS) followed by T-7 (carboxin 37.5% + thiram 37.5% @ 3.5g/kg) (22.46 Q/ha), and T-5 (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L) compared to control (14.7 Q/ha) (**Table 66**).

At TNAU Coimbatore cultivar Jadoo was sown during 2024- 2025 in a replicated trial as per the scheduled 13 treatments. The highest germination of 89% was recorded in the treatment T5 (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L). Among the bioagents treatments, the treatment T5 (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L) was found to be the most effective treatment in reducing root rot incidence by recording the incidence of 12.3% as against 45.5% in the control accounting to the disease reduction of 72.9% which was followed by T-6 (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol mineral paraffin oil) @1.5% 7.5 5 ml/L). T-9, T-10, T-8 for Alternaria blight and T-8, T-9 and T-10 for grey mildew were found superior to other treatments. The highest plant height of 168.6 cm was recorded in treatment T_5 as against 127.3 cm in the control. It was on par with treatment T6 which recorded the plant height of 167.1 cm The highest number of sympodial branches (27.0) was observed in treatment T_5 as against only 15 numbers in the untreated control. The maximum seed cotton yield of 19.1 q/ ha was recorded in treatment T5 and it was on par with the treatments T-6 and T-4 which recorded the seed cotton yield of 18.5 and 18.2 q/ha, respectively in comparison to 11.7 q/ha in control (**Table 67**).

Path.3(L): Field evaluation of Endophytic BCAs along with chemicals for seed and soil-borne diseases

For the management of seed and soil-borne diseases caused location location-specific pathogens, field experiments were conducted with 8 treatments including control with three replications using RBD design under field conditions at designated centers. Treatments including Endophytic BCAs, consortium

ECN, fungicides, insecticides, and control were evaluated. The treatments were given as per the technical programme including seed treatment, soil application and foliar spray. The observations were also disease incidence, plant height, number of monopodial and sympodial branches and seed cotton yield **(Table 68)**.

North Zone:

At Hisar among these treatments, maximum germination (86.74%) was recorded with treatment T-6 (Seed treatment (ST) with commercial formulation (BCA) @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS), followed by T-1, (Seed treatment (ST) with *Diaporthe longicolla* CEL-48 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS), and T-3 (Seed treatment (ST) with *Diaporthe melonis isolate CFS-5* @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS). The minimum root rot disease incidence and severity were recorded with T-3 (Seed treatment (ST) with *Diaporthe melonis isolate CFS-5* @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS), followed T-5 and T-7. The minimum leaf spot disease incidence and severity were found with T-3 (Seed treatment (ST) with *Diaporthe melonis isolate CFS-5* @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS), followed by T-4 and T-5. The lowest boll rot incidence and severity was recorded with T-1, (Seed treatment (ST) with *Diaporthe longicolla* CEL-48 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS), followed by T-2 and T-3. The maximum seed cotton yield was recorded with treatment T-4 (Seed treatment (ST) with consortium ECN-1 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS), followed by T-3 (Seed treatment (ST) with *Diaporthe melonis isolate CFS-5* @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) and T-7 (Seed treatment (ST) with Carboxin + Thiram @ 3.5g/kg seed + Foliar spray (FS) of Propineb @ 2.5g/lit water at 60 and 90 DAS), respectively **(Table 69).**

At RRS Faridkot the maximum germination (98.67%) was recorded with treatment T-6 (Seed treatment (ST) with commercial formulation (BCA) @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS), followed by T-3 (Seed treatment (ST) with *Diaporthe melonis isolate CFS-5* @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS). The minimum fungal foliar disease PDI (4.17%) was recorded with treatment T-7 (Seed treatment (ST) with Carboxin + Thiram @ 3.5g/kg seed + Foliar spray (FS) of Propineb @ 2.5g/lit water at 60 and 90 DAS), followed by T-4 (Seed treatment (ST) with consortium ECN-1 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) and T-1 (Seed treatment (ST) with *Diaporthe longicolla* CEL-48 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS). The maximum seed cotton yield was recorded with treatment T-7 (Seed treatment (ST) with Carboxin+Thiram @ 3.5g/kg seed + Foliar spray (FS) of Propineb @ 2.5g/lit water at 60 and 90 DAS), followed by T-4 (Seed treatment (ST) with consortium ECN-1 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS), T-6 (Seed treatment (ST) with commercial formulation (BCA) @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS), followed by T-2 respectively. **(Table 70).**

At Bathinda, the maximum germination (94.7%) was recorded with treatment T-7 (Seed treatment (ST) with Carboxin + Thiram @ 3.5g/kg seed + Foliar spray (FS) of Propineb @ 2.5g/lit water at 60 and 90 DAS), followed by T-3 (Seed treatment (ST) with *Diaporthe melonis isolate CFS-5* @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) and T-1, (Seed treatment (ST) with *Diaporthe longicolla* CEL-48 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS). The minimum fungal foliar leaf spot disease and bacterial blight PDI was recorded with treatment T-7 (Seed treatment (ST) with Carboxin+Thiram @ 3.5g/kg seed + Foliar spray (FS) of Propineb @ 2.5g/lit water at 60 and 90 DAS), followed by T-4 (Seed treatment (ST) with consortium ECN-1 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS). Among these treatments maximum seed cotton yield was recorded with treatment T-7 (Seed treatment (ST) with Carboxin + Thiram @ 3.5g/kg seed + Foliar spray (FS) of Propineb

@ 2.5g/lit water at 60 and 90 DAS), followed by T-4 (Seed treatment (ST) with consortium ECN-1 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) and T-2 **(Table 71)**

Central Zone

At Junagarh, the maximum germination (97.62%) was recorded with treatment T-4 (Seed treatment (ST) with consortium ECN-1 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS), followed by T-2 (Seed treatment (ST) with *Diaporthe eschscholtzii* M1-4 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) and T-3 (Seed treatment (ST) with *Diaporthe melonis isolate CFS-5* @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS). All the treatment was superior to control. The minimum root rot incidence was recorded with treatment T-1 (Seed treatment (ST) with *Diaporthe longicolla* CEL-48 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS), it was statistically at par with all treatments except T-7 and control. The fungal foliar disease minimum incidence was recorded with T-7 (Seed treatment (ST) with Carboxin + Thiram @ 3.5g/kg seed + Foliar spray (FS) of Propineb @ 2.5g/lit water at 60 and 90 DAS), it is at par with T-2 (ST with *Diaporthe eschscholtzii* M1-4 @ 5 g/kg seed + foliar spray (FS) @ 5g/lit water at 60 and 90 DAS), T-1 (seed treatment with *Diaporthe longicolla* CEL-48 @ 5g/kg seed + foliar spray (FS) @ 5 g/lit water at 60 and 90 DAS) it is statistically at par seed treatment (ST) with *Diaporthe eschscholtzii* M1-4 @ 5 g/kg seed + foliar spray (FS) @ 5 g/lit water at 60 and 90 DAS. The maximum seed cotton yield was observed with treatment T-1 (Seed treatment (ST) with *Diaporthe longicolla* CEL-48 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) followed by T-3 (Seed treatment (ST) with *Diaporthe melonis isolate CFS-5* @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) and T-6 (Seed treatment (ST) with commercial formulation (BCA) @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS), T-4 (Seed treatment (ST) with consortium ECN-1 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) **(Table 72).**

At Nanded the maximum germination (97.98 %) was observed with treatment T-7 (Seed treatment (ST) with Carboxin + Thiram @ 3.5g/kg seed + Foliar spray (FS) of Propineb @ 2.5g/lit water at 60 and 90 DAS), followed by T-4 (Seed treatment (ST) with consortium ECN-1 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) and T-1 (Seed treatment with *Diaporthe longicolla* isolate CEL-48 @ 5g/ kg seed + foliar spray (FS) @ 5g/ L water at 60 and 90 DAS). *Alternaria* leaf spot and Grey mildew maximum reduced over control and reduction was highest in treatment T-7 (Seed treatment (ST) with Carboxin + Thiram @ 3.5g/kg seed + Foliar spray (FS) of Propineb @ 2.5g/lit water at 60 and 90 DAS), followed by T-4 (Seed treatment (ST) with consortium ECN-1 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) and T-5 (seed treatment with consortium ECN- 2@ 5g/kg of seed + foliar application @5g/ L water at 60 and 90 DAS). The maximum seed cotton yield was observed with treatment T-7 followed by T-2 (Seed treatment with *Diaporthe eschscholtzii* M1-4 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) and T-4 (Seed treatment (ST) with consortium ECN-1 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) **(Table 73).**

South Zone

At Coimbatore the highest germination of 96.3 % was recorded in treatment T4seed treatment with consortium ECN- 1@ 5g/kg of seed + foliar application @5g/ L water at 60 and 90 DAS and followed by treatment, T5 - seed treatment with consortium ECN- 2@ 5g/kg of seed + foliar application @5g/ L water at 60 and 90 DAS which exhibited the germination of 95.0%. In the untreated control treatment, 80.0 % germination was observed. The maximum % reduction of Root rot, *Alternaria* leaf blight, grey

mildew and Boll rot was recorded with treatment T4 - seed treatment with consortium ECN- 1@ 5g/kg of seed + foliar application @5g/ L water at 60 and 90 DAS followed by T-5 (Seed treatment with consortium ECN-2 @ 5g/kg seed + foliar spray (FS) @ 5 g/lit water at 60 and 90 DAS. The highest plant height of 167.5 cm was recorded in treatment T4 as against 130.6 cm in control. The maximum seed cotton yield of 18.3 q/ha was recorded in treatment T4 in comparison to 12 q/ha in the untreated control plot **(Table 74).**

At Dharwad, the maximum reduction in seedling mortality over control was recorded with treatment T-7 (Seed treatment (ST) with Carboxin + Thiram @ 3.5g/kg seed + Foliar spray (FS) of Propineb @ 2.5g/lit water at 60 and 90 DAS), followed by T-6 and T-4. The maximum reduction in *Alternaria* leaf blight disease was recorded with treatment T-7 (Seed treatment (ST) with Carboxin + Thiram @ 3.5g/kg seed + Foliar spray (FS) of Propineb @ 2.5g/lit water at 60 and 90 DAS), followed by T-6 (Seed treatment (ST) with commercial formulation (BCA) @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) and T-1. Bacterial blight reduction over control was recorded with treatment T-7 (Seed treatment (ST) with Carboxin + Thiram @ 3.5g/kg seed + Foliar spray (FS) of Propineb @ 2.5g/lit water at 60 and 90 DAS), followed by T-6 (Seed treatment (ST) with commercial formulation (BCA) @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) and T-4. The highest seed cotton yield was recorded in the treatment T-7 (Seed treatment (ST) with Carboxin + Thiram @ 3.5g/kg seed + Foliar spray (FS) of Propineb @ 2.5g/lit water at 60 and 90 DAS) followed by T-6 (Seed treatment (ST) with commercial formulation (BCA) @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) and treatment T-4 (Seed treatment with consortium ECN-1 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) **(Table 75)**

At Lam, Guntur the maximum germination (98.50%) and seedling vigour index were observed with treatment T-4 (Seed treatment (ST) and consortium ECN-1 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) followed by T-5 (Seed treatment (ST) with consortium ECN-2 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) and T-6 (Seed treatment (ST) with commercial formulation (BCA) @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS). The minimum PDI of *Corynespora* leaf spot was recorded with treatment T-5 (Seed treatment (ST) with consortium ECN-2 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS), followed by T-6 (Seed treatment (ST) with commercial formulation (BCA) @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) and T-4 (Seed treatment (ST) and consortium ECN-1 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS). The minimum grey mildew was observed with treatment T-5 (Seed treatment (ST) with consortium ECN-2 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS), followed by T-4 (Seed treatment (ST) and consortium ECN-1 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) and T-6 (Seed treatment (ST) with commercial formulation (BCA) @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS). The rust disease was recorded minimum with treatment T-5 (Seed treatment (ST) with consortium ECN-2 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS), followed by T-4 (Seed treatment (ST) and consortium ECN-1 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) and T-6 (Seed treatment (ST) with commercial formulation (BCA) @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS). The boll rot incidence was recorded minimum with treatment T-6 (Seed treatment (ST) with commercial formulation (BCA) @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) followed by T-4 (Seed treatment (ST) and consortium ECN-1 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) and T-5 (Seed treatment (ST) with consortium ECN-2 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS). The maximum seed cotton yield was observed with treatment T-8 (Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/L Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) followed by T-7 (Seed treatment (ST) with Carboxin + Thiram @ 3.5g/kg seed + Foliar spray

(FS) of Propineb @ 2.5g/lit water at 60 and 90 DAS) and T-5 (Seed treatment (ST) with consortium ECN-2 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS) with minimum untreated T-13 control respectively **(Table 76).**

Path.3. (m): Management of TSV disease on cotton through its vector management

In a comprehensive study at **Rahuri**, six different insecticides were tested for their efficacy in controlling disease by targeting the thrips vector. Among the chemicals tested, Profenofos 50% EC demonstrated the lowest percent disease intensity over control, achieving the highest percent disease control of up to 25.31%, followed by Flonicamid 50 WG with a disease control rate of 24.35%, Spinetoram 11.70% SC at 23.51%, Dinotefuran 20 SG at 20.67%, and Tolfenpyrad 15% EC at 18.74%. The lowest percent of disease control was observed with Diafenthiuron 50% WP SC, which recorded 17.78% (**Table 77)**.

A total of six spray applications were conducted for the management of the thrips vector of TSV at **Rahuri.** Thrips counts were recorded at 0, 3, 7, 10, and 15 days after each spray. Among all the insecticides tested, Profenofos 50% EC showed the lowest average thrips count of 7.62 per three leaves across all sprays, with a high percent reduction over control at 51.74% which was followed by Flonicamid 50 WG with a count of 8.51 thrips per three leaves and a reduction of 46.05%. The highest thrips population was found in the treatment with Diafenthiuron 50% WP SC, which recorded a count of 11.48 thrips per three leaves and the least reduction over control at 27.25%. The highest yield was observed in the treatment using Profenofos 50% EC, which yielded 21.47 q/ha. This was followed by Flonicamid 50 WG with a yield of 19.75 q/ha, Spinetoram at 19.18 q/ha, Dinotefuran 20 SG with 18.97 q/ha, Tolfenpyrad 15% EC at 18.43 q/ha, and Diafenthiuron 50% WP SC yielding 16.59 q/ha. The lowest yield was recorded in the control plot, which produced 9.04 q/ha **(Table 78, 79).**

In a comprehensive study at **Nanded**, six different insecticides were tested for their efficacy in controlling disease by targeting the thrips vector. Among the chemicals tested, Spinetoram 11.70% SC demonstrated the lowest percent disease intensity over control, achieving the highest percent disease control. This was followed by Tolfenpyrad 15% EC. The highest seed cotton yield (17.48 Q/ha) was obtained in a plot treated with Spinetoram 11.70% SC as compared to the untreated control plot (13.13 Q/ha) **(Table 80).**

In a comprehensive study at **Guntur**, four different insecticides were tested for their efficacy in controlling disease by targeting the thrips vector. Among the chemicals tested, Spinetoram 11.70% SC demonstrated the lowest percent disease intensity over control, achieving the highest percent disease control with the highest seed cotton yield in Akira and Siri hybrids. Followed by Tolfenpyrad 15% EC **(Table 81, 82).**

Path.4.: Crop loss estimation

Path.4. (e) Expt.1: Crop loss estimation due to CLCuD and distribution pattern of CLCuD in the north zone

Pooled data of Hisar, Faridkot and Rajasthan on seed cotton yield reduction due to CLCuD (Grade wise from 1-6 grade) in different Bt hybrids varied from 8.78 to 83.5, 2.5 to 83.6, 3.2 to 79.4 and 2.3 to 74.4% in Bt hybrids US-51, RCH 773 BG II, NCS 9013 BGII and ACH177-7 BG II, respectively. A similar trend was observed in the case of a reduction in the number of bolls but the reduction in boll weight varied with the cultivars and the respective CLCuD grades. Overall, the reduction in bolls number under the 1-6 severity grades over healthy plants ranged between 5.4-48.6, 1.2-42.0, 1.5-48.8 and 1.3-47.2% in US-51,

RCH 773 BG II, NCS 9013 BGII and ACH177-7 BG II, respectively (**Table 83, 84, 85**). The average reduction (%) in seed cotton yield ranged from 7.8 to 80.2%, with an overall reduction of 38.1% (Mixed grades) in all four BG II hybrids. The average reduction of SCY corresponding to CLCuD severity grades was 0=Nil, 1= 7.8, 2=21.1, 3=37.4, 4=49.5, 5=53.0, and 6=80.2% **(Table 85a).** However, experimental data recorded from the protected trials at Hisar (Haryana) indicated that at farmers' fields, the average seed cotton yield reduction varied from 8.2 to 53.3% (**Table 85b**).

Crop loss due to *Alternaria* leaf spot disease was estimated in the field trail at CRS, JAU, and Junagarh where, loss varied from 1.9 (30.5% PDI) to 10.4 % (62.5% PDI) in G. Cot. Hy-8 BG II, G. Cot. Hy-24 BG II, G. Cot. Hy-10 BG II, Platinum, Ajeet-5 **(Table 85c**)

Path.4. (1a)) Expt.1: Crop loss estimation due to TSV and distribution pattern of TSV in Central and South Zone

To estimate the yield losses due to TSV in cotton, 6 chemical treatments including insecticides were evaluated with suitable control under open-field conditions. Five foliar sprays were applied at the recommended dosage and the percent incidence of TSV was recorded. Further, yield loss due to TSV was estimated (**Table 86**).

Central Zone

At Rahuri in the case of Rasi 2 (BG II**), t**he average reduction of SCY (Akira & Jadoo BGII) corresponding to TSV severity grades was 0=Nil, 1= 56.11, 2=60.44 was recorded, however the in-boll weight in corresponding to grade 1 and 2 was 36.52 and 39.54%, respectively. Reduction in number of bolls was 31.04 and 36.06%, respectively. No plant was categorized in 3 and 4 grades **(Table 87).** While at Nanded the 23.25 % reduction in SCY was recorded compared with healthy plants **(Table 88).**

South Zone

At Lam, Guntur: The average reduction of SCY corresponding to TSV severity grades 1 was 6.52%, while the reduction in boll number and boll weight was 14.7 and 0.76%, respectively. A similar trend of treatments was recorded in Hybrid Siri at Guntur **(Table 89 a, b, c).**

The average reduction in seed cotton yield at **Coimbatore** in correspondence with grades 1,2,3, and 4 were 12.3, 28.5, 36.7 and 41.7% respectively. The reduction in boll weight was 5.5, 16.3, 20 and 21.8% whereas the reduction number of bolls per plant was 7.2, 14.5, 20.9 and 25.4%, respectively (**Table 90**). Overall, SCY loss in correspondence with TSV grades 1, 2, 3, and 4 was recorded to be 29.5, 49.8, 53.1 and 41.7% in central and south cotton growing zones (Rahuri, Nanded, Guntur, Coimbatore) (**Table 91**).

Path.4 (e) Expt.2: Distribution pattern of CLCuD on local popular BT hybrid at farmer's field.

Comparatively, the CLCuD PDI was higher during 2024-25 than the previous year 2022-24. The highest average leaf curl disease PDI during the 2024 season at farmers' fields was recorded in Punjab (35.8%) followed by Rajasthan (19.1%) and Haryana (14.7%). In Punjab, the maximum CLCuD PDI was found in Fazilka followed by Muktsar, and the least was found in Bathinda whereas in Haryana, the maximum average CLCuD PDI was noted in Fatehabad followed by Sirsa and the least was found in Mahendergarh. In Rajasthan, the CLCuD PDI was higher in Sriganganagar compared to Hanumangarh. (**Table 92**).

Path.4 (1c): Study on the distribution pattern of TSV disease on local popular Bt hybrid at farmer's field.

Among all these field locations in three districts of Andhra Pradesh viz. Guntur, Krishna and Palnadu, the TSV was nil to in traces during this year (Table 93).

The distribution pattern of TSV was observed in the farmers' fields of six districts *viz.*, Coimbatore, Dindigul, Tuticorin, Virudhunagar, Tirunelveli and Perambalur districts. In these districts farmers are growing the hybrids viz., RCH 659, BG II Bollgard II and RCH II BG II and the varieties *viz*., CO17, SVPR 6. In both the hybrids and varieties, the TSV symptoms initiated 45- 50 days after sowing and the intensity of the disease increased gradually and reached the peak after 100 days of sowing after that it started declining. The intensity of the disease was more in hybrids as compared to varieties The severity or the intensity of the disease was observed to be reduced after heavy rainfall. It may be due to the reduction in thrips population and vigorous growth of the plants induces resistance against TSV. TSV symptoms expressed as small purple spots, later it spread all the leaves causing necrosis of the leaves and the early and severe infection resulted in square shedding. In some locations, infected leaves showed light green and dark green patches with misshapen and distorted leaves. In the farmers' fields of Coimbatore district, the TSV incidence of 3.7 to 8.8 % was observed. In Dindigul district the TSV incidence of 3 - 14.0 % was recorded. TSV incidence of Tuticorin, Tirunelveli and Perambalur districts ranged from 2.3 - 7.0, 3.0 - 9.0 and 2.5 – 7.5% respectively. In Virudhunager district the lowest TSV incidence of 1.5- 3.0 % was noticed (Table 94).

Path 5. Developing and testing of organic nutrient, pest and disease management modules in cotton-based cropping system

Three modules including module-1 (Completely on-farm resources), module-2 (LEISA Module-low external 30% input sustainable model), module -3 (Intensive Module, 30% on-farm, 70% off-farm external inputs (Cost basis) and two control modules including Control 1 (Location specific IDM) and Control 2 (Farmers practice) were evaluated at on-station trials **(Table 95).**

At Sirsa, among the five modules the lowest cotton leaf curl disease severity was recorded in module-3 ((Intensive Module, 30% on-farm, 70% off-farm external inputs (Cost basis), followed by module 5 (IDM), and the maximum incidence was recorded in module-2 after fifteen days of spray during 120 days of the crop **(Table 96). At Bathinda** the lowest cotton leaf curl disease, Fungal foliar spots and bacterial leaf blight were recorded in module-2, followed by module 1, and module 4 the maximum incidence was recorded in control-2 (**Table 97**).

At Surat lowest bacterial blight incidence was observed in module 3, followed by module 4, and module 2 (**Table 98**). **At Khandwa, t**he lowest mean PDI of CoLS was recorded in module-2 (26.0%) followed by module -3 (30.8%) and control module-1 (35.3%) compared to control -2. The lowest PDI of ALS and grey mildew were recorded in module-2 followed by module-3. The maximum mean seed cotton yield of 1555.27 Kg/ha was achieved in module -3 followed by 1550.44 Kg/ha was recorded in control module -1 **(Table 99).**

At CRS, Junagarh, among five modules including three organic modules, *Alterneria* leaf spot disease intensity was recorded minimum (10.50%) in control module-1 (Integrated Disease Management) followed by in module 3 (Intensive Module, 30% on-farm, 70% off-farm external inputs (Cost basis). The root rot incidence was recorded minimum in module-1, module-3 and control module-1. The highest SCY was recorded in control module-1 2394 Kg/ha followed by control module-2 (2136 Kg/ha) (**Table 100**).

Concluded Experiment:

Path.3: Management of Diseases of cotton

Path 3(j): Management of boll rot and foliar diseases of Cotton through CIB&RC recommended new chemical pesticides and their Combinations

In this experiment, twelve different treatments including CIB&RC recommended new chemical pesticides and their combinations (Foliar spray) were evaluated for managing boll rot and foliar diseases (bacterial and fungal foliar spot) under field conditions**.** The treatment details of new chemical pesticides and their combinations (**Table 101).**

South Zone: Based on the pooled results (2022-23, 2023-24 and 2024-25) of the experiment conducted at **Coimbatore**, the highest reduction in ALB was recorded with T-3 (Propineb 70% WP @ 2.5 g/litre of water) followed by T-4 (Fluxapyroxad 167 g/Litre + Pyraclostrobin 333 g/Litre SC @ 0.6 g/L) and T-6 Azoxystrobin 18.2% w/w + Difenoconazole 11.4% w/w SC @ 1 ml/ litre of water (68.8%, 63.8%, 60.5%) in comparison to control (18.0% PDI). The reduction of grey mildew was recorded to be the highest (70.9%) with T-1 (Kresoxim methyl 44.3% SC @ 1 ml/litre of water) followed by T-6 (Azoxystrobin 18.2% w/w + Difenoconazole 11.4% w/w SC @ 1 ml/ litre of water) and T-5. The most effective treatment for reduction of BLB was found to be T-7 (Copper sulphate 47.15% + Mancozeb 30% WDG @ 5 g/ litre of water) with up to 51.1% reduction. Similarly, the maximum reduction in boll rot infection (71.1%) was recorded in T-4 (Fluxapyroxad 167 g/Litre + Pyraclostrobin 333 g/Litre SC @ 0.6 g/L). The highest seed cotton yield was also recorded in the treatment T-4 (Fluxapyroxad 167 g/litre + Pyraclostrobin 333 g/litre SC @ 0.6 g/litre of water) (18.8 Q/ha) followed by T-5 (Metiram 55% + Pyraclostrobin 5% WG @ 2 g/litre of water) (17.6 Q/ha) in comparison to 11.4 q/ha in control (**Table 102**). These treatments can be recommended in Coimbatore, Karnataka cotton growing region.

Path 3(k): Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil-borne disease management (Pooled analysis for three years 2022-2023 , 2023- 2024, 2024- 2025)

Field experiments were conducted for three consecutive years (2022-2023, 2023- 2024, 2024-2025) to evaluate the efficacy of rhizospheric fungi and chemicals and their combinations **(Table103)** against soil and seed-borne diseases of cotton using untreated seed in North (Hisar, Sirsa, Bathinda), Central (Junagarh, Nanded) and South Zones (Dharwad, Coimbatore, Guntur). The results of the pooled analysis are presented in the following headings:

North Zone

Based on the pooled results (2022-23, 2023-24 and 2024-25) of the experiments conducted at **HAU Hisar,** the lowest plant mortality (2.6%) during 120 DAS was observed in treatment T5 (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol mineral paraffin oil @1.5% (15 ml/L) with maximum disease reduction of 81.1% which was followed by T-6 (reduction 80.5%) (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L) with disease reduction of upto 80.5%. T-3 and T-4 were at par with each other in terms of plant mortality reduction. The maximum seed cotton yield of 6.0 q/ha was recorded in T-5 followed by T-6 (5.7 q/ha) in comparison to 3.6 q/ha in control (**Table 104a,104b**).

Based on the pooled results (2022-23, 2023-24 and 2024-25) of the experiments conducted at **CICR-RS Sirsa,** the lowest plant mortality was observed in treatment T-6 (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L) with mean minimum area under disease progress curve (298.0) followed by T-5 and T-4 (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L/7.5ml/L) in comparison to control with maximum area under disease progress curve and disease reduction **(Table 105a, 105b).** These treatments also showed enhanced plant growth and yield contributing parameters over control **(Table 105c).**

Based on the pooled results (2022-23, 2023-24 and 2024-25) of the experiments conducted at **Bathinda,** the minimum plant mortality (12.0%) was observed in treatment T-7 (Seed treatment with carboxin 37.5% + thiram 37.5% @ 3.5g/kg) with highest reduction of 40% followed by T-5 (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L)) with 38% disease reduction. Treatments T-9 and T-10 for the management of fungal foliar spot and BLB were found superior to other treatments. The highest seed cotton yield (20.8 q/ha) was recorded with T-9 (Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L) at 60 and 90 DAS) in comparison to 13.5 q/ha in control (**Table 106a, 106b, 1006c**).

CENTRAL ZONE

At CRS Junagarh (disease was observed 90DAS), **t**he three-year pooled result of germination percent indicated that maximum germination (97.5%) was found in T-3 [*Trichoderma* spp. (Rf-B/Th-11) as seed (5g/kg seed) + soil treatment (1 kg/acre in 100 kg FYM) at sowing time] as compared to control (88.2%). Minimum plant mortality (1.9%) and root rot reduction (63.46%) were recorded in T-5 (*Trichoderma* spp. (Rf-B/Th-11) as seed + soil treatment at sowing time and foliar spray at 60 and 90 days after sowing @ 2/L + mineral paraffin oil @ 1.5% (15 ml/L)) and T-9 with maximum disease reduction of 63.43%. Treatments T-10, T-9 and T-8 for management of fungal foliar spot and BLB were found superior to other treatments. The highest seed cotton yield (21.1 q/ha) was recorded in treatment T-9 (Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L + mineral paraffin oil @1.5% (15 ml/L) at 60 and 90 days after sowing) followed by T-3 (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time) as compared to the minimum seed cotton yield (17.7 q/ha) in control (**Table 107a, 107b, 107c**).

Based on the pooled results (2022-23, 2023-24 and 2024-25) of the experiments conducted at **Nanded,** the minimum plant mortality (4.5%) was observed in treatment T-7 (Seed treatment with carboxin 37.5% + thiram 37.5% @ 3.5g/kg) with maximum disease reduction (69.2%) followed by T-4 (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L) with upto 67.1% disease reduction and T-3. Treatments T-10 and T-9 for the management of ALS and GM were found superior to other treatments. The maximum seed cotton yield of 18.2 q/ha was recorded in T-10 (Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L) at 60 and 90 DAS) followed by T-6 (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L)) in comparison to 12.1 q/ha in control (**Table 108a, 108b, 108c**).

Looking to the economics of various treatments with fungicide/bio-agents/mineral oil evaluated at Junagarh, the highest net realization of Rs. 21,440/- was obtained with *Trichoderma* spp. isolate (Rf-B/Th-

11) as seed + soil treatment at sowing time. The maximum ICBR (1:6.09) was obtained in *Trichoderma* spp. (CICR-Rf-B/Th-11) as seed treatment @ 5 g/kg seed followed by T-3 (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time). Treatment T-2 and T-7 were at par with each other **(Table 109)**.

SOUTH ZONE

The pooled results (2022-23, 2023-24 and 2024-25) of the experiments conducted at **Dharwad** (disease incidence was recorded up to 60 DAS), the minimum plant mortality (4.2%) during 120 DAS was observed in treatment T-7 (Seed treatment with carboxin 37.5% + thiram 37.5% @ 3.5g/kg) with maximum disease reduction (81.1%) which was followed by T-5 (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L)) with disease reduction of upto 77.0% and T-3. Treatments T-10, T-8 and T-9 for management of ALS and BLB were found superior to other treatments. The maximum seed cotton yield of 19.2 q/ha was recorded in T-10 (Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L) at 60 and 90 DAS) followed by T-9 (17.6 q/ha) in comparison to 10.9 q/ha in control (**Table 110a, 110b, 110c**).

Based on the pooled results (2022-23, 2023-24 and 2024-25) of the experiments conducted at **Lam Guntur** (disease was observed 90 DAS), the minimum plant mortality (0.4%) at 120 DAS was observed in treatment T-8 (Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L at 60 and 90 DAS) with maximum disease reduction (93.99%) which was followed by T-9 (Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L) at 60 and 90 DAS) with disease reduction of up to 90.71% and T-3. For CoLS management T-5 and T-6 were found superior to other treatments while, for GM treatment T-9 and T-5 were best. Treatments T-5 and T-6 were found best against rust and boll rot diseases. The maximum seed cotton yield of 22.3 q/ha was recorded in T-8 followed by T-9 (21.4 q/ha) in comparison to 12.5 q/ha in control (**Table 111a, 111b**).

At TNAU Coimbatore, the highest pooled germination of 88% was recorded in the treatment T-5 (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L). Bioagents treatment, *viz.,* T-5 (*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L)) was found to be the best treatment in reducing root rot incidence by recording the minimum incidence of 10.6% at 120 DAS as against 37.5% in the control accounting to the disease reduction of 71.7% followed by treatment T-6 and T-4 which reduced the disease incidence by 69.3 and 63.5%, respectively. The highest plant height of 168.6 cm was recorded in treatment T-5 as against 120.6 cm in the control. The highest number of sympodial branches (26.7) was observed in the treatment T_5 as against only 12.7 in the untreated control. The maximum seed cotton yield of 18.3 q/ ha was recorded in the treatment T-5 in comparison to 12.7 q/ ha in the untreated control (**Table 112a**). The maximum Alternaria leaf spot reduction was recorded in T-9, T10 and T-8 while the maximum grey mildew reduction was recorded with the treatment T-8, T-9, T-10 (**Table 112b**).

Plant Protection Plant Pathology Entomology Tables

Research Findings: AICRP on Cotton-Plant Pathology (2024-25)

Path.1. Observations on the occurrence of the diseases (in farmer's fields and research farms)

NORTH ZONE

Path1 (a): Observations on the occurrence of various diseases (in farmer's fields and research farms)

Table 1a: Observations on the occurrence of cotton diseases at farmer's fields in Faridkot, Fazilka, Muktsar area (Punjab)

Sr. No.	District/ Place	Variety/ Hybrid	Stage of sampling								
			Percent Disease Intensity (PDI)								
			Early season/Seedling (20-30 DAS)			Mid-season/Flowering (60-80 DAS)			Late/ Boll development (120-150 DAS)		
			BLB	FFS	CLCuD	BLB	FFS	CLCuD	BLB	FFS	CLCuD
	Name of the District										
I.	**Faridkot**										
1	Chahal	RCH 926, RCH 846	0.0	0.0	0.0	0.0	0.0	9.7	0.0	5.0	31.3
2	Sukhan Wala	RCH 926, ACH177	0.0	0.0	0.0	0.0	0.0	12.0	0.0	10.0	36.0
3	Machaki	RCH 846	0.0	0.0	0.0	0.0	0.0	**8.3**	0.0	3.8	29.7
4	Khara	RCH 926, ACH 177	0.0	0.0	0.0	0.0	0.0	9.0	0.0	7.5	30.3
5	Sadik	RCH 926, Diggaj	0.0	0.0	0.0	0.0	0.0	11.7	0.0	8.8	34.0
6	Mani singh	RCH 926, RCH 846	0.0	0.0	0.0	0.0	0.0	10.3	0.0	5.0	32.7
7	Behlewala	RCH 926, ACH 777	0.0	0.0	0.0	0.0	0.0	11.0	0.0	6.3	36.3
8	Wander jatana	RCH 926, RCH 776,	0.0	0.0	0.0	0.0	0.0	10.7	0.0	7.5	31.3
9	Tehna	RCH 846, RCH 776	0.0	0.0	0.0	0.0	0.0	11.7	0.0	5.0	38.7
10	NwanKilla	RCH 926, ACH 177	0.0	0.0	0.0	0.0	0.0	12.0	0.0	6.3	32.7
		Average	0.0	0.0	0.0	0.0	0.0	10.6	0.0	6.5	33.3
II.	**Fazilka**										
1	Abohar	RCH 773, RCH 776, RCH 926, RCH 846, ACH177, ACH 777, Diggaj	0.0	0.0	0.0	0.0	0.0	14.0	0.0	3.8	39.0
2	Kundal	RCH 926, RCH 776, RCH 846	0.0	0.0	0.0	0.0	0.0	12.3	0.0	6.3	34.3
3	Govindgarh	RCH 926, RCH 846	0.0	0.0	0.0	0.0	0.0	11.7	0.0	5.0	33.0
4	Balluana	RCH 926, RCH 773, ACH 177	0.0	0.0	0.0	0.0	0.0	10.3	0.0	7.5	35.7
5	Ghallu	RCH 926, RCH 773, RCH 776, ACH 177	0.0	0.0	0.0	0.0	0.0	12.3	0.0	3.5	36.33

6	Bajitpur	RCH 773, RCH 776, Diggaj	0.0	0.0	0.0	0.0	0.0	11.0	0.0	6.3	37.3
7	Maujgarh	RCH 776, ACH 777	0.0	0.0	0.0	0.0	0.0	13.0	0.0	8.8	34.0
8	Jandwala	RCH 926, RCH 773	0.0	0.0	0.0	0.0	0.0	10.7	0.0	6.3	38.3
9	Khuian sarwar	RCH 926, RCH 776, ACH 177	0.0	0.0	0.0	0.0	0.0	14.0	0.0	3.5	40.3
10	Sito	RCH 773, RCH 776, Diggaj	0.0	0.0	0.0	0.0	0.0	12.3	0.0	5.0	36.7
11	Roopnagar	RCH 926, RCH 846	0.0	0.0	0.0	0.0	0.0	**14.7**	0.0	3.5	44.0
12	Dangarkhera	RCH 926, RCH 776, ACH 777	0.0	0.0	0.0	0.0	0.0	10.3	0.0	5.0	38.3
		Average	0.0	0.0	0.0	0.0	0.0	12.2	0.0	5.4	37.3
III.	**Muktsar**										
1	Mahbaddar	RCH 926, RCH 846	0.0	0.0	0.0	0.0	0.0	9.7	0.0	6.3	30.0
2	Goniana	RCH 926, ACH 177	0.0	0.0	0.0	0.0	0.0	11.0	0.0	8.8	32.7
3	Marh Mallu	RCH 926, RCH 776, Diggaj	0.0	0.0	0.0	0.0	0.0	13.7	0.0	6.3	38.0
4	Bhagsar	RCH 846, RCH 776, Balraj	0.0	0.0	0.0	0.0	0.0	12.0	0.0	7.5	36.3
5	LubaniaWali	RCH 926, ACH 177	0.0	0.0	0.0	0.0	0.0	11.3	0.0	6.3	33.0
6	Balam garh	RCH 926, RCH 776	0.0	0.0	0.0	0.0	0.0	9.7	0.0	8.8	32.3
7	Dohak	Diggaj, RCH 776,	0.0	0.0	0.0	0.0	0.0	11.0	0.0	3.75	38.7
8	Enakhera	RCH 926, RCH 776, RCH 846, Ajit 177	0.0	0.0	0.0	0.0	0.0	12.3	0.0	5.0	37.7
9	Khara	RCH 926, RCH 846	0.0	0.0	0.0	0.0	0.0	13.7	0.0	3.8	40.3
10	Seer wali	RCH 926, RCH 776, Simsim	0.0	0.0	0.0	0.0	0.0	11.3	0.0	5.0	37.3
		Average	0.0	0.0	0.0	0.0	0.0	11.6	0.0	6.2	35.6
		Overall average	0.0	0.0	0.0	0.0	0.0	11.5	0.0	6.0	35.4

Table 1b: Observations on the occurrence of CLCuD at research farm (RRS-PAU Faridkot)

Days after sowing	Bt hybrids/ Varieties	CLCuD (PDI)
60	PAU Bt 2, PAU Bt 3, F 1861, F 846, F 1378, F 2164, F 2383, F 505, F 1054, F 2381 F2228, RST 9, HS 6, RCH 926, RCH 773, RCH 776, ACH 177, US 51, NCS 9013, Ankur 3028	5.0
75		14.0
90		33.5
105		41.0
120		52.0
Average		**29.1**

Table 2a: Observations on the occurrence of cotton diseases at farmer's fields in Bathinda, Maur, Talwandisabo, Sangat, Nathana & Rampura (Punjab)

Sr. No.	District/ Block/ Place surveyed	Variety/ Hybrid	Stage of sampling																	
			Percent Disease Intensity (PDI)																	
			May- June						July -August						September –October					
			Early season/Seedling (20-30 DAS)						Mid-season/Flowering (60-80 DAS)						Late/ Boll development (120-150 DAS)					
			CLCuD	FFS	BLB	Root rot (%)	Parawilt (%)	Boll rot (%)	CLCuD	FFS/ MLS	BLB	Root rot (%)	Parawilt (%)	Boll rot (%)	CLCuD (%)	FFS/MLS	BLB	Root rot (%)	Parawilt (%)	Boll rot (%)
	Bathinda District																			
	Block –Bathinda																			
1	Ruldu Singh Wala	RCH 926 BG II	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	0.0	0.0	0.0	26.7	2.25	1.5	0.0	0.0	0.0
		RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	26.7	0.0	0.0	0.0	0.0	0.0	38.3	4.5	2.0	0.0	0.0	0.0
2	Khudda	RCH 926 BG II	0.0	0.0	0.0	0.0	0.0	0.0	11.7	0.0	0.0	0.0	0.0	0.0	21.7	0.0	0.0	0.0	0.0	0.0
3	Kotfatah	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0
4	Sangat Mandi	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	21.7	0.0	0.0	0.0	0.0	0.0	36.7	5.0	2.5	0.0	0.0	0.0
5	Bathinda	MRC 7365 BG II (Balraaj)	0.0	0.0	0.0	0.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	0.0	38.3	2.0	1.5	0.0	0.0	0.0
		RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	28.3	0.0	0.0	0.0	0.0	0.0	40.0	5.0	2.5	0-2	0-3	0.0
		RCH 926 BG II	0.0	0.0	0.0	0.0	0.0	0.0	11.7	0.0	0.0	0.0	0.0	0.0	18.3	1.5	0.0	0.0	0.0	0.0
6	Jodhpur Romana	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	28.3	0.0	0.0	0.0	0.0	0.0	35.0	2.5	1.0	0-2	0-2	0.0
		RCH 926 BG II	0.0	0.0	0.0	0.0	0.0	0.0	18.3	0.0	0.0	0.0	0.0	0.0	20.0	0.5	0.0	0.0	0.0	0.0
7	Jassi Pauwali	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	0.0	38.3	2.0	0.0	0.0	0.0	0.0
8	Kotshamir	RCH 926 BG II	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	0.0	0.0	0.0
9	Bibiwala	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	31.7	0.0	0.0	0.0	0.0	0.0	41.7	3.5	2.5	0.0	0.0	0.0
		Average	0.0	0.0	0.0	0.0	0.0	0.0	21.7	0.0	0.0	0.0	0.0	0.0	31.2	2.2	1.0	0.0	0.0	0.0
	Block-Maur																			
10	Bhai Bakhtaur	RCH 926 BG II	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	0.0	0.0	0.0	25.0	2.0	0.5	0.0	0.0	0.0

11	Kasokhana	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	38.3	1.0	0.0	0.0	0.0	0.0
12	MaeserKhana	MRC 7365 BG II (Balraaj)	0.0	0.0	0.0	0.0	0.0	0.0	21.7	0.0	0.0	0.0	0.0	0.0	35.0	1.5	0.0	0.0	0.0	0.0
13	Mansakhurd	MC 5408 BG II (Tata Diggaj) BG II	0.0	0.0	0.0	0.0	0.0	0.0	26.7	0.0	0.0	0.0	0.0	0.0	36.7	4.0	2.3	0.0	0.0	0.0
14	Yatri	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	23.3	0.0	0.0	0.0	0.0	0.0	30.0	2.5	0.0	0.0	0.0	0.0
15	Kotfatta	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	33.3	3.0	2.0	0.0	0.0	0.0
16	Kotbhara	RCH 776 BG II	0.0	0.0	0.0	0.0	0.0	0.0	26.7	0.0	0.0	0.0	0.0	0.0	35.0	2.0	0.0	0.0	0.0	0.0
17	Jodhpur Pakhar	VIVH 308 BG II (Teja+)	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	28.3	2.0	1.0	0.0	0.0	0.0
18	Burj Sema	SP 7272 BG II	0.0	0.0	0.0	0.0	0.0	0.0	23.3	0.0	0.0	0.0	0.0	0.0	31.7	2.5	0.0	0.0	0.0	0.0
		Average	0.0	0.0	0.0	0.0	0.0	0.0	23.2	0.0	0.0	0.0	0.0	0.0	32.6	2.3	0.6	0.0	0.0	0.0
Block – Talwandi																				
19	Talwandi Sabo	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	30.0	4.5	2.0	0.0	0 – 2	0.0
20	Shekhpura	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	23.3	0.0	0.0	0.0	0.0	0.0	33.3	4.0	1.8	0.0	0 -3	0.0
		RCH 926 BG II	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	0.0	0.0	0.0	25.0	2.0	0.5	0.0	0.0	0.0
21	Jewan singhwala	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	33.3	5.5	2.5	0.0	0 -3	0.0
		RCH 926 BG II	0.0	0.0	0.0	0.0	0.0	0.0	18.3	0.0	0.0	0.0	0.0	0.0	26.7	2.0	0.0	0.0	0.0	0.0
22	Sekho	RCH 926 BG II	0.0	0.0	0.0	0.0	0.0	0.0	11.7	0.0	0.0	0.0	0.0	0.0	25.0	1.5	0.5	0.0	0.0	0.0
		ACH 777 BG II	0.0	0.0	0.0	0.0	0.0	0.0	21.7	0.0	0.0	0.0	0.0	0.0	30.0	3.0	2.0	0.0	0.0	0.0
23	Bhagwan Garh	VICH 308 BG II(Teja+)	0.0	0.0	0.0	0.0	0.0	0.0	18.3	0.0	0.0	0.0	0.0	0.0	28.3	2.5	0.5	0.0	0.0	0.0
24	Malwala	MRC 7365 BG II(Balraaj)	0.0	0.0	0.0	0.0	0.0	0.0	21.7	0.0	0.0	0.0	0.0	0.0	33.3	2.5	1.5	0.0	0.0	0.0
25	Chathewala	Parinda (Shakti 9 BG II)	0.0	0.0	0.0	0.0	0.0	0.0	26.7	0.0	0.0	0.0	0.0	0.0	35.0	1.5	0.0	0.0	0.0	0.0
		Average	0.0	0.0	0.0	0.0	0.0	0.0	20.3	0.0	0.0	0.0	0.0	0.0	30.0	2.9	1.1	0.0	0.0	0.0
Block – Sangat																				
26	Gehri Buttar	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	23.3	0.0	0.0	0.0	0.0	0.0	40.0	4.5	3.0	0.0	0.0	0.0
27	Kuti Kishan Pura	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	43.3	3.5	2.5	0.0	0.0	0.0
		RCH 926 BG II	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	0.0	0.0	0.0	28.3	2.0	0.5	0.0	0.0	0.0
28	Mehta	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	26.7	0.0	0.0	0.0	0.0	0.0	35.0	4.5	3.5	0.0	0.0	0.0
		MC 5408 BG II (Tata Diggaj) BG II	0.0	0.0	0.0	0.0	0.0	0.0	23.3	0.0	0.0	0.0	0.0	0.0	41.7	4.5	2.0	0.0	0.0	0.0
29	Sangat Kalan	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	0.0	38.3	7.0	2.8	0.0	0.0	0.0

		RCH 926 BG II	0.0	0.0	0.0	0.0	0.0	0.0	18.3	0.0	0.0	0.0	0.0	0.0	28.3	2.5	1.0	0.0	0.0	0.0
30	Kot Guru	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	35.0	4.0	2.5	0.0	0.0	0.0
		VICH 308 BG II(Teja+)	0.0	0.0	0.0	0.0	0.0	0.0	23.3	0.0	0.0	0.0	0.0	0.0	38.3	5.5	2.0	0.0	0.0	0.0
31	Dunewala	VICH 308 BG II(Teja+)	0.0	0.0	0.0	0.0	0.0	0.0	26.7	0.0	0.0	0.0	0.0	0.0	33.3	3.5	1.0	0.0	0.0	0.0
32	Muhalan	MRC 7365 BG II (Balraaj)	0.0	0.0	0.0	0.0	0.0	0.0	21.7	0.0	0.0	0.0	0.0	0.0	35.0	5.5	2.0	0.0	0.0	0.0
33	Gurusar Sainewala	RCH 926 BG II	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	0.0	0.0	0.0	26.7	3.0	1.5	0.0	0.0	0.0
34	Jassi Bagh Wali	VICH 308 BG II(Teja+)	0.0	0.0	0.0	0.0	0.0	0.0	21.7	0.0	0.0	0.0	0.0	0.0	30.0	2.5	1.0	0.0	0.0	0.0
35	Chak Ruldu Singh Wala	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	35.0	3.5	1.0	0.0	0 – 2	0.0
36	Pakka Kalan	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	28.3	0.0	0.0	0.0	0.0	0.0	40.0	4.5	2.5	0.0	0.0	0.0
37	Gurthari	RCH 926 BG II	0.0	0.0	0.0	0.0	0.0	0.0	8.3	0.0	0.0	0.0	0.0	0.0	30.0	5.0	2.0	0.0	0.0	0.0
38	Sangat Kothe	Parinda (Shakti 9 BG II)	0.0	0.0	0.0	0.0	0.0	0.0	21.7	0.0	0.0	0.0	0.0	0.0	31.7	2.5	0.0	0.0	0.0	0.0
		Average	0.0	0.0	0.0	0.0	0.0	0.0	22.5	0.0	0.0	0.0	0.0	0.0	34.7	4.0	1.8	0.0	0-2	0.0
Block –Nathana																				
39	Bhuchookhurd	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	26.7	0.0	0.0	0.0	0.0	0.0	35.0	3.0	1.5	0.0	0.0	0.0
40	Chak Ram Singh Wala	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	21.7	0.0	0.0	0.0	0.0	0.0	31.7	2.5	0.0	0.0	0.0	0.0
41	Nathana	RCH 926 BG II	0.0	0.0	0.0	0.0	0.0	0.0	18.3	0.0	0.0	0.0	0.0	0.0	28.3	4.5	1.5	0-2	0 – 2	0.0
		Average	0.0	0.0	0.0	0.0	0.0	0.0	22.2	0.0	0.0	0.0	0.0	0.0	31.7	3.3	1.0	0-2.0	0-2	0.0
Block –Rampura																				
42	Dhadde	RCH 773 BG II	0.0	0.0	0.0	0.0	0.0	0.0	23.3	0.0	0.0	0.0	0.0	0.0	35.0	2.0	1.5	0.0	0.0	0.0
43	Rampura	RCH 926 BG II	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	0.0	0.0	0.0	25.0	2.0	1.0	0.0	0.0	0.0
44	Bhunder	RCH 926 BG II	0.0	0.0	0.0	0.0	0.0	0.0	18.3	0.0	0.0	0.0	0.0	0.0	26.7	2.0	0.5	0.0	0.0	0.0
	Average		0.0	0.0	0.0	0.0	0.0	0.0	19.4	0.0	0.0	0.0	0.0	0.0	28.9	2.0	1.0	0.0	0.0	0.0
	Overall average		0.0	0.0	0.0	0.0	0.0	0.0	21.6	0.0	0.0	0.0	0.0	0.0	31.5	2.8	1.1	0.0	0.0	0.0

Table 2b: Observations on the occurrence of cotton diseases at the research farm of ARS PAU Bathinda (Punjab)

DAS	Date/ Month	Mean Percent Disease Intensity (PDI)															
		CLS				CLCuD				MLS				BLB			
		RCH 773	ACH 177	RCH 926	RCH 846	RCH 773	ACH 177	RCH 926	RCH 846	RCH 773	ACH 177	RCH 926	RCH 846	RCH773	ACH 177	RCH 926	RCH 846
30	**June -14**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45	**June -29**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60	**July -14**	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
75	**July 29**	0.0	0.0	0.0	0.0	10.0	15.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
90	**Aug-13**	0.0	0.0	0.0	0.0	40.0	38.3	10.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
105	**Aug-28**	2.5	2.5	0.0	0.0	60.0	43.3	21.7	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
120	**Sept.-12**	5.0	5.0	2.5	2.5	73.3	48.3	36.7	16.6	2.5	2.5	2.5	0.0	2.5	2.5	0.0	0.0
	Average	1.1	1.1	0.4	0.4	26.2	20.9	10.2	3.6	0.4	0.4	0.4	0.0	0.4	0.4	0.0	0.0

Table 3a: Observations on the occurrence of CLCuD at farmer's fields in Sriganganagar and Hanumangarh (Rajasthan)

S.No.	Districts/ Locations surveyed	Bt hybrids/ varieties	Stage of sampling								
			CLCuD-Percent Disease Intensity (PDI)								
			Early season/Seedling (20-30 DAS)			Mid-season/Flowering (60-80 DAS)			Late season/Boll development (120-150 DAS)		
			Incidence (%)	PDI	Disease Range	Incidence (%)	PDI	Disease Range	Incidence (%)	PDI	Disease Range
District: Sriganganagar											
1	Kaliyan	RCH773	-	-	-	77.0	41.7	20.00-51.66	82.0	44.81	20.00-53.33
2	Hindumalkot	RCH 776	-	-	-	59.0	26.8	23.33-31.66	74.0	29.63	25.00-36.66
3	Kotha	RCH 926	-	-	-	55.0	37.2	20.00-45.00	82.0	42.11	25.00-50.00
4	Khakha	ACH 177	-	-	-	64.0	40.8	21.33-48.33	88.0	44.72	25.00-50.00
5	3Y	MC-5408	-	-	-	62.0	34.4	20.00-40.00	83.0	42.20	21.66-43.33
6	4Y	NCS 9013	-	-	-	46.0	16.7	5.00-6.66	74.0	19.12	10.00-25.00
7	Renuka	KCH307	-	-	-	56.0	20.6	15.00-26.66	56.0	26.64	15.00-35.00
8	Mohanpura	RCH 650 MC5408	-	-	-	48.0	11.9	6.66-26.66	67.0	18.86	6.66-30.00
9	8D		-	-	-	57.0	15.3	3.33-20.00	71.0	16.8	3.33-20.00

10	6F Bada Koni	Ankur Ajay Balraj, Shakti82	-	-	-	43.0	16.5	3.33-18.33	65.0	17.84	5.00-30.00
		Average	-	-		**56.7**	**26.2**	**13.8-31.5**	**74.2**	**30.3**	**15.7-37.3**
District: Hanumangarh											
11	34KSD	RCH773	-	-	-	30.0	12.22	0.00-20.00	49.0	14.7	5.00-25.00
12	Khichdawali Dhani	RCH 776	-	-	-	35.0	11.67	0.00-16.66	44.0	14.5	5.00-20.00
13	4KMR	RCH 926	-	-	-	27.0	5.0	3.33-15.00	37.0	7.8	3.33-21.66
14	Bhagatpura	ACH 177	-	-	-	34.0	14.16	1.33-21.66	51.0	16.6	5.00-25.00
15	Deengarh	MC-5408	-	-	-	36.0	11.17	0.00-16.66	46.0	13.5	6.66-20.00
16	Haripura	NCS 9013	-	-	-	40.0	16.24	6.66-25.00	55.0	19.3	8.33-26.66
17	2HRP	KCH307	-	-	-	25.0	6.9	3.33-10.00	43.0	10.2	5.00-16.66
18	Nagrana	RCH 650	-	-	-	30.0	12.50	6.66-16.66	48.0	14.8	8.33-21.66
19	Chishtiyan	MC5408	-	-	-	24.0	8.33	5.00-10.00	54.0	16.1	10.00-25.00
20	Jandawali	Ankur Ajay Balraj, Shakti82 Prabhat Gold	-	-	-	15.0	8.90	6.66-15.00	50.0	18.2	10.00-25.00
		Average	-	-	-	**29.6**	**10.7**	**3.3-16.7**	**47.7**	**14.6**	**6.7-22.7**
		Overall average	-	-	-	**43.2**	**18.4**	**8.6-24.1**	**61.0**	**22.4**	**11.2-30.0**

Table 3b: Observations on the occurrence of CLCuD at ARS-SKRAU Sriganganagar (Rajasthan)

Bt hybrids/varieties	60 DAS			75 DAS			90 DAS			105 DAS		
	Incidence (%)	PDI	Disease Range	Incidence (%)	PDI	Disease Range	Incidence (%)	PDI	Disease Range	Incidence (%)	PDI	Disease Range
RCH773, RCH926, RCH650, US 51, NCS 9013, ACH 177, RS2013, RST-9, HS-6, F846, RS 2818, PAU Bt 3	58.0	15.4	8.33-25.00	69.0	25.3	10.0-40.0	87.0	36.6	20.0-45.0	94.0	40.6	25.0-58.3

Table 4a: Observations on the occurrence of cotton diseases at Farmers' fields in Hisar, Fatehabad, Sirsa, Jind, Bhiwani and Mahendergarh districts (Haryana)

Sr. No.	District/Village	Bt hybrids	Stage of Sampling							
			Per cent Disease Intensity (PDI)							
			Mid-Season/ Flowering (60-80 DAS)				Late/Boll development (120-150 DAS)			
I	Hisar		CLCuD	SM	MLS	RR	CLCuD	SM	MLS	RR
1	Sahapura	RCH-791, RCH-773	0.0	0.0	0.2	0.7	13.3	1.5	10.8	2.6
2	Nyoli Kalan	Ankur-555, RCH-773	0.0	0.0	1.0	1.6	21.7	0.0	15.5	3.8
3	Siswal	US-51, Local Var.	0.0	0.0	0.8	1.0	11.7	1.0	12.5	2.4
4	Sadalpur	RCH-650, US-91	0.0	0.0	0.5	2.0	13.3	0.0	11.3	3.1
5	Dhansu	RCH-776, Balraj	1.6	0.0	1.0	1.0	21.7	0.0	9.3	4.2
6	Kholi	NCS-9013, Super971	0.0	0.0	0.3	3.0	16.7	1.5	17.6	5.6
7	Mothsara	Ankur-555 RCH-650	0.0	0.0	0.6	5.0	14.4	1.0	7.3	8.2
8	Umra	Ankur-999, US-51	0.0	0.0	0.8	2.5	11.7	0.0	10.8	4.5
9	Chullikalan	RCH-776, RCH-773	1.6	0.0	0.5	4.2	13.3	1.0	15.5	8.3
10	Kunwari	BIO-6488, RCH-776	0.0	0.0	0.7	2.6	21.7	1.0	12.5	6.5
11	Dhamana	Ankur-555, ACH-177	0.0	0.0	0.2	1.8	21.7	0.0	11.3	2.8
12	Balawas	RCH-776, RCH-650	0.0	0.0	0.2	1.0	28.3	0.0	15.2	2.4
13	Depal	NCS-9013, Super971	0.0	0.0	1.0	2.9	16.7	1.5	8.5	5.2
14	Bhagana	RCH-650, US-91	0.0	0.0	0.8	1.4	14.4	1.0	6.4	2.5
15	Kherampur	RCH-776, Balraj	1.6	0.0	0.5	2.6	13.3	1.5	12.5	5.4

16	Ladwi	RCH 776, BIO-6488	0.0	0.0	1.0	1.5	21.7	0.0	11.3	4.5
17	Sayadwa	Local Var., RCH-773	0.0	0.0	0.3	0.7	28.3	1.0	8.2	2.6
18	Muklan	Ankur-555, RCH-773	0.0	0.0	0.6	1.6	18.3	0.0	13.3	3.8
19	Gindran	RCH-773, Local Var.	0.0	0.0	0.8	1.0	15.0	0.0	10.3	2.4
		Average	**0.25**	**0.0**	**0.62**	**2.01**	**17.74**	**0.63**	**11.57**	**4.25**
II	**Fatehabad**									
1	Kabhra Kalan	RCH-776, RCH-773	1.6	0.0	0.7	0.3	21.7	0.0	12.5	2.1
2	Bhattu Kalan	Ankur-555, RCH-773	0.0	0.0	0.2	2.2	28.3	2.0	11.3	5.6
3	Banawali	US-51, Local Var.	0.0	0.0	1.0	4.0	13.3	1.5	6.4	7.2
4	Dhand	RCH-650, US-91	0.0	0.0	0.8	5.0	30.7	0.0	7.3	4.5
5	Kirdhan	RCH-776, Balraj	1.6	0.0	0.5	0.2	25.0	1.5	10.8	3.2
6	Pili Mandori	NCS-9013, Super971	1.6	0.0	1.0	4.2	30.7	1.0	15.5	8.5
7	Bhattu	MRC 7017, RCH-773	0.0	0.0	0.3	3.0	18.3	0.0	8.5	6.8
8	Jagan	Ankur-999, US-51	0.0	0.0	0.6	1.5	16.7	2.0	6.4	4.2
9	Mehalsara	RCH-776, RCH-773	0.0	0.0	0.8	1.2	14.4	1.5	11.3	3.2
10	Sarangpur	BIO-6488, RCH-776	0.0	0.0	0.5	2.6	33.3	1.0	10.8	1.0
11	Sherpura	RCH 776, BIO-6488	1.6	0.0	0.7	6.2	21.6	0.0	15.5	9.2
12	Dhangar	Local Var., RCH-773	0.0	0.0	0.2	2.2	28.3	0.0	8.5	5.6
13	Azad nagar	Ankur-555, RCH-773	0.0	0.0	0.7	1.0	20.3	1.5	6.4	3.2
14	Dariyapur	RCH-650, US-91	0.0	0.0	0.2	2.0	11.7	1.0	12.5	4.5
		Average	**0.5**	**0.0**	**0.6**	**2.5**	**22.5**	**0.9**	**10.3**	**4.9**
III	**Sirsa**									
1	Bakhtawarpura	NCS-9013, Super971	0.0	0.0	0.7	2.7	14.4	1.0	10.8	5.2
2	Nathusarichopta	MRC 7017, RCH-773	0.0	0.0	0.2	1.0	28.3	0.0	15.5	2.0
3	Ding	Ankur-999, US-51	0.0	0.0	1.0	1.5	21.7	1.5	12.5	4.0
4	Jodhka	RCH-776, RCH-773	0.0	0.0	0.8	1.2	25.0	1.0	11.3	2.5
5	Najia Khera	BIO-6488, RCH-776	0.0	0.0	0.5	2.6	21.7	0.0	15.2	6.2
6	Moriwala	RCH 776, BIO-6488	1.6	0.0	1.0	0.9	16.7	1.5	10.8	2.4
		Average	**0.27**	**0.0**	**0.70**	**1.65**	**21.29**	**0.83**	**12.7**	**3.72**
IV	**Jind**									
1	Kapro	RCH-776, RCH-773	1.6	0.0	0.7	0.7	21.66	1.0	15.5	4.0
2	Gyanpura	BIO-6488, RCH-776	0.0	0.0	0.2	3.0	28.32	0.0	7.2	1.6

3	Khapada	Ankur-555, ACH-177	1.6	0.0	1.0	1.0	16.66	1.5	5.5	2.2
4	Raj Khera	RCH-776, RCH-650	0.0	0.0	0.8	1.5	14.44	0.0	10.8	5.0
5	Karshindhu	NCS-9013, Super971	0.0	0.0	0.5	1.2	13.33	0.0	8.5	2.5
6	Budhahera	RCH-650, US-91	0.0	0.0	1.0	2.6	21.66	0.0	6.4	2.2
7	Sisar	RCH-776, Balraj	1.6	0.0	0.3	1.8	11.66	1.5	12.5	5.0
		Average	**0.7**	**0.0**	**0.6**	**1.7**	**18.3**	**0.6**	**9.5**	**3.2**
V	**Bhiwani**									
1	Isarwal	RCH-776, Balraj	0.0	0.0	0.1	1.4	4.99	0.0	8.5	0.8
2	Kallodh	NCS-9013, Super971	0.0	0.0	0.5	1.0	3.66	0.0	6.4	1.5
3	Chandawas	RCH 776, BIO-6488	0.0	0.0	0.2	0.0	3.33	0.0	12.5	0.5
4	Babarwas	Local Var., RCH-773	0.0	0.0	0.1	1.0	6.66	0.0	11.3	2.8
5	Salimpur	Ankur-555, RCH-773	0.0	0.0	0.8	0.0	4.99	0.0	8.2	0.0
6	Muzadpur	RCH-773, Local Var.	0.0	0.0	0.2	2.0	4.99	0..0	13.3	1.0
7	Digawa	RCH-650, US-91	0.0	0.0	1.0	1.2	3.66	0.0	10.3	3.5
8	Dariyapur	RCH-776, Balraj	0.0	0.0	0.3	1.2	6.66	0.0	8.5	0.0
9	Obra	NCS-9013, Super971	0.0	0.0	0.1	1.2	4.99	0.0	6.4	3.5
10	Gignow	MRC 7017, RCH-773	0.0	0.0	0.5	0.0	3.33	0.0	12.5	0.0
11	Saral	Ankur-999, US-51	0.0	0.0	0.2	0.0	6.66	0.0	11.3	2.8
		Average	**0.0**	**0.0**	**0.4**	**0.8**	**4.9**	**0.0**	**9.9**	**1.5**
VI	**Mahendergarh**									
1	Khatoti	JKCH-8940, US-91	0.0	0.0	0.8	0.5	5.0	0.0	6.4	0.4
2	Sarai	RCH-650, RCH-773	0.0	0.0	0.2	0.0	3.3	0.0	7.3	0.2
3	Surani	RCH-776, Balraj	0.0	0.0	0.1	1.0	3.3	0.0	10.8	0.5
4	Khalada	NCS-9013, Super971	0.0	0.0	0.3	0.0	1.7	0.0	5.5	0.3
5	Ateli	US-51, Local Var.	0.0	0.0	0.3	0.5	5.0	0.0	8.5	0.4
6	Tigra	RCH-650, US-91	0.0	0.0	0.1	0.0	3.3	0.0	6.4	0.5
7	Bachhod	RCH-776, Balraj	0.0	0.0	0.2	0.2	3.3	0.0	11.3	0.0
8	Chandpura	US-91, RCH-650	0.0	0.0	0.8	0.0	1.7	0.0	8.5	0.5
9	Ganiyar	RCH-776, Balraj	0.0	0.0	0.2	0.0	5.0	0.0	6.4	0.8
10	Bhungarka	RCH 776, BIO-6488	0.0	0.0	0.1	0.2	3.3	0.0	7.3	0.4
11	Bhojawas	Local Var., RCH-773	0.0	0.0	0.3	0.1	1.7	0.0	6.4	0.6
		Average	**0.0**	**0.0**	**0.3**	**0.2**	**3.3**	**0.0**	**7.7**	**0.4**
		Overall average	**0.3**	**0.0**	**0.5**	**1.5**	**14.7**	**0.5**	**10.3**	**3.0**

CLCuD= Cotton leaf curl disease, SM=Sooty mold, MLS=Myrothecium leaf spot, RR= Root rot.

Table 4b: Observations on the occurrence of cotton diseases at the research farm, CCS HAU, Hisar (Haryana)

Month	Hybrids (BG II)	Incidence (%)				Mean Percent Disease Intensity (PDI %)			
		CLCuD	SM	MLS	RR	CLCuD	SM	MLS	RR
June	RCH-773, NCS-9013, ACH-177, US-51	0.0	0.0	0.0	5.6	0.0	0.0	0.0	1.7
July	RCH-773, NCS-9013, ACH-177, US-51	1.3	0.0	3.6	10.3	1.7	0.0	1.3	4.5
August	RCH-773, NCS-9013, ACH-177, US-51	3.5	0.0	8.5	17.6	9.7	0.0	4.4	9.3
September	RCH-773, NCS-9013, ACH-177, US-51	11.5	1.3	16.6	20.5	16.7	0.8	10.5	10.7
October	RCH-773, NCS-9013, ACH-177, US-51	33.3	1.5	28.4	23.7	22.3	0.9	18.8	12.8
	Average	9.9	0.6	11.4	15.5	10.1	0.3	7.0	7.8

CENTRAL ZONE

Table 5a: Observations on the occurrence of cotton diseases at farmer's fields in Nanded, Jalna, Parbhani, Hingoli and Aurangabad (Maharashtra)

District/ Place	Variety/ hybrid	Stage of sampling											
		Percent Disease Intensity (PDI)											
		Early season/ Seedling (20-30 DAS)			Mid season/ Flowering (60-80 DAS)					Late / Boll development (120-150 DAS)			
		ALS	BLB	Root Rot/ wilt	ALS	BLB	GM	Para wilt/ wilt	TSV	ALS	BLB	GM	Boll rot
Nanded													
Kinwat (Amabadi)	Rasi 659, Moksh	-	0.5	-	-	5.0	0.5	-	-	6.0	10.0	15.50	1.0
Bhokar	Kaweri, Rasi 659	-	0.5	-	5.0	-	1.0	-	-	12.50	10.0	27.50	1.0
Ardhapur	Jadoo, Swift	-	0.5	-	5.0	-	-	0.5	-	15.50	13.00	21.25	-
Barad	Kaveri	-	0.5	-	0.5	3.0	-	-	-	5.0	10.0	17.0	-
CRS, Nanded	NH 1904 Bt	-	0.5	-	5.0	5.0	-	-	5.50	5..0	5.0	12.0	-

ATS, Nanded	NH 1901 Bt, NH 1902 Bt	-	0.5	-	5.0	-	-	0.5	-	5.0	5.0	8.0	-
Average			**0.5**		**4.1**	**2.67**	**0.25**	**0.5**	**2.75**	**8.17**	**8.83**	**16.88**	**0.33**
Jalna													
Badanapur	Moksh , Dhandev		0.50	-	5.0	0.5	0.5	0.5	0.0	7.0	10.0	12.0	-
Parbhani													
Gangahed (Khali, Dharasur, Isad , Nila, Mahadpuri)	Navneet, Rasi 659 , Moksh, Swift	-	5.0	-		5.0	5.0	-	0.0	12.00	12.25	18.20	1.50
Aurangabad													
Khultabad	Moksha	-	5.0	-	3.0	5.0	0.50	-	-	10.50	15.0	15.0	-
Average			**2.75**		**3.6**	**3.29**	**2.25**		**2.75**	**9.41**	**11.52**	**15.52**	

Table 5b: Observations on the occurrence of cotton diseases at research farm (CRS, Nanded)

Month	**Hybrids (BG II)**	**Incidence (%)**		**Mean Percent Disease Intensity (PDI)**		
		Parawilt	**TSV**	**ALS**	**BLB**	**GM**
June	Kaweri, Rasi 659, Asha, Rasi 779, Jadoo, NH 1904 Bt, NH 1901 Bt, NH 1902 Bt, Moksh , Dhandev, Navneet, Swift, LRA 5166					
July						
Aug					0.5	
Sept.		0.50	5.50	0.5	1.50	0.50
Oct.				5.0	5.00	5.00
Nov.				18.20	12.25	15.50
Dec.				15.50	15.00	27.25
	Average	**0.50**	**5.50**	**9.80**	**6.85**	**12.06**

Table 6a: Observations on the occurrence of the cotton diseases at farmer's fields in Akola and Buldhana (Maharashtra)

Sr. No.	District/ Place	Variety/ Hybrid	Stage of sampling								
			Percent Disease Intensity (PDI)								
			Seedling (20-30 DAS)			Flowering (60-80 DAS)			Boll development (120-150 DAS)		
			BLB	GM	MLS	BLB	GM	MLS	BLB	GM	MLS
A	**Akola district**										-
1	Aliyabad	Ajeet 155 Bt II	-	-	-	-	-	-	3.75	13.75	-
		Swift Bt BG II	-	-	-	-	-	-	7.50	16.25	6.25
2	Sanglud	Ajeet 155 Bt II	-	-	-	-	-	-	-	-	12.50
		JadooBt	-	-	-	-	-	-	8.75	-	-
3	Marodi	Ajeet 155 Bt II	-	-	-	-	-	-	6.25	-	-
		First class BG II	-	-	-	-	-	-	12.50	8.75	7.50
4	Khobarkhed	Swift Bt BG II	-	-	-	-	-	-	12.50	-	-
		Ajeet 155 Bt	-	-	-	-	-	-	5.00	10.00	-
5	Lakhonda	Ajeet 155 Bt	-	-	-	-	-	-	6.25	-	-
		Swift Bt BG II	-	-	-	-	-	-	11.25	-	-
Average			**-**	**-**	**-**	**-**	**-**	**-**	**8.19**	**12.19**	**8.75**
B	**Buldhana district**										
6	Shegaon	Swift Bt BG II	-	-	-	-	-	-	13.75	9.33	15.00
		Neo Bt BG II			-	-	-	-	-	-	13.75
7	Tintara	Ajeet 155 Bt	-	-	-	-	-	-	8.75		11.25
		First class BG II	-	-	-	-	-	-		-	
8	Mahagaon	Ajeet 155 Bt	-	-	-	-	-	-	7.50	-	-
		Swift Bt BG II	-	-	-	-	-	-	12.50	-	-
9	Warkhed	Ajeet 155 Bt	-	-	-	-	-	-	-	11.25	12.50
Average			-	-	-	-	-	-	**10.63**	**10.29**	**13.13**
Overall Average			-	-	-	-	-	-	**8.94**	**11.56**	**11.25**

Table 6b: Observations on the occurrence of cotton diseases at the research farm (CRS, Akola)

Hybrid/variety	Seedling (20-30 DAS)			Flowering (60-80 DAS)			Boll development (120-150 DAS)		
	BLB	GM	MLS	BLB	GM	MLS	BLB	GM	MLS
Bhakti Bt	-	-	-	-	-	-	13.75	-	-
Ajeet -155 Bt	-	-	-	-	-	-	6.25	8.80	-
Rajat Bt	-	-	-	-	-	-	3.75	12.66	-
Mallika Bt	-	-	-	-	-	-	5.00	-	-
SwiftBt BG II	-	-	-	-	-	-	7.50	12.66	-
PDKV JKAL-116	-	-	-	-	-	-	11.25	8.66	-
Average	**-**	**-**	**-**	**-**	**-**	**-**	**7.92**	**10.70**	**-**

BLB- Bacterial leaf blight, GM- Grey Mildew, MLS-*Myrothecium* leaf spot

Table 7a: Observations on the occurrence of diseases in farmer's fields in Surat, Bharuch and Narmada (Gujarat)

District/ Village/ GPS Location	Variety/ Hybrid	Stage of sampling (Percent Disease Intensity (PDI)								
		Seedling stage (20-30 DAS)			Flowering stage (60-80 DAS)			Boll development stage (120-150 DAS)		
		BLB	ALS	CoLS	BLB	ALS	CoLS	BLB	ALS	CoLS
Dist: Surat										
Tal: Mangrol										
1. Nandola 21.43'25" °N 73.23'68" °E	BG II	0.0-0.0	0.0	0.0	0.0-12.5	5.0	0.0	0.0-22.5	10.5	0.0
	Average	0.0-0.0	0.0	0.0	0.0-12.5	5.0	0.0	0.0-22.5	10.5	0.0
Dist:Bharuch										
Tal: Netrag										
2. Vill: Galiba 21° 38'34" °N 72° 27'1" °E	BG II	0.0	0.0	0.0	0.0-10.0	0.0	0.0	0.0-18.0	0.0	0.0
3. Vill: Bilatha 21° 42'30" °N 73° 28' 22" °E	BG II	0.0	0.0	0.0	0.0-4.5	2.0	0.0	0.0-17.5	6.5	0.0
4. Vill: Yal 21°425'9.56" °N 73° 28' 49.6" °E	BG II	0.0	0.0	0.0	0.0-8.5	0.0	0.0	0.0-15.5	0.0	0.0
5. Vill: Kharetha 21° 425' 34" °N 73° 28' 27" °E	BG II	0.0	0.0	0.0	0.0-4.5	0.0	0.0	0.0-10.5	0.0	0.0
Average		0.0	0.0	0.0	0.0-6.9	0.5	0.0	0.0-15.4	1.6	0.0

Tal:Hanskot										
6. Vill: Shera 21.58738623 °N 72.82761249°E	BG II	0.0	0.0	0.0	0.0-9.0	0.0	0.0	0.0-15.5	0.0	0.0
7. Vill: Uttarag 21.5832716 °N 72.1873901 °E	BG II	0.0	0.0	0.0	0.0-11.5	0.0	0.0	0.0-20.5	0.0	0.0
	Average	0.0	0.0	0.0	0.0-10.3	0.0	0.0	0.0-18.0	0.0	0.0
Tal:Valia										
8. Vill: Tuna 21° 55’ 278” °N 73° 20’ 916” °E	BG II	0.0	0.0	0.0	0.0-16.5	6.5	0.0	0.0-25.5	10.5	0.0
Average		0.0	0.0	0.0	0.0-16.5	6.5	0.0	0.0-25.5	10.5	0.0
Dist: Narmada										
Tal:Dediyapada										
9. Vill: Ghantoli 21° 40’ 15” °N 73° 32’ 40”°E	BG II	0.0	0.0	0.0	0.0-11.5	0.0	0.0	0.0-22.5	0.0	0.0
10 Vill: Timbi 21° 49’ 34” °N 73° 22’ 21” °E	BG II	0.0	0.0	0.0	0.0-10.5	8.0	0.0	0.0-20.0	11.5	0.0
11. Vill: Patgam 21.1686121 °N 73.497014 °E	BG II	0.0	0.0	0.0	0.0-16.5	10.5	0.0	0.0-29.0	13.5	0.0
12. Vill: Gajorota 21.678143 °N 73.566769 °E	BG II	0.0	0.0	0.0	0.0-9.5	0.0	0.0	0.0-20.0	0.0	0.0
Average		**0.0**	**0.0**	**0.0**	**0.0-12.0**	**4.6**	**0.0**	**0.0-22.9**	**6.3**	**0.0**
Overall Average		**0.0**	**0.0**	**0.0**	**0.0-11.6**	**3.3**	**0.0**	**0.0-20.9**	**5.8**	**0.0**

Table 7b: Observations on the occurrence of cotton diseases at research farm (CRS, Surat)

Variety/ Hybrid	Stage of sampling (Percent Disease Intensity (PDI)								
	Seedling stage (20-30 DAS)			Flowering stage (60-80 DAS)			Boll development stage (120-150 DAS)		
	BLB	ALS	CoLS	BLB	ALS	CoLS	BLB	ALS	CoLS
GTHH 49 BG II	0.0-0.0	0.0	0.0	0.0-0.0	0.00	0.0	0.0-0.0	0.0	0.0
G. Cot. 10	0.0-0.0	0.0	0.0	0.0-0.0	3.0	0.0	0.0-0.0	6.0	0.0
G. Cot. 20	0.0-0.0	0.0	0.0	0.0-5.5	0.0	0.0	0.0-10.0	0.0	0.0
G. N. Cot. 22	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0	0.0-00	0.0	0.0
G. N. Cot. 32	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0
G. Cot. 34	0.0-0.0	0.0	0.0	0.0-0.0	1.5	0.0	0.0-0.0	3.5	0.0
G. Cot. 36	0.0-0.0	0.0	0.0	0.0-0.0	10.5	0.0	0.0-0.0	16.5	0.0
G. Cot. 40	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0
G. N. Cot. 44	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0
G. Cot. 100	0.0-0.0	25.5	0.0	0.0-0.0	42.5	0.0	0.0-0.0	**57.0**	0.0
G. Cot. 16	0.0-0.0	0.0	0.0	0.0-0.0	3.5	0.0	0.0-0.0	7.0	0.0

GSHH 24/17 BGII	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0
GSHH 01/2019	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0
GSHH 09/20 BGII	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0
G.Cot.Hy.102	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0
G.Cot.Hy.12 BGII	0.0-8.0	0.0	0.0	0.0-13.5	0.0	0.0	0.0-23.0	0.0	0.0
G.Cot.Hy.10 BGII	0.0-6.0	0.0	0.0	0.0-10.5	0.0	0.0	0.0-15.0	0.0	0.0
G.Cot.Hy.8 BGII	0.0-4.5	0.0	0.0	0.0-8.5	0.0	0.0	0.0-14.0	0.0	0.0
G.Cot.Hy.6 BGII	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0
G.Cot.Hy.8	0.0-0.0	0.0	0.0	0.0-0.0	1.5	0.0	0.0-0.0	5.5	0.0
G.Cot.Hy.10	0.0-9.5	0.0	0.0	0.0-15.0	0.0	0.0	0.0-25.5	0.0	0.0
G.Cot.Hy.12	0.0-7.5	0.0	0.0	0.0-14.5	0.0	0.0	0.0-25.0	0.0	0.0
G. N. Cot. Hy. 14	0.0-0.0	0.0	0.0	0.0-4.5	0.0	0.0	0.0-9.5	0.0	0.0
G. N. Cot. Hy. 18	0.0-0.0	0.0	0.0	0.0-1.5	0.0	0.0	0.0-5.5	0.0	0.0
G. Cot. Hy. 4	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0
MDH 11	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0
G. N. Cot. 27	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0	0.0-0.0	0.0	0.0
LRA 5166	0.0-10.5	0.0	0.0	0.0-35.5	16.5	0.0	0.0-58.5	26.5	0.0
Average	**0.0-1.6**	**0.9**	**0.0**	**0.0-3.9**	**2.8**	**0.0**	**0.0-6.6**	**4.4**	**0.0**

BLB- Bacterial leaf blight, GM- Grey Mildew, CoLS-*Corynespora* leaf spot, ALS- Alternaria Leaf spot, Phoma blight, TVS-Tobacco Streak Virus

Table 8a: Observations on the occurrence of diseases in farmer's field in Junagarh (Gujarat)

Sr. No.	District/ Place	Place No.	Variety/ Hybrid	Stage of sampling									
				Percent Disease Intensity (PDI)									
				Early season/Seedling (20-30 DAS)			Mid-season/Flowering (60-80 DAS)			Late/ Boll development (120-150 DAS)			
				BLB	GM	Phoma	BLB	Parawilt	Wilt Verti.	Corynespora	Boll rot (%)	GM	ALS
I.	**Junagarh**	**I.**											
1	Nandrakha	1	ATM	0.0	0.0	16.5	1.5	5.0	0.0	12.0	11.0	12.5	19.5
		2	Navab	0.0	0.0	21.5	2.0	11.0	0.0	10.0	12.5	10.5	35.5
		3	Bhakti	0.0	0.0	22.5	3.5	14.5	0.0	9.5	10.8	35.0	41.0
		4	Ajeet-1155	0.0	0.0	15.0	0.0	12.5	0.0	2.5	11.0	**41.5**	40.0
		5	Bhakti	0.0	0.0	11.5	0.0	4.5	0.0	3.5	15.0	34.0	36.5
2	Bhalagam	1	ATM	0.0	0.0	12.5	15.5	1.5	1.0	1.0	18.5	37.5	18.5
		2	Buyer First Class	0.0	0.0	16.5	12.5	2.5	2.5	0.5	10.5	28.5	12.0
		3	ATM	0.0	0.0	17.0	16.0	1.0	0.0	2.5	5.0	8.5	8.5
		4	Neo	0.0	0.0	19.0	18.5	0.0	0.0	11.5	0.0	14.5	4.5
		5	ATM	0.0	0.0	14.0	10.5	1.0	0.0	19.0	0.0	16.0	3.5
3	Kharachiya	1	Buyer7576	0.0	0.0	16.5	3.5	2.0	0.0	5.5	5.5	3.5	11.5
		2	ATM	0.0	0.0	2.5	2.5	1.0	0.0	1.5	4.0	5.0	13.5
		3	ATM	0.0	0.0	**1.5**	1.0	3.5	0.0	0.5	2.5	11.5	16.0
		4	Neo	0.0	0.0	14.5	0.0	0.5	0.0	2.0	1.5	16.0	17.0
		5	Platinum	0.0	0.0	16.5	2.5	0.0	0.0	1.0	1.0	19.5	12.5
4	Goladhar	1	ATM	0.0	0.0	11.0	3.5	0.1	0.0	3.5	10.5	10.5	11.5
		2	RCH-659	0.0	0.0	10.0	1.0	0.0	0.0	11.5	11.5	4.5	33.0
		3	Ajeet-5	0.0	0.0	6.5	2.0	0.0	0.0	35.5	13.5	2.1	31.0
		4	Neo	0.0	0.0	7.0	0.0	10.5	0.0	36.0	10.0	1.0	28.5
		5	ATM	0.0	0.0	8.5	1.1	0.0	0.0	12.5	8.5	21.5	27.0
Average				0.0	0.0	13.2	4.7	3.6	0.2	9.2	8.3	16.5	21.0
II.	**Rajkot**												

5	Chhadavavadar	1	Ajeet-1155	0.0	0.0	22.5	0.0	15.5	0.0	8.5	10.0	2.5	12.5
		2	ATM	0.0	0.0	**35.5**	1.5	20.5	0.5	7.0	12.0	15.5	1.0
		3	Navab	0.0	0.0	18.5	2.5	18.5	0.0	6.0	15.4	18.0	19.5
		4	Navab	0.0	0.0	19.5	0.0	16.5	1.0	11.5	20.2	21.0	21.0
		5	Super Gold	0.0	0.0	20.5	0.0	11.5	0.0	10.0	21.0	7.5	38.5
6.	Khakhijaliya	1	Buyer First Class	0.0	0.0	11.5	5.5	16.5	0.0	9.5	18.5	8.0	42.5
		2	ATM	0.0	0.0	8.0	1.2	20.5	0.0	11.0	8.0	11.5	11.5
		3	Buyer First Class	0.0	0.0	16.5	0.0	18.0	0.0	16.5	5.0	2.5	8.5
		4	Platinium	0.0	0.0	20.0	0.0	10.5	0.0	12.0	6.5	**0.5**	9.5
		5	Navab	0.0	0.0	13.5	0.0	5.0	0.0	17.0	7.5	1.5	7.0
7.	Nagavadar	1	ATM	0.0	0.0	11.5	2.5	22.5	0.0	9.0	12.5	2.5	5.5
		2	Navab	0.0	0.0	16.5	1.5	25.0	0.0	21.5	5.60	11.5	5.0
		3	Navab	0.0	0.0	2.5	2.5	10.0	0.0	22.0	1.0	30.5	12.5
		4	ATM	0.0	0.0	18.5	0.0	5.0	0.0	29.5	12.5	32.5	11.5
		5	Surpass	0.0	0.0	11.5	0.0	11.5	0.0	25.5	11.5	11.5	10.0
Average				0.0	0.0	16.4	1.1	15.1	0.1	14.4	11.1	11.8	14.4
III.	**Amreli**												
8.	Bagasara	1	Bhakti	0.0	0.0	16.5	3.5	11.5	2.0	2.5	11.5	17.5	12.5
		2	RCH-659	0.0	0.0	12.5	2.5	0.0	15.5	1.5	12.5	14.5	10.5
		3	RCH-659	0.0	0.0	9.5	5.0	9.5	2.5	1.0	6.5	8.5	8.5
		4	Navab	0.0	0.0	12.5	1.0	1.0	20.0	2.5	3.5	7.0	0.5
		5	Navakar	0.0	0.0	21.5	0.0	0.5	1.5	2.0	1.0	8.5	1.5
Average				0.0	0.0	14.5	2.4	4.5	8.3	1.9	7.0	11.2	6.7
IV.	**Surendranagar**												
9.	Muli	1	Supab	0.0	0.0	2.5	1.5	0.0	0.0	1.5	5.5	2.5	12.5
		2	Ajeet-5	0.0	0.0	4.5	1.0	0.5	0.0	2.0	12.5	3.5	11.0
		3	Neo	0.0	0.0	10.0	0.0	0.0	0.0	11.5	0.5	**1.0**	5.0
		4	Bhakti	0.0	0.0	1.5	2.5	0.5	0.0	2.0	0.0	11.0	8.5
		5	Platinum	0.0	0.0	2.5	5.0	0.0	0.0	3.0	0.5	15.5	12.0
Average				**0.0**	**0.0**	**4.2**	**2.0**	**0.2**	**0.0**	**4.0**	**3.8**	**6.7**	**9.8**
Overall Average				**0.0**	**0.0**	**12.1**	**2.6**	**5.9**	**2.2**	**7.4**	**7.6**	**11.6**	**13.0**

BLB- Bacterial leaf blight, GM- Grey Mildew, CoLS-*Corynespora* leaf spot, ALS- Alternaria Leaf spot, Phoma blight, TVS-Tobacco Streak Virus

Table 8b: Observations on the occurrence of cotton diseases at the research farm (CRS, Junagarh)

Month	Hybrids (BG II)	Incidence (%)			Mean Percent Disease Intensity (PDI)								
		ParaWilt	Root rot	Boll Rot	ALS	HLS	CLS	ATN	CoLS	MLS	BLB	GM	Phoma
July	RCH-2 (BG-II)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	7.0
	G. Cot. Hy. 8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	11.5
Aug	RCH-2 (BG-II)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.5	0.0	12.5
	G. Cot. Hy. 8	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0	0.0	20.5
Sept.	RCH-2 (BG-II)	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	5.0	6.5	0.0
	G. Cot. Hy. 8	0.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	10.5	0.0
Oct.	RCH-2 (BG-II)	10.5	0.0	10.5	0.0	0.0	0.0	0.0	15.5	0.0	11.0	15.5	0.0
	G. Cot. Hy. 8	15.0	0.0	30.5	0.0	0.0	0.0	0.0	25.5	0.0	12.0	20.0	0.0
Nov.	RCH-2 (BG-II)	12.0	0.0	5.0	10.5	0.0	0.0	0.0	16.5	0.0	42.0	22.5	0.0
	G. Cot. Hy. 8	18.0	0.0	10.0	14.5	0.0	0.0	0.0	24.0	0.0	25.5	54.5	0.0
Dec.	RCH-2 (BG-II)	0.0	0.0	0.0	33.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
	G. Cot. Hy. 8	0.0	0.0	0.0	54.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0
Average		5.5	0.0	6.1	9.4	0.0	0.0	0.0	6.8	0.0	10.2	11.4	4.3

ALS: Alternaria leaf spot, HLS: Helminthosporium leaf spot, CLS: Cercospora leaf spot, ATN: Anthracnose, CoLS: Corynespora Leaf spot, MLS: Myrothecium leaf spot, BB: Bacterial blight, GM: Grey mildew, Phoma: Phoma wet blight

Table 9a: Observations on the occurrence of the diseases in farmer's fields in Khandwa (Madhya Pradesh)

District	Block	Village	BLB (PDI)	ALS (PDI)	GM (PDI)	CoLS
Khandwa	Khandwa	Tigaria	2.50	17.00	17.5	12.5
		kalmukhi	5.00	5.5	12.0	15.6
		Jaswadi	5.50	17.00	5.5	12.7
		Talwadiya	2.5	12.43	12.50	8.50
		Bamjhar	5.75	5.50	7.5	17.6
	Pandhana	Kodar	7.5	12.5	15.5	7.5
		Temi khurda	0.00	7.5	12.5	17.5
		Siltiya	0.00	0.00	12.5	10.5

		Dolhar	0.00	7.5	12.50	16.7
		Arud	5.5	0.00	16.8	17.5
	Chhegaon Makhan	Pachhaya	2.5	0.00	12.5	7.5
		Chichgohan	7.5	10.0	2.50	12.00
		Sulyakhedi	0.00	7.50	17.50	13.50
		Ahmadpur	2.5	0.00	7.5	7.5
		Bhojakhedi	0.00	0.00	15.80	12.00
	Punasa	Jawar	5.25	0.00	17.50	12.5
		Khutla	0.00	7.5	2.5	7.5
		Bangarda	2.50	2.50	15.5	5.50
		DhamanGaon	0.00	5.50	17.5	7.50
		Beed	5.00	10.00	15	5.00
	Harsood	Charkheda	2.50	5.00	12.5	7.5
		Barud Mal	0.00	5.50	5.25	7.50
		Bori bandori	2.50	7.50	5.00	8.5
Average			**2.8**	**6.3**	**11.8**	**10.9**
Dhar	Manawar	Semalda	7.50	5.00	8.50	5.50
		Lunhera	2.50	8.50	12.50	7.50
		Amjhera	7.50	5.80	17.50	10.50
		Jhirwi	2.50	8.50	12.50	7.50
	Sardarpur	Manasya	5.5	12.60	14.80	5.50
		Timaichi	2.5	7.5	10.50	12.50
Average			**4.7**	**8.0**	**12.7**	**8.2**
Overall average			**3.7**	**7.2**	**12.3**	**9.5**

BLB- Bacterial leaf blight, GM- Grey Mildew, CoLS-*Corynespora* leaf spot, ALS- Alternaria Leaf spot, Phoma blight, TVS-Tobacco Streak Virus

Table 9b: Observations on the occurrence of cotton diseases at research farm RVSKVV at Khandwa station

Month	Disease incidence			
	CoLS	GM	BLB	ALB
July	-	0.0	0.0	00
August	2.50	Traces	2.5	0.00
September	5.50	5.5	5.5	Traces
October	17.7	18.5	2.5	5.75
November	18.6	17.5	0.00	10.5
December	14.2	10.7	0.00	12.8
Average	**9.8**	**8.7**	**1.8**	**4.8**

ALB: Alternaria leaf spot; **MLS:** Myrothecium leaf spot; **BLB**: Bacterial leaf blight; **GM:** Grey mildew

SOUTH ZONE

Table 10a: Observations on the occurrence of diseases at Farmer's fields in Dharwad (Karnataka)

Sr. No.	District/Village	Variety/Hybrid	Stage of sampling												
			Percent Disease Intensity (PDI)												
			Early season/Seedling				Mid-season/Flowering				Late season/Boll development				
			(20-30DAS)				(60-80DAS)				(120-150 DAS)				
			AB	BLB	GM	Boll rot	AB	BLB	GM	Boll rot	AB	BLB	GM	Rust	Boll rot
A	**District: Belagavi**														
1	Kittur	Anand	0.0	0.0	0.0	0.0	10.5	2.8	3.0	0.0	19.9	5.5	8.3	10.7	8.5
		Ajeet-155	0.0	0.0	0.0	0.0	15.7	3.7	3.3	0.0	18.2	5.0	6.5	12.5	6.8
		ATM	0.0	0.0	0.0	0.0	13.1	4.8	5.5	0.0	20.5	4.5	9.3	9.8	7.8
		Kuber	0.0	0.0	0.0	0.0	14.8	3.5	4.3	0.0	22.1	4.9	6.5	10.3	9.5
		First class	0.0	0.0	0.0	0.0	12.8	4.4	5.2	0.0	18.8	5.3	7.6	12.3	6.6
2	Pattihala	Jaadu	0.0	0.0	0.0	0.0	14.6	4.0	2.0	0.0	19.4	12.1	9.6	18.5	15.7
		Chiranjeevi	0.0	0.0	0.0	0.0	15.0	3.5	2.9	0.0	18.9	9.6	8.8	20.6	14.5
		MRC7373	0.0	0.0	0.0	0.0	14.6	5.0	2.5	0.0	17.1	10.1	6.6	20.0	14.5

		Jwala	0.0	0.0	0.0	0.0	17.8	2.2	1.2	0.0	20.7	11.5	7.8	20.6	15.0
		Money maker	0.0	0.0	0.0	0.0	16.7	2.0	3.0	0.0	21.5	12.1	7.5	18.9	15.0
3	Asundi	Indam	0.0	0.0	0.0	0.0	15.2	2.9	2.1	0.0	18.4	10.5	7.4	21.1	13.7
		Anand	0.0	0.0	0.0	0.0	16.9	4.0	2.0	0.0	18.9	10.7	8.3	20.1	14.5
		MRC7373	0.0	0.0	0.0	0.0	17.8	3.7	2.4	0.0	19.9	10.5	6.7	20.0	15.5
		Jwala	0.0	0.0	0.0	0.0	17.8	3.0	2.7	0.0	20.6	10.5	8.8	19.9	14.5
		vittal	0.0	0.0	0.0	0.0	15.5	3.9	3.0	0.0	19.8	11.0	8.9	19.7	13.3
4	Belawadi	Bhaskar	0.0	0.0	0.0	0.0	14.5	4.3	7.2	0.0	24.7	10.7	10.9	14.7	16.6
		Mahadev	0.0	0.0	0.0	0.0	14.0	4.0	5.6	0.0	25.6	11.2	11.1	23.9	15.6
		KCH-36	0.0	0.0	0.0	0.0	13.8	4.0	5.3	0.0	24.5	10.1	10.6	16.7	17.8
		Soumya	0.0	0.0	0.0	0.0	12..4	5.5	5.0	0.0	23.7	11.0	9.7	24.0	15.8
		Ajeet 199	0.0	0.0	0.0	0.0	12.6	5.1	4.6	0.0	20.2	11.2	13.6	24.1	17.8
5	Govinkoppa	Everest	0.0	0.0	0.0	0.0	10.6	6.0	4.0	0.0	16.7	12.9	10.6	13.9	7.9
		Ajeet 155	0.0	0.0	0.0	0.0	10.5	5.9	4.1	0.0	18.1	9.8	9.2	12.7	8.7
		Esha	0.0	0.0	0.0	0.0	9.8	5.8	3.8	0.0	17.7	10.9	9.6	13.0	9.0
		DPC-7065	0.0	0.0	0.0	0.0	10.0	5.7	3.9	0.0	18.5	11.8	10.8	13.7	9.5
		MRC-7017	0.0	0.0	0.0	0.0	10.0	6.0	3.9	0.0	16.6	9.9	11.0	12.7	10.0
		Average	**0.0**	**0.0**	**0.0**	**0.0**	**13.9**	**4.2**	**3.7**	**0.0**	**20.0**	**9.7**	**9.0**	**17.0**	**12.6**
B	**District: Dharwad**														
6	Dastikoppa	Ajeet 199	0.0	0.0	0.0	0.0	13.6	5.0	8.5	0.0	20.0	9.9	10.9	23.9	15.6
		Super cot,	0.0	0.0	0.0	0.0	12.9	5.0	7.9	0.0	25.0	10.6	9.6	23.1	18.9
		Jwala	0.0	0.0	0.0	0.0	14.0	5.8	8.6	0.0	24.7	11.7	9.9	23.1	18.0
		Vega	0.0	0.0	0.0	0.0	14.1	5.5	6.9	0.0	18.8	11.5	11.1	23.7	17.8
		MRC7373	0.0	0.0	0.0	0.0	14.0	4.8	7.6	0.0	24.0	9.8	10.1	25.7	18.0
7	Shivalli	Rasi 659	0.0	0.0	0.0	0.0	10.2	5.9	4.0	0.0	18.5	8.6	10.0	13.5	8.9
		First class	0.0	0.0	0.0	0.0	9.8	4.6	4.0	0.0	16.8	11.1	9.9	12.8	10.1
		Super fiber,	0.0	0.0	0.0	0.0	10.0	6.1	3.2	0.0	17.9	11.0	10.6	14.0	9.9
		Jiaho	0.0	0.0	0.0	0.0	8.5	6.0	3.6	0.0	17.7	10.7	8.9	9.9	8.8
		puli	0.0	0.0	0.0	0.0	9.9	6.0	3.9	0.0	18.9	11.6	9.7	10.8	9.0
8	Garag	Bhaskar	0.0	0.0	0.0	0.0	18.5	4.3	7.2	0.0	24.7	10.7	10.9	18.7	16.6
		Mahadev	0.0	0.0	0.0	0.0	14.0	4.0	5.6	0.0	25.6	11.2	11.1	23.9	15.6
		RCH-659	0.0	0.0	0.0	0.0	13.8	4.0	5.3	0.0	24.5	10.1	10.6	26.7	17.8

		Soumya	0.0	0.0	0.0	0.0	12..4	5.0	5.0	0.0	23.7	11.0	9.7	24.0	15.8
		Ajeet 155	0.0	0.0	0.0	0.0	12.6	5.1	4.6	0.0	20.2	11.2	13.6	24.1	17.8
9	Kundagol	Lotus	0.0	0.0	0.0	0.0	13.8	5.0	8.1	0.0	24.1	10.8	9.4	26.7	15.9
		Super cot	0.0	0.0	0.0	0.0	14.8	5.1	8.9	0.0	23.9	10.9	9.6	24.8	12.8
		Jwala	0.0	0.0	0.0	0.0	14.0	4.8	7.9	0.0	24.6	11.1	11.1	24.0	13.0
		Vega	0.0	0.0	0.0	0.0	14.7	5.1	7.6	0.0	19.8	9.8	10.1	19.8	17.7
		RCH-659	0.0	0.0	0.0	0.0	14.4	5.7	7.3	0.0	24.0	11.9	9.7	24.0	18.0
10	Nooli	Bhaskar	0.0	0.0	0.0	0.0	13.7	5.9	8.6	0.0	24.2	11.0	8.8	24.5	14.1
		Mahadev	0.0	0.0	0.0	0.0	12.4	5.7	8.0	0.0	22.7	10.9	10.4	24.8	15.0
		RCH-659	0.0	0.0	0.0	0.0	12.3	5.0	8.2	0.0	24.8	10.9	7.7	20.6	12.7
		Soumya	0.0	0.0	0.0	0.0	13.7	5.5	8.7	0.0	23.2	10.5	8.6	21.5	13.8
		Ajeet 155	0.0	0.0	0.0	0.0	12.6	5.1	8.9	0.0	24.0	9.7	10.0	25.7	15.0
		Average	**0.0**	**0.0**	**0.0**	**0.0**	**13.0**	**5.2**	**6.7**	**0.0**	**22.3**	**10.7**	**10.1**	**21.4**	**14.7**
C	**District: Gadag**														
11	Makapur	Everest	0.0	0.0	0.0	0.0	10.6	6.0	4.0	0.0	16.7	12.9	10.6	13.9	7.9
		Ajeet 155	0.0	0.0	0.0	0.0	10.5	5.9	4.1	0.0	18.1	9.8	9.2	12.7	8.7
		RCH-659	0.0	0.0	0.0	0.0	9.8	5.8	3.8	0.0	17.7	10.9	9.6	13.0	9.0
		Bhaskar	0.0	0.0	0.0	0.0	10.0	5.7	3.9	0.0	18.5	11.8	10.8	13.7	9.5
		Rasi 659	0.0	0.0	0.0	0.0	10.0	6.0	3.9	0.0	16.6	9.9	11.0	12.7	10.0
12	Laxmeshwar	Rasi 659	0.0	0.0	0.0	0.0	10.2	5.9	4.0	0.0	18.5	8.6	10.0	13.5	8.9
		First class	0.0	0.0	0.0	0.0	9.8	4.6	4.0	0.0	16.8	11.1	9.9	12.8	10.1
		Super fiber,	0.0	0.0	0.0	0.0	10.0	6.1	3.2	0.0	17.9	11.0	10.6	14.0	9.9
		Jiaho	0.0	0.0	0.0	0.0	8.5	6.0	3.6	0.0	17.7	10.7	8.9	9.9	8.8
		puli	0.0	0.0	0.0	0.0	9.9	6.0	3.9	0.0	18.9	11.6	9.7	10.8	9.0
13	Shirahatti	MRC7351	0.0	0.0	0.0	0.0	9.9	4.8	4.5	0.0	18.9	11.0	10.7	14.7	9.6
		First class	0.0	0.0	0.0	0.0	10.1	6.1	3.9	0.0	18.1	11.9	9.9	15.6	9.0
		Super fiber,	0.0	0.0	0.0	0.0	9.6	5.8	3.9	0.0	18.0	11.0	9.7	15.0	7.7
		Jiaho	0.0	0.0	0.0	0.0	9.6	5.9	4.2	0.0	18.5	10.8	9.6	14.0	8.8
		puli	0.0	0.0	0.0	0.0	9.6	6.0	4.2	0.0	18.8	10.7	9.6	14.8	9.6
14	Mevundi	Rasi 659	0.0	0.0	0.0	0.0	9.7	5.4	3.7	0.0	18.0	12.1	9.5	14.8	7.9
		First class	0.0	0.0	0.0	0.0	10.5	5.9	2.5	0.0	18.0	10.7	10.0	14.9	8.5

		Super fiber,	0.0	0.0	0.0	0.0	10.0	6.1	2.9	0.0	18.4	12.4	9.5	13.8	9.2
		Jiaho	0.0	0.0	0.0	0.0	9.3	6.0	4.0	0.0	18.0	12.7	10.0	14.7	9.1
		puli	0.0	0.0	0.0	0.0	10.0	6.0	4.0	0.0	17.7	11.1	10.0	13.3	9.0
15	Mundaragi	Everest	0.0	0.0	0.0	0.0	10.1	6.8	4.1	0.0	17.7	11.3	10.7	13.9	9.0
		Ajeet 155	0.0	0.0	0.0	0.0	9.0	6.1	4.1	0.0	18.0	7.7	10.5	14.0	8.8
		RCH-659	0.0	0.0	0.0	0.0	10.5	5.7	5.0	0.0	17.7	9.0	10.5	14.8	9.0
		Bhaskar	0.0	0.0	0.0	0.0	10.0	5.8	2.6	0.0	17.9	12.0	10.3	15.1	9.1
		Rasi 659	0.0	0.0	0.0	0.0	9.8	5.4	3.6	0.0	18.8	10.9	9.6	13.9	9.7
		Average	**0.0**	**0.0**	**0.0**	**0.0**	**9.9**	**5.8**	**3.8**	**0.0**	**18.0**	**10.9**	**10.0**	**13.8**	**9.0**
D	**District: Haveri**														
16	Hanagall	MRC7351	0.0	0.0	0.0	0.0	10.7	6.0	4.9	0.0	27.5	13.5	10.7	9.8	15.5
		MRC 7383	0.0	0.0	0.0	0.0	11.2	7.7	5.0	0.0	27.0	12.4	9.9	12.9	18.7
		Jaadu	0.0	0.0	0.0	0.0	10.0	8.5	5.1	0.0	26.9	11.5	10.0	10.5	20.0
		Chiranjeevi,	0.0	0.0	0.0	0.0	12.3	6.7	4.8	0.0	26.8	10.7	8.9	9.9	14.0
		Everest	0.0	0.0	0.0	0.0	10.1	6.0	4.9	0.0	27.0	10.0	10.1	10.8	14.2
17	Savanur	First class	0.0	0.0	0.0	0.0	11.2	7.5	5.6	0.0	26.9	11.9	9.8	11.1	13.8
		Priya seeds	0.0	0.0	0.0	0.0	12.5	8.6	6.0	0.0	25.6	10.9	9.7	9.9	15.1
		Yuva	0.0	0.0	0.0	0.0	12.0	8.0	6.0	0.0	27.9	9.8	11.0	10.6	13.9
		Dhanya	0.0	0.0	0.0	0.0	12.6	8.0	5.7	0.0	28.0	11.0	10.8	10.3	14.1
		Puli	0.0	0.0	0.0	0.0	11.9	8.0	4.9	0.0	35.8	10.9	10.9	9.9	12.6
18	Chikkerur	Mahadev	0.0	0.0	0.0	0.0	11.9	6.8	5.0	0.0	26.6	11.9	10.8	10.5	14.2
		MRC7351	0.0	0.0	0.0	0.0	11.0	7.8	4.0	0.0	27.1	12.9	11.0	10.1	13.9
		MRC 7383	0.0	0.0	0.0	0.0	12.7	8.0	5.0	0.0	27.1	9.9	9.6	10.0	14.2
		Jaadu	0.0	0.0	0.0	0.0	10.7	8.2	5.7	0.0	27.0	9.5	9.0	9.6	13.0
		Chiranjeevi,	0.0	0.0	0.0	0.0	10.9	8.1	5.9	0.0	26.8	10.0	9.9	10.0	14.8
19	Village 4: Kundur	Ajeet 155	0.0	0.0	0.0	0.0	12.0	8.0	5.7	0.0	26.9	10.0	10.8	10.5	13.1
		MRC 7383	0.0	0.0	0.0	0.0	12.6	8.0	4.9	0.0	27.5	10.7	10.0	10.7	12.0
		Jaadu	0.0	0.0	0.0	0.0	11.7	7.6	4.6	0.0	27.0	10.8	9.8	9.9	13.0
		Chiranjeevi,	0.0	0.0	0.0	0.0	10.8	7.0	4.7	0.0	27.5	9.6	10.6	10.7	13.9
		Ajeet 199	0.0	0.0	0.0	0.0	10.9	7.5	5.0	0.0	27.0	11.9	11.1	10.7	11.8
20	Village 5: Akkialur	First class	0.0	0.0	0.0	0.0	11.7	7.7	4.0	0.0	26.8	11.7	10.7	9.6	14.1

		Priya seeds	0.0	0.0	0.0	0.0	12.1	7.3	5.9	0.0	25.9	12.3	10.8	10.5	12.0
		Yuva	0.0	0.0	0.0	0.0	10.7	6.8	5.4	0.0	27.6	11.9	10.8	8.9	13.9
		Dhanya	0.0	0.0	0.0	0.0	12.6	7.0	5.0	0.0	27.0	11.1	10.0	9.8	12.0
		Puli	0.0	0.0	0.0	0.0	11.5	7.2	4.0	0.0	26.9	11.0	10.8	11.0	14.2
		Average	**0.0**	**0.0**	**0.0**	**0.0**	**11.5**	**7.5**	**5.1**	**0.0**	**27.4**	**11.1**	**10.3**	**10.3**	**14.1**
E	**District: Uttar Kannada**														
21	hunagund	First class	0.0	0.0	0.0	0.0	9.2	1.0	5.5	0.0	17.8	3.0	13.4	7.8	16.6
		MRC 7383	0.0	0.0	0.0	0.0	12.5	2.0	7.7	0.0	15.5	2.7	12.0	6.7	15.0
		Jaadu	0.0	0.0	0.0	0.0	8..9	2.0	8.4	0.0	16.6	3.0	10.6	7.0	14.5
		Everest	0.0	0.0	0.0	0.0	10.5	2.0	5.8	0.0	15.5	3.2	11.1	6.4	17.0
		Mahadev	0.0	0.0	0.0	0.0	11.1	2.0	8.0	0.0	18.4	2.7	12.4	8.0	16.6
22	Dombarakoppa	First class	0.0	0.0	0.0	0.0	12.0	1.6	7.8	0.0	20.6	4.2	13.4	8.5	14.5
		Yuva	0.0	0.0	0.0	0.0	11.0	2.0	8.5	0.0	16.4	3.7	10.0	8.9	15.0
		Priya seeds	0.0	0.0	0.0	0.0	9.6	3.0	5.5	0.0	18.6	4.0	12.0	7.5	14.6
		Puli	0.0	0.0	0.0	0.0	12.0	2.0	7.0	0.0	20.0	4.3	9.9	6.7	13.9
		Chiranjeevi	0.0	0.0	0.0	0.0	8.6	1.7	8.4	0.0	20.0	3.9	12.7	9.0	14.0
23	Bachunaki	Dhanya	0.0	0.0	0.0	0.0	9.5	2.0	5.1	0.0	20.0	3.0	13.7	8.6	15.5
		MRC 7383	0.0	0.0	0.0	0.0	12.6	1.7	7.7	0.0	18.8	2.0	12.7	7.8	16.7
		Jaadu	0.0	0.0	0.0	0.0	11.0	1.7	7.7	0.0	16.4	3.0	10.0	8.1	16.4
		Chiranjeevi	0.0	0.0	0.0	0.0	9.6	2.0	8.0	0.0	21.0	4.7	12.2	8.3	15.9
		Mahadev	0.0	0.0	0.0	0.0	12.0	2.0	7.0	0.0	18.5	3.7	10.4	7.8	15.0
24	Hundagol	First class	0.0	0.0	0.0	0.0	10.1	2.0	6.6	0.0	20.0	4.0	9.7	7.6	16.0
		MRC 7383	0.0	0.0	0.0	0.0	18.1	2.0	8.9	0.0	19.6	3.7	10.5	6.7	14.8
		Yuva	0.0	0.0	0.0	0.0	19.1	1.0	8.0	0.0	18.4	3.8	13.6	5.6	15.0
		Priya seeds	0.0	0.0	0.0	0.0	16.5	1.6	7.7	0.0	17.7	4.2	12.0	6.8	15.1
		Puli	0.0	0.0	0.0	0.0	20.0	1.4	7.2	0.0	16.4	4.2	11.8	7.6	16.6
25	Benal	Chiranjeevi	0.0	0.0	0.0	0.0	17.9	2.1	8.5	0.0	18.0	3.6	12.4	8.1	14.2
		MRC 7383	0.0	0.0	0.0	0.0	12.2	1.6	7.0	0.0	17.6	4.2	9.7	9.0	15.5
		Jaadu	0.0	0.0	0.0	0.0	13.0	2.0	6.0	0.0	16.7	4.0	8.4	6.8	16.7
		Everest	0.0	0.0	0.0	0.0	13.6	2.0	6.6	0.0	17.8	4.9	10.4	7.3	14.0
		Mahadev	0.0	0.0	0.0	0.0	12.4	1.7	8.0	0.0	20.8	3.0	13.7	8.5	14.5
		Average	**0.0**	**0.0**	**0.0**	**0.0**	**12.7**	**1.8**	**7.3**	**0.0**	**18.3**	**3.6**	**11.5**	**7.6**	**15.3**
		Overall Average	**0.0**	**0.0**	**0.0**	**0.0**	**12.2**	**4.9**	**5.3**	**0.0**	**21.2**	**9.2**	**10.2**	**14.0**	**13.1**

AB-Alternaria Blight, BLB= Bacterial leaf blight, CoLS= Corynespora leaf spot, GM= Grey mildew

Table 10b: Observations on the occurrence of diseases at the research farm (UAS Dharwad, Under Protected conditions)

Month	Hybrids (BG II)	Incidence (%)			Mean Percent Disease Intensity (PDI)								
		Wilt	Root rot	Boll Rot	ALS	HLS	CLS	ATN	CoLS	MLS	BLB	GM	Rust
Aug-24	MRC-7373,Rashi magic,KCH-144, Money maker, Malini, Raja NCS-954,Indam,Anand, Jadoo,First class,Vittal,KCH-36,Mahadev,Esha,ankur Jai,DPC-7065,MRC-7017,navaneeth and gold Kuber.	0.0	4.0	0.0	8.6	0.0	0.0	0.0	0.0	0.0	4.8	1.8	0.0
Sept. -24	MRC-7373,Rashi magic,KCH-144, Money maker, Malini, Raja NCS-954,Indam,Anand, Jadoo,First class,Vittal,KCH-36,Mahadev,Esha,ankur Jai,DPC-7065,MRC-7017,navaneeth and gold Kuber.	0.0	5.5	5.2	10.8	0.0	0.0	0.0	0.0	0.0	6.5	6.8	0.0
Oct.-24	MRC-7373, Rashi magic,KCH-144, Money maker, Malini, Raja NCS-954,Indam,Anand, Jadoo,First class,Vittal,KCH-36,Mahadev,Esha,ankur Jai,DPC-7065,MRC-7017,navaneeth and gold Kuber.	2.0	4.4	9.5	12.6	0.0	0.0	0.0	0.0	0.0	7.9	10.3	0.0
Nov. -24	MRC-7373, Rashi magic,KCH-144, Money maker, Malini, Raja NCS-954,Indam,Anand, Jadoo,First class,Vittal,KCH-36,Mahadev,Esha,ankur Jai,DPC-7065,MRC-7017,navaneeth and gold Kuber.	0.0	6.3	12.1	18.8	0.0	0.0	0.0	0.0	0.0	10.3	8.8	12.5
Dec.-24	MRC-7373, Rashi magic,KCH-144, Money maker, Malini, Raja NCS-954,Indam,Anand, Jadoo,First class,Vittal,KCH-36,Mahadev,Esha,ankur Jai,DPC-7065,MRC-7017,navaneeth and gold Kuber.	0.0	0.0	14.6	20.5	0.0	0.0	0.0	0.0	0.0	5.4	12.5	18.6
	Average	0.4	4.0	8.3	14.3	0.0	0.0	0.0	0.0	0.0	7.0	8.0	6.2

ALS=Alternaria leaf spot, BLB= Bacterial leaf blight, HLS=Helminthosporium leaf spot, CLS=Cercospora leaf spot, ATN= Anthracnose, CoLS= Corynespora leaf spot, GM= Grey mildew, MLS=Myrothecium leaf spot.

Table 11a: Observations on the occurrence of diseases in Guntur, Palnadu and Krishna districts (Andhra Pradesh) (in farmers' fields)

District/ Place	Var/ Hybrid	Stage of the crop																		
		Early / Seedling (20-30 DAS)			Mid season / Flowering (50-100 DAS)								Late / Boll development (100-150 DAS)							
		BLB	ALS	CoLS	Var / Hyb.	BLB	ALS/ Cercco	MLS	CoLS	GM	Rust	Var / Hyb	BLB	ALS	CoLS	Root rot	wilt	Boll rot	GM	Rust
Guntur																				
Tadikonda crossroads	Akira	0.0	0	0	Platinum	0	0 / Tr.	0	0	0	0	Platinum	1.00	Tr	5.25	Few plants	0	0	0	1.25
Ponnekllu	Sarkar	0	0	0	Akira	0	0 / 0	0	0	0	0	Platinum	0	0	36.50	0	0	Few plants	0	Tr.
	Super Chetak	0	0	0	Platinum	0	0 / Tr.	0	0	0	0	Sarkar	0	2.5	15.50	Few plants	0	0	Tr	Tr.
	Rangoli	0	0	0	Akira	0	0 / 0	0	0	0	0	Super Bunty	1.25	1.25	15.00	0	0	0	0	Tr.
	Sarkar	0	0	0	Platinum	0	0 / Tr.	0	0	0	0	Platinum	Tr	0	14.75	0	Few plants	0	0	13.25
Ravela	Super Bunty	0	0	0	Akira	0	0 / Tr.	0	0	0	0	Akira	1.5	0	4.75	0	0	0	0	11.75
	Super Bunty	0	0	0	Super Bunty	0	O / Tr.	0	0	0	0	Platinum	Tr	0	Tr	0	0	Few plants	0	Tr.
Bezathpuram	US 4078	0	0	0	US 4078	0	0	0	0	0	0	Platinum	1.0	3.75	24.00	Few plants	0	0	0	Tr.
	US 4078	0	0	0	Platinum	0	Tr/ Tr.	0	0	0	0	Super bunty	0	Tr.	25.00	0	0	0	0	Tr.
Nidumukkala	Platinum	0	0	0	Platinum	0	Tr/ Tr	0	0	0	0	Platinum	Tr.	2.75	3.25	0	Few plants	0	0	Tr.
	Platinum	0	0	0	Akira	0	0/ Tr	0	0	0	0	Platinum	0	Tr.	5.50	0	0	0	Tr.	Tr.

Jonnalagadda	Dharma Gold	0	0	0	Akira	0	0 / 0	0	0	0	0	Akira	0	0	Tr.	0	0	0	0	Tr.
	Akira	0	0	0	Super bunty	0	0 / 0	0	0	0	0	Platinum	2.5	7.0	12.75	0	0	Few plants	Tr.	Tr.
	NCS 1122	0	0	0	Janani 555	0	0 / 0	0	0	0	0	Super bunty	0.0	9.0	15.25	Few plants	0	0	Tr.	Tr.
	Dharma Gold	0	0	0	Akira	0	0 / Tr.	0	0	0	0	Platinum	0.0	4.75	12.75	0	Few plants	0	Tr.	6.25
Damarapalli	US 6072	0	0	0	Siri	0	0 / 0	0	Traces	0	0	Akira	Tr.	Tr.	16.5	0	0	0	4.0	11.50
hikkiredypalem	Akira	0	0	0	Siri	0	0 / Tr.	0	0	0	0	Janani 555		5.0	Tr.	0	0	0	2.5	3.80
Pamulapadu	Janani 555	0	0	0	Janani 555	0	0 / 0	0	0	0	0	Akira	Tr.	1.75	14.0	FEw plants	0	0	3.0	2.50
Kondepadu	Platinum	0	0	0	Platinum	0	0 / Tr.	0	0	0	0	Platinum	2.25	2.75	22.0	0	0	Few plants	Tr.	4.00
Visadala	Janani 555	0	Tr	Tr	Platinum	0	0 / 0	0	0	0	0	Platinum	Tr.	Tr.	18.25	0	Few plants	0	Tr.	5.00
Gundlapalem,	Super Bunty	0	0	0	Platinum	0	0 / Tr.	0	0	0	0	Akira	Tr.	Tr.	5.00	0	0	0	1.5	8.50
Pedanandipadu	Akira	0	Tr.	0	Akira	0	0/Tr.	0	0	0	0	Sarkar	Tr.	1.00	3.50	0	0	0	1.00	6.50
Prattipadu	Akira	0	0	0	Platinum	0	0/Tr.	0	0	0	0	Siri	0	1.25	3.00	0	0	0	1.25	5.50
Mallayapalem	Siri	0	0	Tr.	Akira	0	Tr./Tr.	0	0	0	0	Siri	0	1.00	2.50	0	0	0	1.75	4.50
Average		0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	-	0.4	1.9	11.5	0.0	0.0	0.0	0.6	3.5
Palnadu																				
Chilakaluri peta	Platinum	0	0	0	Akira	0	0 / Tr.	0	0	0	0	Platinum	0	0	5.25	Few plants	0	0	2.50	Tr.

	Akira	0	0	0	Platinum	0	0/ Tr	0	0	0	0	Akira	0	Tr.	6.80	Few plants	0	Few plants	Tr.	3.50
	Super bunty	0	0	0	Akira	0	0	0	Tr.	Tr.	0	Platinum	0	Tr.	Tr.		0	0	3.0	2.80
Rajapeta	Akira	0	0	0	Akira	0	0 / 0	0	0	0	0	Platinum	0	1.25	39.50	0	0	0	Tr.	5.80
	Sarkar	0	0	0	Platinum	0	0 / Tr.	0	0	0	0	Sarkar	1.55	2.00	14.50	Few plants	0	0	Tr	Tr.
	Rangoli	0	0	0	Akira	0	Tr / Tr	0	0	0	0	Sarkar	0	1.55	11.80	0	0	0	Tr.	Tr.
	Akira	0	0	0	Super bunty	0	0 / Tr.	0	0	0	0	Akira	0	Tr.	19.25	0	Few plants	Few plants	0	19.50
Kukkapallevaripalem	Super Bunty	0	0	0	Akira	0	0 / Tr.	0	0	0	0	Akira	0	Tr.	11.75	0	0	0	0	6.50
	Super Bunty	0	0	0	Platinum	0	O / Tr.	0	Tr.	0	0	Super bunty	Tr	0	Tr.	0	0	Few plants	Tr.	Tr.
Boppudi	Akira	0	0	0	US 4078	0	Tr/Tr.	0	0	0	0	Akira	1.85	1.75	20.00	0	0	0	0	Tr.
	US 4078	0	0	0	Akira	0	Tr/ Tr.	0	0	0	0	Platinum	0	Tr.	26.00	0	0	Few plants	Tr.	Tr.
Gottipadu	Akira	0	0	0	Super bunty	0	Tr/ Tr	0	0	0	0	Platinum	Tr.	3.00	7.50	0	Few plants	0	0	Tr.
	Platinum	0	0	0	Akira	0	0/ Tr	0	Tr.	Tr.	0	Akira	1.9	Tr.	15.50	0	0	0	Tr.	Tr.
Sattenapalli	Dharma Gold	0	0	0	Akira	0	0 / 0	0	0	0	0	Akira	0	Tr.	Tr.	0	0	0	2.25	Tr.
	Akira	0	0	0	Super bunty	0	Tr / 0	0	0	0	0	Platinum	0	6.0	11.75	Few plants	0	0	Tr.	Tr.
	Dharma Gold	0	0	0	Janani 555	0	0 / 0	0	0	0	0	Super bunty	Tr.	0	Tr.	Few plants	0	Few plants	Tr.	Tr.

	Super bunty	0	0	0	Platinum	0	0 / Tr.	0	0	0	0	Platinum	0.0	Tr.	19.75	0	Few plants	0	2.00	6.25
Kantepudi	Platinum	0	0	0	Siri	0	Tr / 0	0	Tr.	0	0	Akira	1.45	Tr.	18.50	0	0	0	5.50	12.50
Panidem	Janani 555	0	0	0	Siri	0	Tr./ Tr.	0	0	0	0	Akira	0	5.000	Tr.	0	0	0	2.75	2.80
Piduguralla	Janani 555	0	0	0	Janani 555	0	0 / 0	0	Tr.	0	0	Platinum	1.50	2.50	18.0	Few plants	0	Few plants	3.25	8.50
													1.25	3.00						
Guttikonda	Platinum	0	Tr	0	Akira	0	0 / Tr.	0	0	0	0	Sarkar	0	2.75	26.00	0	0	Few plants	Tr.	6.00
Kamepalle	Akira	0	0	0	Akira	0	Tr./ Tr.	0	Tr.	0	0	Akira	0	Tr.	32.75	0	Few plants	0	9.60	9.00
Janapadu	Super Bunty	0	0	0	Platinum	0	0 / Tr.	0	0	0	0	Akira	0	Tr.	15.00	Few plants	0	Few plants	1.25	2.50
Average		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.4	1.2	13.3	0.0	0.0	0.0	1.4	3.7
Krishna																				
Chilllakallu	Platinum	0	0	0	Super bunty	0	0 / 0	0	0	0	0	Akira	0	Tr.	9.50	0	Few plants	0	Tr.	5.50
	Akira	0	0	0	Akira	0	0/ Tr	0	0	0	0	Platinum		1.50	4.50	0	0	Few plants	3.25	2.50
	Sarkar	0	0	0	Platinum gold	0	0	0	0	Tr.	0	Sarkar		Tr.	Tr.		0	0	Tr.	2.30
Toraguntapalem	Akira	0	0	0	Akira	0	0 / Tr.	0	0	0	0	Platinum	0	2.25	6.50	0	0	0	2.50	4.60
	Sarkar	0	0	0	US 4078	0	0 / Tr.	0	Tr.	0	0	Sarkar	1.55	Tr.	26.50	0	0	0	Tr	0
	Super bunty	0	0	0	Super bunty	0	Tr / 0	0	0	0	0	Sarkar	0	2.00	11.80	0	0	0	0	20.25

	Akira	0	0	0	Super bunty	0	0 / Tr.	0	0	0	0	Akira	0	0	35.25	Few plants	0	Few plants	1.50	19.50
Vatsavai	Akira	0	0	0	Platinum	0	0Tr./ Tr.	0	0	0	0	Super bunty	0	0	11.75	0	0	0	2.80	5.50
	Dharma Gold	0	0	0	Akira	0	O / Tr.	0	Tr.	0	0	Sarkar	Tr	0	Tr.	0	0	Few plants	2.00	0
Makkapeta	US 4078	0	0	0	US 4078	0	0/0.	0	0	Tr.	0	Akira	1.85	1.40	19.00	0	0	0	Tr.	6.25.
	Akira	0	0	0	Platinum	0	0/0	0	Tr.	0	0	Platinum	0	0	16.00	Few plants	0	Few plants	0	5.75
Penuganchibrolu	Janani 555	0	0	0	Super bunty	0	Tr/ Tr	0	0	0	0	Platinum	Tr.	2.50	17.50	0	0	0	Tr.	8.60
	Platinum	0	0	0	Super bunty	0	Tr/Tr	0	Tr.		0	Akira	1.9	0	25.50	0	0	0	0	7.90
Mundlapadu	Sarkar	0	0	0	Akira	0	0 / Tr.	0	0	0	0	Akira	0	Tr.	Tr.	0	0	0	1.75	6.25
	Platinum	0	0	0	Sarkar	0	0 / 0	0	Tr.	0	0	Akira	0	3.75.0	19.75	Few plants	Few plants	0	0	5.50
	Super bubty	0	0	0	Janani 555	0	0 / 0	0	0	0	0	Sarkar	Tr.	Tr.	Tr.	0	0	Few plants	2.00	2.62
	Janani 555	0	0	0	Siri	0	0 / 0.	0	0	0	0	Platinum	0.0	Tr.	11.75	0	0	0	Tr.	7.50
Nawabpeta	Akira	0	0	0	Siri	0	0 / 0	0	0	0	0	Platinum	1.35	Tr.	19.50	Few plants	Few plants	0	4.50	9.50
Nandigama	Janani 555	0	0	0	Siri	0	Tr./ 0	0	0	Tr.	0	Platinum	Tr.	5.00	Tr.	0	0	0	6.75	3.80
Gollamudi	Janani 555	0	0	0	Sarkar	0	Tr./ Tr.	0	Tr.	0	0	Akira	1.25	2.50	16.0	0	0	Few plants	3.25	11.50

Damuluru	Akira	0	Tr	0	Akira	0	Tr./ Tr.	0	Tr.	Tr.	0	Siri	Tr.	2.75	18.50	0	Few plants	Few plants	0	8.00
Average		0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	-	0.4	1.0	12.7	0.0	0.0	0.0	1.4	6.9
Overall Average		0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	-	0.4	1.4	12.5	0.0	0.0	0.0	1.1	4.7

ALS=Alternaria leaf spot, BLB= Bacterial leaf blight, HLS=Helminthosporium leaf spot, CLS=Cercospora leaf spot, ATN= Anthracnose, CoLS= Corynespora leaf spot, GM= Grey mildew, MLS=Myrothecium leaf spot, RR= Root rot

Table 11b: Observations on the occurrence of diseases in at research farm (Lam Guntur-Andhra Pradesh)

Month	Hybids(BG-II)	Incidence (%)			Mean Percent Disease Index (PDI)							
		Wilt	Root rot	Boll rot	ALS	HLS	ATN	CoLS	MLS	BB	GM	Rust
Aug-2024	Varieties and hybrids of cotton trials	0.0	0.0	0.0	0/0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sept. 2024		0.0	0.0	0.0	0/0	0.0	0.0	Traces	0.0	0.0	0.0	0.0
Oct. 2024		0.0	0.0	0.0	Tr. / Tr.	0.0	0.0	Traces-2.50	0.0	0.0 to 9.0	0.0	0.0
Nov. 2024		0.0	0.0	0.0	Tr. /Tr.	0.0	0.0	2.5-7.50	0.0	9.0 to 10.0	0.0	0.0
Dec. 2024		0.0	0.0	Few plants were infected	2.50/1.00	0.0	0.0	8.50-29.25	0.0	10-11.50	18.75	4.4 - 16.6
Average		**0.0**	**0.0**	**0.0**	**0.2-0.5**	**0.0**	**0.0**	**2.2-7.9**	**0.0**	**3.8-6.1**	**3.75**	**0.88-3.32**

Table 12a: Observations on the occurrence of diseases in farmer's fields in Coimbatore, Dindigul, Virudhnagar, Tuticorin, Tirunelveli, Salem, Perambalur (Tamil Nadu)

S.No.	District/Villages	Variety/Hybrid	Stage of sampling									
			Per cent Disease Index (PDI) / Per cent Disease Incidence									
			Early season/ Seedling stage	Mid-season/ Flowering stage				Late season / Boll development stage				
			(20-30DAS)	(60- 80 DAS)				(120- 150 days)				
			Collar rot	ALB	BB	GM	RR	ALB	BB	GM	RR	BR
	Coimbatore											
1	Kovilpalayam	RCH 659,	5.1	6.3	10.5	10.1	6.4	7.7	12.2	11.3	7.7	5.0
2	Thottipalayam	RCHIIBGII, RCH 659,	5.0	7.0	15.3	12.3	7.7	7.8	16.2	14.3	8.5	4.5
3	Ayyapparettipudur	RCHIIBGII, Kaveri, RCH 659	5.5	7.7	18	15.5	5.8	8.5	19.5	17.2	6.5	5.1
4	Sataikalpudhur	RCHIIBGII, Jackpot, RCH 659, CO17	4.7	5.8	12.3	7.7	7.0	6.3	13.7	8.4	7.7	6.3
5	Vadaputhoor	RCHIIBGII, RCH 659	4.3	6.5	7.5	5.7	5.5	7.3	8.7	6.8	6.0	3.7
		Average	**4.9**	**6.7**	**12.7**	**10.3**	**6.5**	**7.5**	**14.1**	**11.6**	**7.3**	**4.9**
	Dindigul											
1	Guyavanayakkanpatti	RCHIIBGII, RCH 659,	6.7	14.3	12.5	18	7.3	15.4	13.7	19.3	8.5	5.1
2	Veeralapatti	RCHIIBGII, Kaveri, RCH 659,	4.8	12.7	10.3	10.5	5.4	13.2	11.3	12	7.0	5.7
3	Kallimanthayam	Kaveri, RCH 659, BG II Bollgard II	5.7	11.3	7	7.8	5.3	12	8.3	9.3	6.7	6.5
4	Kalikkampatti	RCHIIBGII, RCH 659,	5.0	10.7	5.3	8.8	6.7	11.5	6.7	10.2	7.3	5.0
5	S.Paraipatti	RCHIIBGII, Kaveri, RCH 659, 5. Bagubali	4.3	12.5	6.3	4.7	3.8	13.4	4.3	5.3	4.5	5.3
		Average	**5.3**	**12.3**	**8.3**	**9.9**	**5.7**	**13.1**	**8.9**	**11.2**	**6.8**	**5.5**

	Virudhunagar											
1	Sreevilliputhur	RCHIIBGII, RCH 659	7.0	3.0	14.5	11.3	15.0	4.0	15.2	12	15.7	5.3
2	Seeniapuram	RCHIIBGII, RCH 659	5.0	5.3	10.4	10.7	13.4	7.5	11.6	11.9	14.0	5.4
3	Melaamaththur	RCHIIBGII, RCH 659	4.8	4.7	11.7	7.7	12.9	5.7	12.4	8.4	13.0	4.3
4	Pavali	RCHIIBGII, RCH 659	5.3	4.5	13.7	6.8	15.3	6.0	16.3	7.5	16.2	5.8
5	Thonugal	RCHIIBGII, RCH 659,SVPR 6	5.5	7.5	12.5	11.7	14.0	8.0	17.5	12.4	15.3	4.7
		Average	**5.5**	**5.0**	**12.5**	**9.6**	**14.1**	**6.2**	**14.6**	**10.4**	**14.8**	**5.1**
	Tuticorin											
1	Villicheri	RCHIIBGII, RCH 659, Kaveri,	5.7	7.5	10.3	8.5	7.5	8.3	12.1	9.3	8.0	4.5
2	Ottapidaram	RCHIIBGII, RCH 659, Kaveri,	5.3	10.7	6.5	6.0	6.0	11.5	7.7	7.4	10.7	5.7
3	Kayatharu	RCHIIBGII, RCH 659, Kaveri,	4.0	5.3	7.0	7.1	4.3	6.7	8.2	8.5	5.5	5.0
		Average	**5.0**	**7.8**	**7.9**	**7.2**	**5.9**	**8.8**	**9.3**	**8.4**	**8.1**	**5.1**
	Tirunelveli											
1	Rastha	RCHIIBGII, RCH 659, Kaveri,	5.5	11.3	13.4	3.7	10.3	12.2	14.3	4.0	11.0	4.5
2	Manur	RCHIIBGII, RCH 659, Kaveri,	5.0	10.7	12.1	4.4	9.4	`11.3	12.7	5.1	10.3	4.9
3	Devarkulam	RCHIIBGII, RCH 659, Kaveri,	4.7	7.5	10.1	3.1	7.3	8.4	11.3	3.7	8.0	6.0
4	Alagiathanapuarm	RCHIIBGII, RCH 659, Kaveri,	3.8	6.3	9.7	4.7	6.8	7.0	10.4	5.7	7.2	4.5
5	Thalapathisamuthiram	RCHIIBGII, RCH 659, SVPR 6	5.0	7.0	15	4.5	7	8.5	15.7	5.5	7.5	4.3
		Average	**4.8**	**8.6**	**12.1**	**4.1**	**8.2**	**9.0**	**12.9**	**4.8**	**8.8**	**4.8**
	Salem											
1	Ladduvadi	RCH 659, Bagubali	5.0	10.7	13.3	11.3	6.0	11.3	14.5	12.5	6.7	5.0
2	Veeraganur	RCH 659, RCHIIBGII Ankur, Jackpot	4.5	12.3	11.4	12.5	6.8	13.2	12.7	13.3	7.3	5.7
3	Navalur	RCH 659, RCHIIBGII	5.7	11.3	13.7	13.5	6.5	12.0	14.7	14.7	7.0	5.5
4	Sathapadi	RCH 659, Bagubali	5.0	10	10.1	15.7	7.3	11.7	12.4	16.2	8.5	4.3

5	Sadasivapuram	RCH 659, RCHIIBGII	5.5	12.5	15.5	17.0	8.0	13.5	16.3	18.9	9.1	6.5
		Average	**5.1**	**11.4**	**12.8**	**14.0**	**6.9**	**12.3**	**14.1**	**15.1**	**7.7**	**5.4**
	Perambalur											
1	Veppamthattai	RCHIIBGII, Kaveri, NEO, RCH 659,	5.5	9.7	17.7	14.3	6.3	10.3	18.1	15.3	7.0	4.4
2	Nergunam	RCHIIBGII, Kaveri, RCH 659, Bagubali	4.5	8.4	15.4	11.5	6.0	9.7	13.7	12.7	6.7	4.7
3	Alathur	RCHIIBGII, NEO, RCH 659	6.3	8.0	13.5	10.3	7.0	8.9	15.4	12.1	7.8	5.2
4	Padalur	RCHIIBGII, Kaveri, RCH 659, Ankur, Bagubali	4.7	7.0	10.3	13.3	6.8	7.8	9.5	14.5	7.3	5.0
5	Pasumbalur	RCHIIBGII, Kaveri, RCH 659, Ankur, Bagubali	5.0	8.4	11.0	12.7	6.3	9.2	12.3	13.2	6.9	5.9
		Average	**5.2**	**8.3**	**13.5**	**12.4**	**6.5**	**9.1**	**13.8**	**13.5**	**7.1**	**5.0**
		Overall Average	**5.1**	**8.6**	**11.4**	**9.6**	**7.7**	**9.4**	**12.5**	**10.7**	**8.7**	**5.1**

ALS=Alternaria leaf spot, BLB= Bacterial leaf blight, GM= Grey mildew, MLS=Myrothecium leaf spot, RR= Root rot, BR=Boll

Table 12b: Occurrence of TSV from major cotton growing areas of Coimbatore district in Tamil Nadu

Period	District & Village	Hybrids/ varieties	Stage of the crop	TSV incidence %
	Coimbatore			
October 2024	Kovilpalayam	RCHIIBGII, RCH 659, CO17	Vegetative stage	3.7
	Thottipalayam	RCHIIBGII, RCH 659, CO17	Vegetative stage	4.3
	Ayyapparettipudur	RCHIIBGII, RCH 659, CO17	Vegetative stage	5.5
	Vadaputhoor	RCHIIBGII, RCH 659, CO17	Vegetative stage	3.0
	TNAU Farm	RCH 659,DCH32, Jadoo CO 14, CO17,MCU 5	Vegetative stage	7.0
		Average		**4.7**
	Dindugal			
	Veeralapatti	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Vegetative stage	3.0
	Kallimanthayam	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Vegetative stage	2.5
	Kalikkampatti	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Vegetative stage	3.7

	S.Paraipatti	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Vegetative stage	2.9
	Kuyanayakkanpatti	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Vegetative stage	4.3
		Average		**3.3**
November 2024	**Coimbatore**			
	Kovilpalayam	RCHIIBGII, RCH 659, CO 17	Square formation	5.8
	Thottipalayam	RCHIIBGII, RCH 659, CO 17	Square formation	4.7
	Ayyapparettipudur	RCHIIBGII, RCH 659, CO 17	Square formation	6.5
	Vadaputhoor	RCHIIBGII, RCH 659, CO 17	Square formation	4.8
	TNAU Farm	RCH 659, DCH32, Jadoo CO 14, CO17, MCU 5	Square formation	16.5
		Average		**7.7**
	Dindugal			
	Veeralapatti	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Square formation	4.3
	Kallimanthaya	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Square formation	3.7
	Kalikkampatti	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Square formation	5.8
	S.Paraipatti	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Square formation	6.0
	Kuyanayakkanpatti	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Square formation	8.5
		Average		**5.7**
December 2024	**Coimbatore**			
	Kovilpalayam	RCHIIBGII, RCH 659,CO17	Boll formation	8.5
	Thottipalayam	RCHIIBGII, RCH 659,CO17	Boll formation	5.7
	Ayyapparettipudur	RCHIIBGII, RCH 659,CO17	Boll formation	8.8
	Vadaputhoor	RCHIIBGII, RCH 659,CO17	Boll formation	6.3
	TNAU Farm	RCH 659,DCH32, Jadoo CO 14, CO17,MCU 5	Boll formation	18.0
		Average		9.5
	Dindugal			
	Veeralapatti	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Boll formation	5.7
	Kallimanthayam	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Boll formation	6.8
	Kalikkampatti	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Boll formation	8.5
	S.Paraipatti	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Boll formation	7.5
	Kuyanayakkanpatti	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Boll formation	14.0
		Average		**8.5**

January 2024	**Coimbatore**			
	Kovilpalayam	RCHIIBGII, RCH 659,CO17	Boll maturity	6.5
	Thottipalayam	RCHIIBGII, RCH 659,CO17	Boll maturity	4.3
	Ayyapparettipudur	RCHIIBGII, RCH 659,CO17	Boll maturity	5.4
	Vadaputhoor	RCHIIBGII, RCH 659,CO17	Boll maturity	4.3
	TNAU Farm	RCH 659,DCH32, Jadoo CO 14, CO17,MCU 5	Boll maturity	12.5
		Average		**6.6**
	Dindugal			
	Veeralapatti	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Boll maturity	3.6
	Kallimanthayam	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Boll maturity	4.8
	Kalikkampatti	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Boll maturity	5.3
	S.Paraipatti	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Boll maturity	4.7
	Kuyanayakkanpatti	Kaveri, RCH 659, BG II Bollgard II, RCHIIBGII	Boll maturity	9.5
		Average		**5.6**

Table 12c: Observations on the occurrence and distribution of major diseases of cotton diseases at Research farm TNAU Coimbatore

Month & Year	Hybrids / Varieties	Incidence (%)			Mean Percent Disease Intensity (PDI)					
		CR	Root rot	Boll Rot	ALS	CLS	MLS	BLB	GM	Rust
Aug-2024	DCH32 RCHIIBGII, RCH 659 , Co15 and Co17, MCU 5 ,Jaddoo, NDLH 1938	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sept. 2024		6.5	0.0	0.0	2.5	0.0	2.0	3.5	0.0	0.0
Oct. 2024		7.3	0.0	0.0	7.5	5.0	4.6	8.8	3.0	0.0
Nov. 2024		0.0	10.0	4.0	13.5	8.3	5.7	15.9	12.5	2.4
Dec. 2024		0.0	17.5	6.3	18.7	7.0	6.5	20. 6	19.0	8.5
Jan.2025		0.0	12.0	9.7	14.3	5.4	7.3	17.7	13.3	7.3
Average		**2.8**	**6.6**	**3.3**	**9.4**	**4.3**	**4.4**	**9.2**	**8.0**	**3.0**

Path 1(b) Disease progress in relation to weather factors

NORTH ZONE

Table 13a: Disease progress in relation to weather factors at RRS, PAU Faridkot (Punjab)

SMW	Temperature (°C)			Relative humidity (%)			Wind speed (Km/ h)	Sunshine (Hr)	Rainfall (mm)	Rainy days	F 846		HS 6		RS 921		RST 9	
											CLCuD %		CLCuD %		CLCuD %		CLCuD %	
	Max	Min	Mean	Max	Min	Mean					Incidence	PDI	Incidence	PDI	Incidence	PDI	Incidence	PDI
23	40.2	25.2	32.7	51.1	22.6	36.9	7.9	6.6	4.0	2	11.9	2.1	5.9	1.1	12.8	2.4	5.1	1.0
24	43.1	27.9	35.5	48.6	21.0	34.8	6.9	9.8	0.0	0	22.2	5.3	18.8	4.0	21.4	4.7	23.9	5.4
25	38.8	27.0	32.9	62.6	36.3	49.5	7.3	6.7	7.8	1	65.0	10.1	87.2	14.9	49.6	7.9	63.2	9.6
26	37.1	28.4	32.8	74.1	50.9	62.5	6.9	4.9	6.4	1	80.3	14.1	98.3	20.1	75.2	13.9	94.0	17.8
27	35.1	26.9	31.0	82.7	61.9	72.3	8.2	3.5	41.0	2	80.3	11.7	90.6	15.9	71.8	13.0	82.9	15.7
28	35.4	26.4	30.9	79.1	56.4	67.8	4.6	6.4	12.6	2	78.6	14.1	82.9	13.9	75.2	14.6	93.2	19.7
29	37.3	29.8	33.6	78.7	55.7	67.2	5.9	5.3	0.0	0	98.3	22.9	99.1	27.4	98.3	30.4	98.3	27.6
30	37.2	28.8	33.0	79.9	58.6	69.3	5.9	4.1	0.0	0	99.1	31.7	99.1	33.6	100.0	37.7	100.0	31.8
31	35.3	27.1	31.2	85.1	64.9	75.0	5.7	4.3	58.0	4	100.0	41.2	100.0	41.6	100.0	52.2	100.0	46.9
32	33.5	26.9	30.2	86.6	67.6	77.1	6.5	5.0	12.7	2	100.0	46.1	100.0	48.2	100.0	55.7	100.0	47.6
33	34.3	27.0	30.7	87.7	71.3	79.5	4.2	4.1	67.4	2	100.0	46.6	100.0	49.9	100.0	54.7	100.0	48.4
34	34.5	26.7	30.6	85.7	65.6	75.7	2.4	6.3	21.6	3	100.0	51.3	100.0	54.4	100.0	56.5	100.0	54.5
35	32.9	24.9	28.9	89.0	70.7	79.9	5.4	6.7	17.4	3	100.0	51.3	100.0	56.7	100.0	59.1	100.0	53.5
36	33.1	24.5	28.8	91.0	63.9	77.5	3.1	7.4	35.5	2	100.0	54.0	100.0	57.8	100.0	63.5	100.0	56.5
37	34.1	24.7	29.4	86.4	63.0	74.7	3.2	7.0	9.6	1	100.0	55.3	100.0	59.9	100.0	62.0	100.0	60.7
38	33.4	23.7	28.6	88.3	61.1	74.7	1.9	7.5	14.4	2	100.0	57.5	100.0	67.1	100.0	63.1	100.0	58.8
39	33.5	24.7	29.1	88.3	65.6	77.0	3.3	4.8	0.0	0	100.0	59.3	100.0	61.4	100.0	66.39	100.0	60.0

Table 13b: Correlation coefficient between weather parameters and CLCuD of cotton (Cv F 846) RRS, PAU Faridkot (Punjab)

Sr.No	Weather parameters	Correlation coefficient	
		CLCuD (DI)	CLCuD PDI
1.	Maximum temperature (°C)	-0.81	-0.45
2.	Minimum temperature (°C)	-0.66	-0.49
3.	Mean temperature (°C)	-0.78	-0.47
4.	Maximum relative humidity (%)	0.82	-0.13
5.	Minimum relative humidity (%)	0.72	-0.08
6.	Mean relative humidity (%)	0.78	-0.11
7.	Rainfall (mm)	0.13	0.02
8.	Rainy days (#)	0.22	0.07
9.	Sunshine (hour)	0.32	0.09

Table 14a: Disease progress in relation to weather factors at ARS SKRAU, Sriganganagar (Rajasthan) (HS-6)

SMW	Date of Observation	Disease incidence (%)	PDI (%)	Whitefly/3 leaves	Meteorological data				
					Rainfall (mm)	Temperature (°C)		RH (%)	
						Max	Min	Morning	Evening
21	24.05.24	0.1	0.03	2.4	0.0	45.0	28.2	52.6	39.9
22	03.06.24	2.0	6.7	4.7	0.0	46.0	29.8	56.4	46.4
23	09.06.24	5.4	17.5	9.1	9.6	41.6	25.8	66.0	53.1
24	16.06.24	31.7	20.4	9.4	0.0	44.5	28.1	53.6	47.7
25	23.06.24	57.4	24.8	8.1	36.5	39.1	28.7	70.6	57.6
26	01.07.24	88.6	36.5	18.8	13.5	41.5	31.4	69.1	56.3
27	07.07.24	100.0	42.3	22.9	96.7	39.2	29.5	75.0	63.1

Table 14b: Correlation values between weather parameters and CLCuD of cotton ARS Sriganganagar

S.No	Weather parameters	Correlation coefficient (r)		
		Disease incidence (%)	PDI (%)	Whitefly/3 leaves
1.	Rainfall (mm)	0.75	0.74	0.74
2.	Maximum temperature (°C)	-0.75	-0.79	-0.66
3.	Minimum temperature (°C)	0.60	0.41	0.45
4.	Morning relative humidity (%)	0.79	0.84	0.77
5.	Evening relative humidity (%)	0.84	0.92	0.84
6.	Whitefly	0.91	0.96	

Table 15a: Disease progress in relation to weather factors at HAU, Hisar (Haryana) (Cultivar HS-6)

SMW	Period	Rainy days (No.)	Rainfall (mm)	Temp. (^{0}C)		RH (%)		Sunshine (Hr)	Wind speed Km/h	WF/ 3 leaves	CLCuD (%)		
				Max.	Min.	Morn	Even				Incidence	Change	PDI
18	30.4.24 – 06.5.24	0	0.0	36.3	17.7	57	14	9.5	4.5	0.0	0.0	0.0	0.0
19	07.5.24 – 13.5.24	0	0.0	40.0	24.8	56	24	8.9	6.8	0.0	0.0	0.0	0.0
20	14.5.24–20.5.24	0	0.0	42.6	24.2	52	17	9.6	3.6	0.0	0.0	0.0	0.0
21	21.5.24 – 27.5.24	0	0.0	44.3	28.4	52	19	9.4	6.9	0.0	0.0	0.0	0.0
22	28.5.24 – 03.6.24	1	9.0	45.6	25.9	42	15	9.1	6.2	0.0	0.0	0.0	0.0
24	04.6.24 - 10.6.24	0	2.2	41.6	25.7	52	22	8.5	7.4	0.0	0.0	0.0	0.0
24	11.6.24 - 17.6.24	0	0.0	43.7	28.2	42	19	10.2	6.7	0.0	0.0	0.0	0.0
25	18.6.24 - 24.6.24	1	25.2	40.5	28.4	66	40	6.6	7.8	0.0	0.0	0.0	0.0
26	25.6.24 - 01.7.24	1	52.4	37.8	27.8	79	54	4.4	7.3	0.0	0.0	0.0	0.0
27	02.7.24 - 08.7.24	3	43.4	33.9	27.2	88	71	2.1	6.5	2.5	0.0	0.0	0.0
28	09.7.24 - 15.7.24	0	0.0	36.2	27.5	83	56	6.7	5.2	3.8	2.1	2.1	0.2
29	16.7.24 - 22.7.24	0	1.2	37.8	28.7	85	60	6.2	6.8	5.7	3.7	1.5	0.5
30	23.7.24 - 29.7.24	1	8.0	37.6	28.8	83	56	4.3	4.8	11.3	6.5	2.9	1.3
31	30.7.24 - 05.8.24	2	71.0	35.5	28	87	68	5	7.1	13.2	11.3	4.7	2.3
32	06.8.24 - 12.8.24	4	143.8	33.4	26.7	93	75	5.7	6.8	17.3	16.4	5.1	4.3
33	13.8.24- 19.8.24	1	24.4	33.5	27.3	93	70	5.5	3.8	19.2	22.2	5.9	5.4
34	20.8.24 - 26.8.24	2	9.0	34.5	27.2	87	66	6.6	4.2	12.3	24.4	1.2	7.4
35	27.8.24 - 02.9.24	2	29.2	33.0	26.2	94	72	5.2	5.2	9.3	24.7	1.2	10.3
36	03.9.24 - 09.9.24	2	46.1	31.7	25.7	93	83	2.4	3.4	5.3	25.2	0.5	12.4
37	10.9.24 - 16.9.24	1	19.6	33.9	25	92	63	5.3	4.6	7.3	26.2	1.0	15.4
38	17.9.24 - 23.9.24	0	0.0	34.1	24.4	92	60	5.7	3.6	5.2	26.8	0.6	18.4
39	24.9.24 - 30.9.24	0	0.0	35.0	25.2	89	56	6.1	5.2	4.4	27.1	0.4	19.3
40	01.10.2 -07.10.24	0	0.0	37.1	24	90	38	7.9	3.7	5.2	27.5	1.7	20.3
41	08.10.24 -14.10.24	0	0.0	34.5	18.8	89	32	7.9	3.1	6.2	28.2	0.7	22.2
42	15.10.24 - 21.10.24	0	0.0	35.9	17.7	84	28	7.6	2.3	3.2	29.7	1.5	24.4

Table 15b: Correlation values between weather parameters and CLCuD of cotton HAU Hisar (Variety HS-6)

S.No	Weather parameters	Correlation coefficient		
		Disease incidence (%)	PDI (%)	Whitefly/3 leaves
1	Rainy Days	0.12	-0.15	0.56
2	Rainfall (mm)	0.05	-0.15	0.52
3	Maximum temperature (°C)	-0.70	-0.52	-0.63
4	Minimum temperature (°C)	-0.37	-0.56	0.20
5	Morning relative humidity (%)	0.74	0.57	0.68
6	Evening relative humidity (%)	0.46	0.18	0.70
7	Sunshine (Hr)	-0.31	-0.13	-0.46
8	Wind Speed (Km/h)	-0.70	-0.72	-0.23
9	Whitefly/3 leaves	0.53	0.20	

Table 16a: Disease progress in relation to weather factors at CICR-RS, Sirsa (Haryana) (Cultivar HS-6)

SMW	Temp. (^{0}C)			Degree Days	GDD	RH (%)		Rainfall (mm)	Rainy days	CLCuD			WF/3 leaves
										Incidence (%)	Grade	PDI (%)	
	Max	Min	Mean			Max	Min						
23	44.0	27.6	35.8	20.3	20.3	49.1	27.0	3.5	1.0	0.0	0.0	0.0	0.5
24	46.7	29.4	38.1	22.6	42.9	44.1	23.4	0.0	0.0	0.6	0.01	0.2	3.0
25	43.1	29.0	36.1	20.6	63.4	67.3	29.7	5.2	1.0	5.1	0.1	0.8	3.3
26	38.4	29.0	33.7	18.2	81.6	69.6	48.0	0.0	0.0	12.5	0.1	2.1	3.9
27	35.3	26.9	31.1	15.6	97.2	84.9	59.9	78.5	2.0	17.3	0.2	3.1	7.5
28	37.6	28.3	33.0	17.5	114.7	72.9	52.4	0.0	0.0	27.5	0.4	6.9	24.0
29	39.2	28.7	34.0	18.5	133.1	67.3	49.1	17.0	1.0	66.6	1.1	17.6	15.6
30	39.2	28.2	33.7	18.2	151.3	71.3	48.9	10.5	1.0	89.1	1.6	26.2	12.2
31	32.1	27.5	29.8	14.3	165.6	79.1	59.6	21.0	1.0	99.2	2.1	35.3	12.8
32	35.1	26.6	30.9	15.4	181.0	79.7	63.7	5.0	1.0	99.8	2.5	40.8	13.9
33	36.2	27.2	31.7	16.2	197.2	73.4	60.3	32.4	2.0	99.8	2.9	48.4	13.7

34	36.2	26.7	31.5	16.0	213.1	65.4	60.0	9.4	1.0	99.8	3.5	59.1	14.5
35	34.4	26.1	30.3	14.8	227.9	79.3	67.4	18.2	2.0	99.8	3.9	64.6	16.6
36	34.5	25.3	29.9	14.4	242.3	76.7	64.9	0.0	0.0	100.0	4.3	71.8	12.9
37	34.5	24.4	29.5	14.0	256.2	77.1	60.1	0.0	0.0	100.0	4.6	77.0	12.6
38	36.1	24.3	30.2	14.7	270.9	79.1	62.7	0.0	0.0	100.0	4.7	77.9	12.3
39	35.7	24.3	30.0	14.5	285.4	75.9	59.9	0.0	0.0	100.0	4.8	79.6	11.4
40	36.6	22.1	29.4	13.9	299.3	66.9	42.4	0.0	0.0	100.0	4.8	79.7	11.1
41	34.4	19.7	27.1	11.6	310.8	66.7	37.9	0.0	0.0	100.0	4.8	80.0	10.5

Table 16b: Correlation values between weather parameters and CLCuD of cotton CICR RS, Sirsa

S.No	Weather parameters	Correlation coefficient (r)		
		Disease incidence (%)	PDI (%)	Whitefly/3 leaves
1.	Max Temp	-0.77	-0.66	-0.60
2.	Min Temp	-0.61	-0.84	-0.16
3.	Mean temp	-0.80	-0.83	-0.48
4.	Max RH	0.53	0.39	0.54
5.	Min RH	0.67	0.51	0.66
6.	Rainfall	-0.13	-0.28	-0.01
7.	Rainy days	-0.01	-0.26	0.04

CENTRAL ZONE

Table 17a: Disease progress in relation to weather factors at CRS NAU, Nanded (Maharashtra)

Met. Week	Week period	Rainfall (mm)	No. of rainy days	Temp ^{O}c		Relative Humidity		RCH2 BG II				LRA5166				PA255
				Max	Min	B.N.	A.N	BLB	ALS	GM	Para wilt	TSV	BLB	ALS	GM	GM
29	16 –22 July	129.6	7	30.2	23.9	86.4	79.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	23 – 29 July	92.4	5	29.6	24.2	82.6	67.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	30 –5 August	93.6	6	30.2	20.9	81.5	70.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	6 –12 August	94.4	2	30.4	24.6	79.1	64.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	13 –19 August	4.0	1	32.1	24.7	70.6	58.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34	20 – 26 August	63.6	3	31.0	24.6	75.6	72.7	0.5	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
35	27 –2 September	262.0	4	31.1	23.4	67.6	60.9	0.5	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
36	3 – 9 September	55.0	4	32.0	25.3	69.4	65.1	0.5	0.5	0.5	0.0	0.0	0.5	0.5	0.0	0.0
37	10 –16 September	0.0	0	32.6	22.4	60.0	55.3	0.5	0.5	0.5	0.0	0.0	0.5	0.5	0.0	0.5
38	17- 23 September	37.6	2	33.0	22.0	65.3	57.9	0.5	1.5	2.5	0.0	5.5	3.0	1.0	0.5	0.0
39	24 – 30 September	26.6	3	33.0	22.1	61.3	59.0	1.0	3.0	3.0	0.0	0.0	4.3	5.0	1.3	0.0
40	1 – 7 October	2.0	0	33.0	20.6	74.3	64.9	1.5	4.0	4.0	0.0	0.0	5.0	5.5	2.3	0.5
41	8 – 14 October	32.2	2	33.0	21.6	74.3	68.7	5.0	5.0	5.0	0.0	0.0	5.0	7.0	3.0	1.0
42	15 –21 October	72.0	1	33.4	22.4	65.9	61.9	5.0	6.0	5.5	0.0	0.0	5.0	8.5	4.3	0.5
43	22 – 28 October	0.0	0	33.1	21.3	77.1	63.1	7.0	7.5	6.5	0.0	0.0	6.3	9.5	5.0	0.5
44	29 Oct 4 November	0.0	0	32.6	21.1	75.1	62.0	9.0	10.0	8.3	0.0	0.0	7.0	12.3	7.0	0.5
45	5 – 11 November	0.0	0	32.7	17.7	82.6	63.0	12.3	11.0	9.0	0.0	0.0	8.0	15.5	8.0	0.5
46	12 – 18 November	0.0	0	32.3	17.3	84.6	61.9	14.0	13.3	11.5	0.0	0.0	10.3	17.3	13.2	0.5
47	19 –25 November	0.0	0	29.9	14.4	70.3	47.0	14.5	15.5	13.0	0.0	0.0	11.5	18.0	15.5	0.5
48	26 Nov - 2 Dec.	0.0	0	29.3	12.4	71.1	47.4	15.0	18.2	15.5	0.0	0.0	12.3	17.0	25.0	0.5
49	3 - 9 December	7.6	1	30.7	17.4	62.7	50.9	15.0	18.0	17.0	0.0	0.0	12.0	15.5	25.0	0.5
50	10-16 December	0.0	0	30.3	14.3	68.4	42.0	15.0	17.5	18.0	0.0	0.0	12.0	15.5	27.3	0.5
51	17-23 December	0.0	0	30.1	16.7	52.4	37.4	10.0	17.8	25.0	0.0	0.0	11.0	14.0	27.0	0.0
52	24-31 December	1.4	0	29.5	16.4	54.8	45.1	10.0	13.2	27.3	0.0	0.0	9.3	9.3	27.0	0.0

Table 17b: Correlation values between weather parameters and diseases of cotton Nanded

Weather Parameters	Correlation coefficient (r)								
	RCH 2 BG II				LRA 5166				PA 255
	BLB	ALS	GM	Para wilt	BLB	ALS	GM	Para wilt	GM
Rainfall (mm)	-0.545	-0.569	-0.516	0.610	-0.010	-0.613	-0.590	-0.477	-0.457
Temp. Maximum (^{0}C)	-0.24	-0.295	-0.382	-0.092	0.236	-0.180	-0.104	-0.488	0.367
Temp. Minimum (^{0}C)	-0.906	-0.925	-0.84	0.289	0.086	-0.926	-0.884	-0.885	-0.431
Morning RH (%)	-0.142	-0.311	-0.506	0.008	-0.141	-0.299	-0.133	-0.447	0.103
Evening RH (%)	-0.649	-0.761	-0.813	0.224	-0.032	-0.731	-0.616	-0.828	-0.114

Table 18a: Disease progress in relation to weather factors at PDKV, Akola (Maharashtra)

SMW	Period	Rainy days	Rainfall (mm)	Temperature		Relative humidity		Sunshine hours	Wind speed (km/H)	LRA-5166 (PDI)			Bhakti Bt. (PDI)		
				Max.	Min.	Morn.	Eve.	BSH		BLB	ALB	GM	BLB	ALB	GM
33	13-19 Aug	0	1.4	31.5	20.4	84	61	4.4	8.8						
34	20-26 Aug	4	120.2	31.4	19.6	85	69	2.9	5.3						
35	27-2 Sep	3	30.1	31.1	19.8	85	67	1.9	6.4						
36	3-9 Sept	3	59.5	29.6	19.4	88	71	4.1	5.4	0.3			3.9		
37	10-16 Sept	1	5.5	30.2	19.9	85	63	4.9	4.4	3.9			7.8	3.9	
38	17-23 Sept	0	2.4	32.4	19.6	84	56	6	6.1	5.0	5.8	2.2	3.9	8.3	
39	24-30 Sept	2	30.9	31.5	19.7	84	65	3.6	8.5	5.0	6.1	3.9	5.0	13.8	3.8
40	1-7 Oct	0	0	33.9	19.6	85	50	6.8	2.4	12.7	9.2	14.2	5.0	13.9	3.9
41	8-14 Oct	3	25	33.3	18.7	87	56	6.7	1.8	13.9	11.3	17.5	13.9	16.3	5.0
42	15-21 Oct	1	65	33.3	18.6	85	53	6.3	2.9	16.7	15.0	13.3	12.7	18.9	7.8
43	22-28 Oct	0	0	32.9	16.5	84	47	7.4	0.9	15.3	16.7	9.2	18.9	12.5	11.3
44	29-4 Nov	0	0	33.6	14.8	81	40	8.2	0.6	14.2	8.3	8.3	15.6	8.3	6.1
45	5-11 Nov	0	0	32.2	13.8	81	41	7	0.5	11.7	5.0	3.9	15.6		3.9
46	12-18 Nov	0	0	31.3	12.6	80	40	8.3	0.8				13.9		
47	19-25 Nov	0	0	29.4	9.3	81	38	7.1	1.6						
48	26-2 Dec	0	0	29	9.4	81	39	7.2	0.8						

Table 19a: Disease progress in relation to weather factors at NAU, Surat (Gujarat)

SMW	Period	Weather parameter, 2024							
		Temperature (^{0}C)		Humidity (%)		Sunshine hour	Rain fall (mm)	Rainy days	BLB
		Max	Min	Morning	Evening				PDI (%)
25	17/06/24	33.1	27.9	74	65	1.2	34	1	0.0
26	24/06/24	30.7	27.0	92	94	1.1	101	5	0.0
27	01/07/24	29.3	24.4	88	89	2.1	186	5	0.0
28	08/07/24	29.1	25.4	86	81	2.2	60	4	0.0
29	15/07/24	30	25.3	84	80	1.2	123	4	0.0
30	22/07/24	29.3	24.7	90	85	1.3	272	5	**2.0**
31	29/07/24	30.9	26.7	80	75	1.6	28	3	5.5
32	05/08/24	29.9	27.3	75	68	1.2	18	4	9.0
33	12/08/24	29.3	26.7	78	69	3.1	20	2	10.5
34	19/08/24	27.6	25.4	88	83	1.6	126	3	12.5
35	26/08/24	29.9	27.3	87	82	2.4	59	3	13.5
36	02/09/24	28.4	25.7	81	78	3.9	76	6	23.5
37	09/09/24	28.4	25.6	80	75	5.9	57	2	25.5
38	16/09/24	29.9	26.0	75	70	7.1	0	0	27.0
39	23/09/24	27.1	26.0	88	81	2.4	119	4	31.5
40	30/09/24	32.5	25.6	69	62	8.3	0	0	36.0
41	07/10/24	33.4	23.8	67	61	5.8	39	2	42.0
42	14/10/24	35.3	25.1	62	56	5.7	17	1	**46.5**
43	21/10/24	35.4	23.6	55	47	7.6	0	0	39.5
44	29/10/24	37.6	22.7	49	43	8.1	0	0	35.5
45	04/11/27	35	21.6	55	45	7.1	0	0	33.5
46	12/11/24	33.3	21.6	57	48	8	0	0	30.5
47	18/11/24	31.1	19.9	55.5	45	8.6	0	0	27.0
48	25/11/24	30.9	19.6	55	45	7.6	0	0	22.5
49	02/12/24	30	16.7	58	49	5.1	0	0	17.5
50	09/12/24	29.6	15.6	58	49	3.9	0	0	14.5
51	16/12/24	28.6	16.3	58	49	3.7	0	0	8.50

Table 19b: Correlation values between weather parameters and bacterial blight of cotton at MCRS, Surat

Factors	Temperature		Relative Humidity		Sunshine hour	Rain fall	Rainy days
	Max	Min	Morning	Evening			
Correlation matrix	**0.5618**	**-0.1652**	**-0.5939**	**-0.5776**	**0.8074**	**-0.4864**	**-0.5364**

*Significant at 5 % (r=0.381) and ** 1% (r=0.487) level of significance at n-2 degree of freedom

Table 20a: Disease progress in relation to weather factors at JAU, Junagarh (Gujarat)

SMW	Period	Rainy days	Rainfall in mm	Temperature ^{0}C		R. Humidity %		Sunshine hours (BSH)	Wind speed (km/hr)	LRA-5166, RCH-2 BG II			
				Max.	Min.	Morn.	Even.			ALS	BLB	GM	CoLS
30	23-07-24 to 29-07-24	4.0	184.6	29.40	25.80	94	89	0.0	9.1	0.0	1.0	0.0	0.0
31	30-07-24 to 05-08-24	5.0	56.1	30.30	25.10	93	86	0.2	8.9	0.0	6.0	0.0	0.0
32	06-08-24 to 12-08-24	4.0	19.7	30.75	24.75	94	82	0.3	8.0	0.0	13.5	0.0	0.0
33	13-08-24 to 19-08-24	4.0	30.4	31.72	24.61	94	78	1.3	5.5	0.0	20.5	0.0	0.0
34	20-08-24 to 26-08-24	3.0	64.1	32.83	24.88	92	78	4.0	4.5	0.0	34.0	0.0	0.0
35	27-08-24 to 02-08-24	4.0	274.3	29.20	23.91	95	86	1.5	11.1	0.0	32.5	0.0	0.0
36	03-09-24 to 09-09-24	2.0	11.4	31.50	24.40	90	77	3.6	4.6	0.0	1.0	0.0	0.0
37	10-09-24 to 16-09-24	2.0	5.6	32.10	24.60	89	62	7.5	5.8	0.0	2.5	0.0	0.0
38	17-09-24 to 23-09-24	0.0	0.0	33.40	23.80	87	57	8.6	4.3	0.0	2.0	0.0	0.0
39	29-09-24 to 30-09-24	5.0	250.5	30.70	23.60	96	79	1.8	4.1	0.0	3.5	0.0	10.0
40	01-10-24 to 07-10-24	0.0	0.0	33.70	25.00	86	62	8.2	3.7	0.0	4.0	0.0	13.5
41	08-10-24 to 14-10-24	2.0	13.6	34.00	24.80	86	61	3.3	3.2	0.0	15.5	2.0	27.5
42	15-10-24 to 21-10-24	3.0	57.4	34.00	24.80	87	71	3.3	3.0	0.0	12.5	8.0	25.0
43	22-10-24 to 28-10-24	2.0	17.5	34.70	22.40	85	46	8.6	2.6	0.0	30.0	13.5	36.5
44	29-10-24 to 04-11-24	0.0	0.0	36.00	20.00	82	34	9.3	2.7	0.0	37.0	28.0	**53.5**
45	05-11-24 to 11-11-24	0.0	0.0	35.20	19.80	82	34	8.8	2.8	3.0	**42.0**	54.5	41.0
46	12-11-24 to 18-11-24	0.0	0.0	33.80	17.00	82	30	8.3	2.3	12.5	9.5	58.0	7.5

47	19-11-24 to 25-11-24	0.0	0.0	31.10	19.40	83	29	8.8	2.5	14	6	**59.0**	2.0
48	26-11-24 to 02-12-24	0.0	2.0	30.70	13.60	74	28	8.8	2.9	34	6.5	26.5	0.5
49	03-12-24 to 09-12-24	0.0	0.0	31.10	17.30	65	31	7.7	4.6	**54.5**	6.5	29.0	0.0
50	10-12-24 to 16-12-24	0.0	0.0	28.30	15.10	66	30	9.3	5.8	25.5	1	23.0	0.0
51	17-12-24 to 23-12-24	0.0	0.0	27.60	12.10	74	33	6.8	5.0	35	2.5	17.5	0.0
52	24-12-24 to 31-12-24	0.0	0.0	26.10	12.50	80	46	3.8	6.3	41.5	0.5	7.0	0.0

Table20b: Correlation values between weather parameters and BLB, ALB, Corynespora leaf spot, Grey mildew diseases of cotton Junagarh

Sr. No.	Diseases	Correlation coefficient (r)						
		Rainfall	Temperature ^{0}C		R. Humidity		Sunshine hours/BSH	Wind Speed
			Max.	Min.	Morn.	Even.		
1	Bacterial leaf blight	0.1032	0.5482*	0.1918	0.1904	0.0001	0.0655	-0.1216
2	Alternaria leaf spots	-0.5918	-0.6373	-0.5913	-0.6730	0.2562	-0.5055	0.6343
3	Grey mildew	-0.4540	0.2351	-0.1183	-0.0287	-0.6677*	0.6637	-0.4462
4	Corynespora leaf spot	-0.1301	0.8905**	0.3729	0.2932	0.0888	0.0826	-0.3577

Table 21a: Disease progress in relation to weather factors at Khandwa

Met. Week	Period	Rainfall in mm	Temperature ^{0}C		R. Humidity %		BLB		ALB		GM		CoLS	
			Max.	Min.	Morn.	Even.	Max. grade	PDI	Max. grade	PDI	Max. grade	PDI	Max. grade	PDI
30	23-29 July	42.5	27.1	25.1	98	84		-		-	-	-		
31	30 July to 5 August	71.5	29.9	24.8	99	67		-		-	-	-		Traces
32	6-12 August	51	28.3	24.5	99	72	1	Traces		-	-	-	1	2.5
33	13-19 August	1	34.1	25.4	100	39	1	Traces		-	-	-	1	2.5
34	20-26 August	82.5	31.9	24.5	100	51	1	2.5		-	-	-	2	7.5
35	27 August to 2 Sept	91	31.8	23.9	100	50	2	7.5		-	-	-	2	10.0
36	3-9 September	56	31.5	24.5	99	48	1	5.5		-	-	-	2	10.5

37	10-16 September	1.5	31.0	23.9	92	41	1	5.00		-	-	-	3	12.5
38	17-23 September	0.5	34.2	24.6	90	29	0	-		-	-	Traces	2	10.8
39	24-30 September	98.5	32.7	24.5	100	23	1	2.67		-	1	7.6	2	10.4
40	1-7 Oct.	0	35.6	24.5	81	10	1	Traces		-	1	8.5	3	15.7
41	8-14 Oct.	44	34.2	22.9	100	16	0	Traces	1	Traces	1	12.1	2	12.5
42	15-21 Oct.	5.5	34.3	23.4	100	13	0	-	1	Traces	2	12.3	3	**18.5**
43	22-28 Oct.	22.5	34.8	20.1	100	13	0	-	1	5.0	2	17.3	3	15.3
44	29 Oct. To 4 Nov.	0	36.1	18.1	100	9	0	-	1	5.3	3	18.8	3	15.7
45	5-11 Nov.	0	34.4	16.6	100	9	0	-	2	8.0	3	**20.0**	3	12.3
46	12-18 Nov.	0	32.5	14.9	100	9	0	-	2	8.0	3	10.2	3	12.0
47	19-25 Nov.	0	29.6	13.2	100	8	0	-	1	10.6	1	7.6	3	10.0
48	26 Nov. To 2 Dec.	0	28.6	11.7	100	8	0	-	2	12.5	1	0.0	3	15.0
49	3 - 9 Dec.	0	30.2	16.9	100	8	0	-	2	12.6	0	0.0	3	15.8
50	10-16 Dec	0	26.7	8.1	100	8	0		2	10.0	0	0.0	3	10.0
51	17-23 Dec	0	29.2	10.5	100	8	0		2	10.0	0	0.0	3	10.0

Table 21b: Correlation values between weather parameters and BLB, ALS, Grey mildew diseases of cotton at Khandwa

Sr. No.	Diseases	Correlation coefficient (r)				
		Rainfall	Temperature ^{0}C		R. Humidity	
			Max.	Min.	Morn.	Even.
1	Bacterial leaf blight (BLB)	0.546	-0.016	0.352	-0.006	0.339
2	Alternaria leaf spots (ALS)	-0.562	-0.326	-0.931	0.328	-0.651
3	Grey mildew (GM)	-0.237	0.676	-0.111	0.083	-0.529
4	Coryenospora Leaf Spot (CoLS)	-0.434	0.486	-0.325	-0.161	-0.809

SOUTH ZONE

Table 22a: Disease progress in relation to weather factors at UAS, Dharwad (Karnataka)

Met. Week	Period	Rainy days	Rainfall (mm)	Temperature ^{0}C		R. Humidity %		V1Abhaditha				V2 Jayadhar				V3 MRC-7373 Bt				V4 KCH-144 Bt			
				Max.	Min.	Morn.	Evn.	AB	BLB	GM	Rust	AB	BLB	GM	Rust	AB	BLB	GM	Rust	AB	BLB	GM	Rust
31	29 Jul - 4 Aug	5	73.6	26.2	20.6	92.7	87.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	5 - 11 Aug	1	4.0	27.3	20.3	89.9	81.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	12 - 18 Aug	4	50.6	30.7	20.9	89.3	68.1	**9.8**	0.0	0.0	0.0	**8.5**	0.0	0.0	0.0	5.8	0.0	0.0	0.0	4.0	0.0	0.0	0.0
34	19 - 25 Aug	4	36.4	28.1	20.9	92.4	82.1	11.5	0.0	0.0	0.0	10.3	0.0	0.0	0.0	8.8	0.0	0.0	0.0	6.5	0.0	0.0	0.0
35	26 Aug - 01 Sep	4	24.8	26.7	20.4	91.0	85.0	13.3	0.0	0.0	0.0	11.8	0.0	0.0	0.0	11.5	0.0	0.0	0.0	8.5	0.0	0.0	0.0
36	2 - 8 Sep	1	14.6	27.9	20.5	87.3	81.7	14.8	0.0	0.0	0.0	13.8	0.0	0.0	0.0	13.3	0.0	0.0	0.0	9.3	0.0	0.0	0.0
37	9 - 15 Sep	1	6.6	28.6	19.5	88.3	74.7	27.8	**4.3**	0.0	0.0	15.3	0.0	**7.0**	0.0	14.5	0.0	0.0	0.0	12.0	**4.5**	0.0	0.0
38	16 - 22 Sep	1	14.2	29.5	19.3	88.7	57.4	19.0	6.0	6.3	0.0	18.3	0.0	9.3	0.0	16.3	0.0	**7.8**	0.0	14.0	6.5	8.3	0.0
39	23 - 29 Sep	2	39.4	28.4	19.2	87.9	54.7	22.8	7.3	8.8	0.0	22.5	0.0	19.5	0.0	18.0	0.0	8.8	0.0	15.3	9.8	10.8	0.0
40	30 - 6 Oct	2	7.6	31.7	20.5	85.1	71.4	23.5	9.3	11.0	0.0	24.3	0.0	24.0	0.0	21.8	0.0	10.3	0.0	19.8	10.0	11.0	0.0
41	7 - 13 Oct	5	127.0	30.4	20.3	88.3	77.7	28.8	11.0	12.0	0.0	29.5	0.0	37.0	0.0	23.3	0.0	12.5	0.0	22.0	11.0	13.8	0.0
42	14 - 20 Oct	3	60.2	28.3	20.9	91.9	74.3	25.5	13.0	14.8	0.0	32.8	0.0	46.3	0.0	25.3	0.0	14.8	0.0	25.3	13.5	15.0	0.0
43	21 - 27 Oct	2	15.4	29.9	20.1	86.3	60.4	36.5	07.0	19.0	0.0	35.5	0.0	**50.1**	0.0	27.8	0.0	15.5	0.0	27.8	15.0	17.8	0.0
44	28 Oct - 3 Nov	1	10.0	30.9	19.9	86.3	58.9	**42.8**	10.0	18.3	0.0	41.8	0.0	47.5	0.0	21.5	0.0	16.3	0.0	22.5	18.0	19.0	0.0
45	4 - 10 Nov	0	0.0	30.7	16.8	68.1	49.9	28.3	12.8	16.5	**5.3**	29.5	0.0	47.5	6.5	29.3	0.0	15.0	8.5	26.8	**18.3**	15.5	9.6
46	11 - 17 Nov	0	0.0	30.0	18.2	76.6	49.6	21.3	10.5	11.5	10.6	32.8	0.0	60.3	11.6	24.0	0.0	13.0	12.5	22.3	17.3	12.8	12.5

AB=Alternaria leaf spot, BLB= Bacterial leaf blight, GM= Grey mildew

Path– 22b: Correlation values between weather parameters and cotton foliar diseases at UAS, Dharwad

Weather parameters	Correlation coefficient (r) values															
	V1Abhaditha				V2 Jayadhar			V3 MRC-7373 Bt				V4 KCH-144 Bt				
	AB	BB	GM	Rust	AB	GM	Rust	AB	BB	GM	Rust	AB	BB	GM	Rust	
Max. Temp	0.872	0.765	0.853	0.622	0.838	0.776	0.621	0.855	0.799	0.833	0.627	0.836	0.833	0.823	0.626	
Min. Temp	-0.673	-0.600	-0.628	-0.718	-0.646	-0.614	-0.723	-0.633	-0.577	-0.613	-0.715	-0.659	-0.642	-0.600	-0.718	
RH Morning (%)	-0.763	-0.660	-0.715	-0.666	-0.717	-0.674	-0.668	-0.719	-0.618	-0.695	-0.668	-0.743	-0.715	-0.683	-0.670	
RH Evening (%)	-0.843	-0.731	-0.805	-0.613	-0.798	-0.747	-0.614	-0.805	-0.731	-0.792	-0.614	-0.815	-0.797	-0.786	-0.615	
Total Rainfall	-0.464	-0.394	-0.462	-0.332	-0.449	-0.415	-0.334	-0.433	-0.431	-0.470	-0.339	-0.457	-0.477	-0.456	-0.340	
Rainy Days	-0.673	-0.630	-0.656	-0.353	-0.662	-0.634	-0.354	-0.654	-0.781	-0.645	-0.359	-0.663	-0.656	-0.641	-0.360	

r' Values: * Significant at 5% 0.482, ** Significant at 1% 0.606

Table 23a: Disease progress in relation to weather factors (weekly observations) at RARS, Lam Guntur (Andhra Pradesh)

Met. Week	Period	Rainfall (mm)	Rainy days	Temperature ^{0}C		R. Humidity%		Sunshine hours BSH	Wind speed (km/H)	Evaporation
				Max.	Min.	Morn./I	Even./II			
35	27-02 SEP	322.0	3	31.0	25.4	99	72	2.7	9.7	2.5
36	03-09	60.6	6	29.6	25.0	100	81	0.4	7.6	0.0
37	10-16	0.0	0	33.9	26.9	99	49	4.1	7.0	4.4
38	17-23	7.6	2	34.7	26.9	98	47	6.4	7.5	7.6
39	24-30	68.6	5	32.4	26.4	98	88	2.9	5.7	2.6
40	01-07 OCT	10.2	1	34.7	26.3	98	59	7.0	5.2	6.4
41	08-14	30.0	4	31.4	25.3	99	70	2.9	4.3	1.3
42	15-21	81.2	5	29.9	25.1	99	70	0.9	4.0	0.0
43	22-28	4.0	1	33.7	24.4	98	67	4.4	4.3	4.7
44	29-04 NOV	0.0	0	33.3	23.4	98	67	4.5	4.2	3.9
45	05-11	0.0	0	33.9	23.1	98	66	4.7	4.1	4.0
46	12-18	1.2	0	31.1	22.7	98	66	4.3	3.7	2.6
47	19-25	0.0	0	30.7	20.4	98	68	2.6	3.5	2.9
48	26-02 DEC	7.4	1	29.0	20.0	99	84	2.1	4.1	1.5
49	03-09	2.6	1	31.6	21.3	98	62	3.9	5.4	3.1
50	10-16	0.0	0	31.0	19.7	99	65	3.6	4.8	3.3
51	17-23	1.2	0	29.6	19.7	99	75	1.8	4.8	1.9
52	24-31	11.6	1.0	29.9	19.6	99.5	74.3	2.5	4.0	2.5
1	01-07 JAN	0.0	0	30.3	19.0	99	67	4.8	3.9	2.7
2	08-14	0.0	0	30.7	19.2	99	68	6.0	4.2	4.3
3	15-21	0.0	0	31.3	19.0	98	68	6.9	4.3	4.3
4	22-28	0.0	0	32.1	19.1	99	68	6.9	3.8	4.6
5	29-04 FEB	0.0	0	33.4	19.3	99	67	7.7	3.3	5.7

Table 23b: Disease progress in relation to weather factors (weekly observations) at RARS, Lam Guntur (Andhra Pradesh)

Met. Week	Period	Corynespora leaf spot				Grey mildew				Rust			
		NDLH 1938	Siri	L 1060	Akira	NDLH 1938	Siri	L 1060	Akira	NDLH 1938	Siri	L 1060	Akira
35	27Aug-2Sept	0.00	0.00	0.00	0.00								
36	3-9 Sept	0.00	0.00	0.00	0.00								
37	10-16	0.00	0.00	0.00	0.00								
38	17-23	0.00	0.00	0.00	0.00								
39	24-30Sept	0.00	0.00	0.00	0.00								
40	Oct.1-7	**1.50**	0.00	**2.25**	**2.00**								
41	8-14	3.00	0.86	3.00	2.50								
42	15-21	4.75	1.38	5.50	3.00	**0.75**	**1.00**	**1.25**	**1.00**				
43	22-28	9.25	6.50	11.00	4.75	2.75	2.50	1.50	3.50				
44	29Oct-4 Nov	11.00	11.75	12.30	8.50	4.75	4.25	2.75	5.60				
45	5-11	20.25	17.00	19.25	14.50	5.50	5.00	4.00	7.50				
46	12-18	21.50	19.50	23.25	19.75	6.75	5.75	5.25	10.75				
47	19-25	22.00	20.00	32.00	26.00	9.50	6.25	6.75	11.00	**3.50**	**3.75**	**2.00**	**2.50**
48	26- 2Dec	25.50	21.75	33.75	28.50	16.00	7.50	8.75	17.50	4.75	5.00	3.00	5.50
49	3-9	26.00	23.50	34.75	29.25	20.25	17.75	9.00	25.50	9.00	10.75	5.25	6.25
50	10-16	27.25	24.50	35.25	30.75	24.50	20.25	12.50	26.75	11.50	11.50	6.50	12.20
51	17-23	29.75	26.75	35.75	31.50	25.50	20.75	16.75	33.00	16.75	17.25	18.50	16.75
52	24-31Dec	30.00	27.25	36.00	32.50	30.00	23.50	17.75	36.25	17.75	25.25	20.25	26.50
01	1-7 Jan	32.00	28.50	38.00	33.00	33.50	24.75	22.50	37.75	24.00	31.50	22.50	34.50
02	8-14	33.75	29.00	38.50	34.75	36.25	29.25	24.00	40.00	26.00	38.00	27.00	41.50
03	15-21	34.50	30.25	39.00	35.75	37.75	33.50	24.42	45.25	33.75	45.00	34.50	46.00
04	21-28	35.00	32.00	40.25	36.00	42.00	33.75	25.00	50.75	39.50	49.25	38.00	48.25
05	29Jan-4Feb	35.25	32.00	**40.25**	36.25	**42.00**	**34.25**	27.17	**51.25**	40.25	**51.75**	39.25	**53.25**

Table 23c: Correlation values between weather parameters and diseases of cotton: Guntur-Andhra Pradesh

Weather parameters	Correlation coefficients											
	NDLH 1938			Siri			L 1060			Akira		
	CLS	GM	Rust	CLS	GM	Rust	CLS	GM	Rust	CLS	GM	Rust
Rainfall (mm)	-0.450	-0.349	-0.274	-0.446	-0.343	-0.266	-0.448	-0.342	-0.260	-0.429	-0.352	-0.261
Temp. Max.(^{0}C)	-0.353	-0.286	-0.157	-0.339	-0.241	-0.148	-0.395	-0.283	-0.155	-0.402	-0.275	-0.153
Temp. Mini. (^{0}C)	-0.975	-0.908	-0.783	-0.974	-0.881	-0.768	-0.983	-0.896	-0.758	-0.981	-0.903	-0.762
Morning RH (%)	0.095	0.249	0.251	0.090	0.212	0.248	0.097	0.246	0.262	0.134	0.233	0.267
Evening RH (%)	0.115	0.081	0.039	0.108	0.042	0.034	0.125	0.084	0.054	0.124	0.079	0.041
Sunshine hours	0.329	0.438	0.537	0.334	0.469	0.553	0.274	0.451	0.529	0.291	0.439	0.552
Wind speed (km/hr)	-0.649	-0.493	-0.415	-0.626	-0.464	-0.413	-0.636	-0.508	-0.407	-0.603	-0.498	-0.413
Evaporation	0.070	0.161	0.241	0.085	0.188	0.251	0.042	0.162	0.238	0.049	0.161	0.249

Table 24a: Disease progress in relation to weather factors at TNAU, Coimbatore (Tamil Nadu)

SMW	Period	Rainy days	Rainfall (mm)	Temperature (^{0}C)		Relative Humidity (%)		Wind speed (km/h)	Sun Shine hours
				Max.	Min.	Morn.	Even.		BSH
30	July 23-29	1	12.4	30.6	24.1	75	63	15.2	4.0
31	July 30-05Aug	2	19.0	30.4	23.0	92	61	6.8	3.9
32	Aug 6- 12	1	7.0	31.1	23.8	92	62	4.2	4.2
33	Aug 13-19	1	9.0	33.3	24.6	90	54	4.3	8.1
34	Aug 20-26	1	12. 2	31.8	24.0	80	54	8.0	6.2
35	27 Aug -2Sep	-	0.4	31.4	23.6	82	56	9.0	4.5
36	Sep 3-9	-	1.0	32.9	23.9	83	54	10.0	6.1
37	Sep 10-16	-	0.0	32.6	23.9	85	58	10.0	8.0

38	Sep 17-23	-	0	33.6	23.0	85	52	6.1	8.4
39	Sep 24-30	1	10.2	32.0	23.9	83	55	6.4	6.3
40	Oct 1-7	1	28.0	33.4	24.1	88	62	4.4	5.5
41	Oct 8-14	5	158.2	29.9	23.0	94	70	3.1	4.5
42	Oct 15-21	4	99.4	29.0	22.5	93	71	3.4	3.8
43	Oct 22-29	3	83.8	30.6	21.4	93	69	2.6	5.9
44	Oct 29-Nov 4	1	11.0	31.1	22.0	92	67	3.0	6.5
45	Nov5-11	1	9.4	30.3	22.2	91	51	3.0	5.8
46	Nov 12-18	3	43.2	29.8	22.6	92	66	4.3	4.3
47	Nov 19-25	-	0	29.2	22.2	90	59	4.1	3.4
48	Nov 26- 2 Dec	1	4.8	29.1	21.5	93	64	3.0	1.9
49	Dec 3-9	1	7.6	30.2	22.0	92	58	4.1	6.1
50	Dec 10-16	3	22.8	27.7	20.8	92	70	5.2	3.4
51	Dec 17-23	-	0	30.9	19.9	93	50	2.1	7.6
52	Dec 24-31	1	4.5	30.1	20.9	89	56	5.2	7.0

Table 24b: Disease progress in relation to weather factors at TNAU, Coimbatore (Tamil Nadu)

SMW	Foliar diseases																Soil borne disease			
	ALB				BLB				Grey Mildew				Tobacco Streak virus				Collar rot / root rot			
	CO 17	MCU5	RCH659	Jadoo	CO 17	MCU5	RCH659	Jadoo	CO 17	MCU5	RCH659	Jadoo	CO 17	MCU5	RCH659	Jadoo	CO 17	MCU5	RCH659	Jadoo
31	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.3**	**1.1**	**1.0**	**1.7**
33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.7	1.3	2.5
34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.3	2.4	3.0
35	0.0	0.0	0.0	0.0	**3.0**	**4.3**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.8	3.5	3.7
36	**2.7**	**1.5**	**1.9**	**2.7**	4.5	6. 8	1.7	0.0	**2.4**	**1.7**	0.0	0.0	0.0	0.0	0.0	0.0	2.9	3.2	4.0	4.1

37	4.0	2.7	2. 8	3.4	5.3	7.3	2.8	1.5	2.7	2.8	0	3.7	**1.5**	**2.3**	**2.0**	**2.5**	3.5	3.7	4.7	4.7
38	7.5	3.9	3.9	4.6	6.7	10.7	4.3	2.7	3.9	4.3	1.3	5.5	1.9	2.8	3.5	3.7	3.7	4.5	5.0	5.0
39	8.0	4.5	4.7	6.3	7.5	12.5	5.7	3.5	4.5	5.9	2.7	6. 8	3.7	3.5	4.7	4. 8	4.0	5.3	5.5	6.4
40	9. 2	5.3	5.5	7.5	10.7	14.8	7.0	4.7	5.7	6.5	4.5	8.7	5.5	4.6	5.8	6.7	0.0	0.0	0.0	0.0
41	10. 1	6. 8	6. 8	8. 2	11.9	16.3	13.3	5.4	6.3	7.8	5.9	9.3	6.7	5.3	6.5	7.7	0.0	0.0	0.0	0.0
42	11.5	8.7	8.3	8. 8	15.9	18.5	15.4	6.7	7.7	8.3	6.7	12.5	7.5	6.0	7.2	8.9	2.6	0.0	0.0	3.0
43	11.9	9. 2	9.5	10.3	17.5	19. 2	17.2	8.8	9.5	9.3	8.5	13.7	7.8	6.7	9.0	9. 8	3.8	2.8	3.4	4.3
44	13. 8	10.0	9. 8	10.7	18. 8	20.7	17.9	12.5	13.0	10.5	9.0	14.3	8.3	7.4	10.4	13.5	4.3	3.9	4.8	5.5
45	15.0	11.3	10.6	11.9	15.7	17.3	**14.3**	10.5	14.3	11.7	10.3	15.5	9.0	8.1	14.0	16.7	8.5	5.1	5.3	6.4
46	15.7	12.7	11.4	12.7	14. 2	15.2	11.3	9.7	15.5	12.4	10.7	17.3	9.8	9.0	15.5	**19.7**	9.0	6.5	6.5	7.5
47	16.5	13.3	13.3	13.9	13.2	13.4	10.1	7.7	16.0	13.0	12.0	20.7	8.0	7.3	13.4	13.5	9.5	7.5	7.8	9.0
48	17.7	13.7	14.2	15.0	11.3	11.3	9.4	5.0	16.7	13.5	12.5	21.8	6.2	6.1	11.5	10.5	11.2	8.3	8.5	10.3
49	**18.3**	13.9	14.5	15.7	10.5	10.4	7.5	4.2	**17.0**	14.0	13.1	22.9	4.5	5.2	9.5	8.5	13.4	9.3	9.8	13.5
50	15.0	11. 2	12.7	13.4	9.3	8.4	5.3	3.8	14.3	10.3	8.3	20.0	3.7	4.5	7.4	7. 8	14.0	10.0	10.3	15.9
51	10.0	9.5	10.5	11.3	7.5	7.5	4.7	3.5	8.5	7.5	6.8	17.3	2.9	3.0	5.8	6.7	14.3	11.5	11.0	**16.2**
52	9.5	7.5	9.0	10.3	6. 8	6.3	4.0	3.0	6.0	4.8	4.5	15.3	2.5	3.8	4.7	5.0	15.0	13.0	12.3	18.3

Table 24c: Correlation between weather variables and disease incidence in Cotton at TNAU, Coimbatore (Tamil Nadu)

Environmental variables	Correlation Coefficient (r)				
	***Alternaria* blight**	**Grey mildew**	**Collar/Root Rot**	**Bacterial blight**	**TSV**
Maximum Temperature	-0.866	-0.74	0.45	-0.054	-0.528
Minimum Temperature	-0.504	-0.663	-0.778	0.167	-0.121
RH (Morning)	0.777	0.619	0.259	0.468	0.509
RH (Evening)	0.385	0.06	0.236	0.463	0.238
Wind speed	-0.799	-0.524	-0.195	-590	-0.504
Sunshine hours	-0.676	-0.56	0.083	-0.212	-528
Rainfall	0.147	-0.66	-0.464	0.482	-0.512

Path 1 (d) Survey and basic studies of TSV

Table 25: Progress of TSV incidence (%) in popular BG II hybrids during *kharif* 2024- Lam, Guntur

SMW	Month & Date	Incidence of Tobacco Streak Virus Disease (%)			
		NDLH 1938	Siri	L 1060	Akira
32	5-12th Aug.	0.00	0.00	0.00	0.00
33	13-20 Aug.	0.00	0.00	0.00	0.00
34	20-26 Aug.	0.00	0.00	0.00	0.00
35	27Aug-2Sept.	0.00	0.00	0.00	0.00
36	3-9 Sept.	0.00	0.00	0.00	0.00
37	10-16 Sep.	0.00	0.00	0.00	0.00
38	17-23Sep.	0.00	0.00	0.75	1.13
39	24-30 Sep.	0.50	0.63	1.88	1.13
40	Oct.1-7	0.50	0.63	2.00	1.13
41	8-14 Oct.	0.63	0.75	2.13	1.25
42	15-21Oct.	0.63	0.75	2.13	1.25
43	22-28 Oct.	0.63	0.75	2.13	1.88
44	29Oct- 4 Nov	0.75	0.88	2.25	1.88
45	5-11 Nov.	0.75	1.00	2.88	2.00
46	12-18 Nov.	0.75	1.13	2.88	2.00
47	19-25 Nov.	0.88	1.25	2.88	2.00
48	26Nov- 2Dec	1.00	1.25	3.00	2.00
49	3-9 Dec.	1.13	1.38	3.00	2.13
50	10-16 Dec.	1.13	1.38	3.50	2.13
51	17-23Dec.	1.13	1.38	3.50	2.25
52	24-31Dec.	1.13	1.38	3.50	2.50
1	1-7 Jan25	1.13	1.38	3.50	2.50
2	8-14 Jan	1.13	1.38	3.50	2.50

Path 1 (e) Studies on variability of *Corynespora l*eaf spot

Table 26: Morphological studies of *Corynespora* cultures (Junagarh)

Days	Morphological character	Growth	Sporulation	Virulence
3	Septate brownish mycelium	profuse aerial mycelium	No	-
5	Septate brownish mycelium	olivaceous, profuse aerial mycelium	No	-
7	Septate brownish mycelium, conidia with 3-4 transverse pseudoseptate	dark brown, profuse aerial mycelium	Moderate	-
9	Septate brownish black mycelium,	brown to black pigmentation	Good	virulent

Table 27 : Morphological studies of *Corynespora* cultures (Khandwa)

S. No.	District	Block	Village	Colony Characters	No. Septation in conidia	Microscopic confermation
1	Khandwa	Khandwa	Tigaria	Septate, brown mycelium	5-9	positive
2	Khandwa	Harsud	Barud Mal	Septate, brown mycelium	5-9	positive
3	Khandwa	Chhegaon makan	Pachhaya	Septate, brown mycellium	5-9	positive

Table 28: Morphological studies of *Corynespora* cultures *kharif* 2024 in Andhra Pradesh

S. No.	Date	Place (district)	Hybrid / variety	Presence of *Corynespora* spores
1	27.09.24	RARS, Lam (Guntur)	Siri	Positive
2	03.10.24	Jonnagadda Guntur)	Akira	Positive
3	03.10.24	Tadikonda (Guntur)	Platinum	Positive
4	09.10.24	Guttikonda(Palnadu)	Super bunty	Positive
5	09.10.24	Rajupalem (Palnadu)	Siri	Positive
6	09.10.24	Reddygudem (Palnadu)	Siri	Positive
7	07.11.24	Chillakallu (NTR / Krishna)	Platinum	Positive
8	07.11.24	Mullapadu (NTR / Krishna)	Akira	Positive
9	07.11.24	Vastavai (NTR / Krishna)	Platinum	Positive

Path 2: Screening of AICRP entries for disease reaction and confirmation

Path 2(a) Screening of breeding lines for disease reaction

NATIONAL TRIAL: NORTH ZONE

Table 29a: Br. 22 (a/b) Initial Evaluation Trial -*G. arboreum*

Code 2nd	Code 1st	Entry	Average Percent Disease Index (PDI %) & Disease reaction (DR)					
			Faridkot				Sirsa	
			Bacterial Blight		Fungal foliar leaf spot		Root rot	
			PDI	DR	PDI	DR	PDI	DR
401	10	CISA6-11	0.0	DF	0.0	DF	100.0	S
402	4	PBD 161	0.0	DF	0.0	DF	95.0	S
403	13	**Local Check**	0.0	DF	0.0	DF	70.0	S
404	1	RG 944	0.0	DF	0.0	DF	100.0	S
405	7	PBD 166	0.0	DF	0.0	DF	100.0	S
406	8	FDK 421	0.0	DF	0.0	DF	60.4	S
407	11	RG 945	0.0	DF	0.0	DF	83.3	S
408	3	FDK 354	0.0	DF	0.0	DF	58.3	S
409	9	HD 584	0.0	DF	0.0	DF	68.6	S
410	12	FDK 431	0.0	DF	0.0	DF	85.4	S
411	6	HD 579	0.0	DF	0.0	DF	91.5	S
412	2	**ZC(FDK 124)**	0.0	DF	0.0	DF	100.0	S
413	5	CISA 8-1	0.0	DF	0.0	DF	100.0	S

Table 30: Br. 25 a/b Preliminary Hybrid Trial - Desi Hybrid protected and unprotected conditions condition.

Code 2nd	Code 1st	Entry	Average Percent Disease Index (PDI %) & Disease reaction (DR): unprotected conditions	
			Sirsa	
			Root rot	
			PDI	DR
421	28	GVDH 111/22	100.0	S
422	22	CISAA 23-2	100.0	S
423	25	CISAA 23-3	91.7	S
424	29	**Local Check**	100.0	S
425	21	KR 166	77.1	S
426	24	GVDH 145/22	75.0	S
427	27	**ZC (KR 64-NZ)**	80.4	S
428	23	AAH 51	70.0	S
429	26	AAH 53	75.0	S

NATIONAL TRIALS: CENTRAL ZONE

Table 31: Br.02c - Initial Evaluation of *G. hirsutum* under organic conditions (Rainfed)

Code 2nd	Code 1st	Entry	Average Percent Disease Index (PDI %) & Disease reaction (DR)																			
			Surat (Rainfed)				Dharwad (Rainfed)								Khandwa (Rainfed)							
			BLB		ALS		GM		Rust		ALB		BLB		CoLS		ALS		GM		TSV	
			PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR
431	11	Suraksha (CC)	22.3	R	0.0	DF	6.3	R	27.9	MR	22.9	R	10.4	R	22.5	R	2.5	R	7.5	R	0.0	R
432	9	CNH 3001	7.7	R	0.0	DF	11.5	R	23.3	R	20.0	R	12.1	R	27.5	MR	7.5	R	5	R	12.5	R
433	5	L 1822	0.0	DF	0.0	DF	0.0	R	23.6	R	20.3	R	13.0	R	2.5	R	12.5	R	2.5	R	0.0	R
434	4	ZC [Phule Yamuna	0.0	DF	0.0	DF	16.8	R	25.0	R	20.9	R	9.5	R	7.5	R	15	R	27.5	MR	12.5	R

		(CZ)/ Suraj (SZ)]																				
435	6	NH768	0.0	DF	0.0	DF	20.3	R	23.9	R	24.3	R	0.0	R	5	R	7.5	R	2.5	R	0.0	R
436	3	AKH 2009	0.0	DF	0.0	DF	0.0	R	23.5	R	22.6	R	0.0	R	7.5	R	5	R	2.5	R	0.0	R
437	8	CNH 2219	0.0	DF	0.0	DF	0.0	R	26.9	MR	21.4	R	0.0	R	17.5	R	7.5	R	12.5	R	2.5	R
438	1	TCH 2001	10.3	R	0.0	DF	0.0	R	25.6	MR	20.6	R	13.3	R	22.5	R	12.5	R	22.5	R	22.5	R
439	23	L 1651	0.0	DF	0.0	DF	0.0	R	23.8	R	23.0	R	17.8	R	12.5	R	10	R	5	R	0.0	R
440	19	GBHV 227	0.0	DF	0.0	DF	0.0	R	26.1	MR	22.9	R	17.9	R	22.5	R	5	R	17.5	R	22.5	R
441	17	AKH 2018-6	0.0	DF	0.0	DF	0.0	R	23.4	R	22.0	R	0.0	R	5	R	2.5	R	2.5	R	0.0	R
442	14	CSH NB 101	16.3	R	0.0	DF	0.0	R	23.3	R	23.3	R	0.0	R	2.5	R	7.5	R	2.5	R	0.0	R
443	12	NH761	0.0	DF	0.0	DF	22.3	R	27.3	MR	21.5	R	0.0	R	2.5	R	5	R	7.5	R	5.0	R
444	7	GISV 419	0.0	DF	0.0	DF	16.9	R	24.4	R	20.9	R	0.0	R	0	R	10	R	2.5	R	0.0	R
445	2	BS277-24	0.0	DF	0.0	DF	19.0	R	25.6	MR	21.9	R	0.0	R	0	R	10	R	2.5	R	2.5	R
446	22	BS144-24	0.0	DF	0.0	DF	20.6	R	26.5	MR	23.5	R	0.0	R	7.5	R	7.5	R	5	R	0.0	R
447	25	KGH 2411	0.0	DF	0.0	DF	17.0	R	24.4	R	19.3	R	14.8	R	7.5	R	10	R	15	R	0.0	R
448	24	RHC 2018	4.5	R	0.0	DF	22.5	R	23.9	R	21.8	R	0.0	R	2.5	R	12.5	R	12.5	R	5.0	R
449	15	RHC 2107	0.0	DF	0.0	DF	0.0	R	23.0	R	22.6	R	0.0	R	10	R	5	R	20	R	20	R
450	20	TCH 1966	17.3	R	0.0	DF	0.0	R	25.8	MR	21.8	R	16.0	R	17.5	R	12.5	R	12.5	R	17.5	R
451	13	GSHV 271	0.0	DF	0.0	DF	21.5	R	25.4	MR	21.4	R	0.0	R	2.5	R	7.5	R	10	R	0.0	R
452	27	NDLH 2097	0.0	DF	0.0	DF	25.0	R	25.3	MR	24.0	R	16.0	R	0	R	2.5	R	35	MR	0.0	R
453	18	RHC 1904	11.3	R	0.0	DF	20.5	R	23.1	R	23.1	R	0.0	R	22.5	R	5	R	22.5	R	0.0	R
454	28	NDLH 2092-3	13.5	R	0.0	DF	5.3	R	24.6	R	24.4	R	22.5	R	7.5	R	5	R	17.5	R	0.0	R
455	21	CNH 3002	0.0	DF	0.0	DF	21.8	R	22.8	R	20.6	R	19.5	R	17.5	R	12.5	R	20	R	0.0	R
456	10	AKH 2002	0.0	DF	0.0	DF	23.0	R	24.9	R	21.1	R	0.0	R	20	R	7.5	R	22.5	R	2.5	R
457	26	Local Check	0.0	DF	0.0	DF	24.5	R	23.6	R	21.1	R	0.0	R	22.5	R	22.5	R	15	R	5.0	R
458	16	ADB755	0.0	DF	0.0	DF	21.8	R	24.4	R	24.8	R	10.4	R	12.5	R	15	R	32.5	MR	0.0	R

Br. 32. Coordinated varietal trial of *G. arborerum* Cotton

Code 2nd	Code 1st	Entry	Average Percent Disease Index (PDI %) & Disease reaction (DR): at Akola									Average Percent Disease Index (PDI %) & Disease reaction (DR): at Khandwa					
			Bacterial Leaf Blight			Grey Mildew			Myrothecium leaf spot			Grey mildew		Corynespora Leaf spot		Alternaria Leaf Spot	
			PDI	DR	Max Grade	PDI	DR	Max Grade	PDI	DR	Max Grade	PDI	DR	PDI	DR	PDI	DR
461	17	Local Check	3.8	R	0.2	15.0	R	0.6	5.0	R	0.2	0.0	R	32.5	MR	7.5	R
462	21	NDLA 3167-1	6.3	R	0.3	20.0	R	0.8	7.5	R	0.3	12.5	R	12.5	R	10.0	R
463	8	GAM 316	7.5	R	0.3	16.3	R	0.7	6.3	R	0.3	5.0	R	7.5	R	12.5	R
464	12	JLA 1518	6.3	R	0.3	17.5	R	0.7	8.8	R	0.4	12.5	R	35.0	MR	20.0	R
465	2	GBAV 173	7.5	R	0.3	18.8	R	0.8	11.3	R	0.5	5.0	R	12.5	R	10.0	R
466	18	DAS 2451	8.8	R	0.4	12.5	R	0.5	7.5	R	0.3	10.0	R	7.5	R	10.0	R
467	15	AKA 2016-1	7.5	R	0.3	11.3	R	0.5	12.5	R	0.5	7.5	R	42.5	MR	27.5	R
468	16	GAM 327	5.0	R	0.2	16.3	R	0.7	5.0	R	0.2	15.0	R	35.0	MR	20.0	R
469	6	PA 963	7.5	R	0.3	12.5	R	0.5	13.8	R	0.6	12.5	R	32.5	MR	17.5	R
470	20	KGA- VS 2412	10.0	R	0.4	13.8	R	0.6	12.5	R	0.5	2.5	R	10.0	R	5.0	R
471	19	GBAV 179	8.8	R	0.4	15.0	R	0.6	15.0	R	0.6	5.0	R	12.5	R	5.0	R
472	7	CNA 1089	12.5	R	0.5	13.8	R	0.6	13.8	R	0.6	7.5	R	12.5	R	12.5	R
473	1	JLA 1913	10.0	R	0.4	13.8	R	0.6	10.0	R	0.4	10.0	R	17.5	R	5.0	R
474	11	DAS 2452	11.3	R	0.5	18.8	R	0.8	15.0	R	0.6	10.0	R	32.5	MR	15.0	R
475	4	HD 579	10.0	R	0.4	15.0	R	0.6	13.8	R	0.6	7.5	R	17.5	R	10.0	R
476	14	ZC (CZ: CNA 1032/SZ: DLSa 17)	8.8	R	0.4	18.8	R	0.8	12.5	R	0.5	7.5	R	37.5	MR	17.5	R
477	10	CNA 1090	7.5	R	0.3	13.8	R	0.6	12.5	R	0.5	15.0	R	32.5	M R	30.0	R
478	5	AKA 2018-1	8.8	R	0.4	17.5	R	0.7	16.3	R	0.7	10.0	R	17.5	R	12.5	R
479	22	NDLA 3163	8.8	R	0.4	15.0	R	0.6	13.8	R	0.6	12.5	R	27.5	MR	22.5	R
480	9	HD 584	11.3	R	0.5	17.5	R	0.7	12.5	R	0.5	17.5	R	37.5	MR	25.0	R
481	3	KGA- VS 2413	10.0	R	0.4	15.0	R	0.6	11.3	R	0.5	10.0	R	10.0	R	12.5	R
482	13	PA 986	12.5	R	0.5	16.3	R	0.7	15.0	R	0.6	12.5	R	22.5	R	12.5	R

Table 33: Br. 25 b Preliminary Hybrid Trial – Desi Hybrid

Code 2nd	Code 1st	Entry	Average Percent Disease Index (PDI %) & Disease reaction (DR): at Akola					
			Bacterial Leaf Blight		Grey Mildew		Myrothecium leaf spot	
			PDI	DR	PDI	DR	PDI	DR
491	3	AAH 53	11.3	R	11.3	R	11.3	R
492	8	KR 166	7.5	R	16.3	R	15.0	R
493	5	GVDH 111/22	8.8	R	13.8	R	13.8	R
494	2	ZC (NACH 560)	6.3	R	11.3	R	15.0	R
495	6	AAH 51	10.0	R	10.0	R	16.3	R
496	4	CISAA 23-2	11.3	R	10.0	R	15.0	R
497	1	GVDH 145/22	8.8	R	12.5	R	17.5	R
498	7	Local Check	10.0	R	8.8	R	12.5	R

Table 34: Br. 32(b): IET of *G. herbaceum* cotton (Rainfed) at Surat

Code 2nd	Code 1st	Entry	Average Percent Disease Index (PDI %) & Disease reaction (DR): at Surat				Average Percent Disease Index (PDI%) & Disease Reaction (DR): at Bharuch					
			Bacterial Leaf Blight		Alternaria Leaf Spot		Bacterial Leaf Blight			Alternaria Leaf Spot		
			PDI	DR	PDI	DR	PDI	DR	Max Grade	PDI	DR	Max Grade
501	6	GVhv 1338	0.0	DF	0.0	DF	0.00	DF	0	3.67	R	1
502	9	GBhv 391	0.0	DF	0.0	DF	0.00	DF	0	2.00	R	1
503	7	GShv 836/17	0.0	DF	0.0	DF	0.50	R	1	0.00	DF	0
504	2	GBhv 402	0.0	DF	0.0	DF	0.00	DF	0	0.00	DF	0
505	11	Local Check	0.0	DF	0.0	DF	0.00	DF	0	0.00	DF	0
506	4	GShv 918/17	0.0	DF	0.0	DF	0.00	DF	0	0.00	DF	0
507	12	GVhv 1350	0.0	DF	0.0	DF	0.00	DF	0	0.00	DF	0
508	3	ZC (GN Cot 25)	0.0	DF	0.0	DF	0.00	DF	0	0.00	DF	0
509	5	GBhv 401	0.0	DF	0.0	DF	0.00	DF	0	0.00	DF	0
510	8	GVhv 1073	0.0	DF	0.0	DF	0.00	DF	0	3.50	R	1
511	10	DDhc -2451	0.0	DF	0.0	DF	0.00	DF	0	4.83	R	1
512	1	GVhv 1262	0.0	DF	0.0	DF	0.00	DF	0	0.00	DF	0

NATIONAL TRIALS: SOUTH ZONE

Table 35: Br. 22a/b Initial Evaluation Trial of G. *arboreum*

Code 2nd	Code 1st	Entry	Average Percent Disease Index (PDI %) & Disease reaction (DR): at Bharuch						Average Percent Disease Index (PDI %) & Disease reaction (DR): at Dharwad							
			Bacterial Leaf Blight			Alternaria Leaf Spot			Alternaria blight		Bacterial blight		Grey Mildew		Rust	
			PDI	DR	Max Grade	PDI	DR	Max Grade	PDI	DR	PDI	DR	PDI	DR	PDI	DR
461	17	Local Check	0.0	DF	0	1.3	R	1	24.5	R	0.0	DF	0.0	R	26.3	MR
462	21	NDLA 3167-1	1.7	R	1	0.0	DF	0	23.8	R	0.0	DF	19.3	R	22.8	MR
463	8	GAM 316	0.0	DF	0	0.0	DF	0	24.3	R	0.0	DF	0.0	R	25.8	MR
464	12	JLA 1518	0.0	DF	0	0.0	DF	0	24.0	R	0.0	DF	0.0	R	27.1	MR
465	2	GBAV 173	0.0	DF	0	1.8	R	1	24.6	R	0.0	DF	15.8	R	24.9	R
466	18	DAS 2451	3.2	R	1	1.7	R	1	24.3	R	0.0	DF	16.8	R	26.1	MR
467	15	AKA 2016-1	0.0	DF	0	2.7	R	1	26.5	MR	0.0	DF	0.0	R	27.5	MR
468	16	GAM 327	0.0	DF	0	3.3	R	1	23.8	R	0.0	DF	0.0	R	25.1	MR
469	6	PA 963	0.0	DF	0	0.0	DF	0	25.6	MR	0.0	DF	0.0	R	26.9	MR
470	20	KGA- VS 2412	0.0	DF	0	0.0	DF	0	24.1	R	0.0	DF	26.0	R	26.6	MR
471	19	GBAV 179	0.0	DF	0	0.0	DF	0	26.4	MR	0.0	DF	0.0	R	25.5	MR
472	7	CNA 1089	0.0	DF	0	2.3	R	1	24.1	R	0.0	DF	0.0	R	22.8	R
473	1	JLA 1913	0.0	DF	0	0.8	R	1	20.5	R	0.0	DF	18.0	R	25.9	MR
474	11	DAS 2452	0.0	DF	0	1.2	R	1	12.9	R	0.0	DF	0.0	R	25.8	MR
475	4	HD 579	0.0	DF	0	0.0	DF	0	24.6	R	0.0	DF	0.0	R	24.5	R
476	14	ZC (CZ: CNA 1032/SZ: DLSa 17)	0.0	DF	0	1.2	R	1	24.5	R	0.0	DF	0.0	R	26.3	MR
477	10	CNA 1090	0.0	DF	0	2.0	R	1	23.8	R	0.0	DF	19.3	R	22.8	R
478	5	AKA 2018-1	0.0	DF	0	0.0	DF	0	24.3	R	0.0	DF	0.0	R	25.8	MR
479	22	NDLA 3163	0.0	DF	0	1.2	R	1	24.0	R	0.0	DF	0.0	R	27.1	MR
480	9	HD 584	2.7	R	1	0.0	DF	0	24.6	R	0.0	DF	15.8	R	24.9	MR
481	3	KGA- VS 2413	0.0	DF	0	0.0	DF	0	24.3	R	0.0	DF	16.8	R	26.1	MR
482	13	PA 986	0.0	DF	0	0.0	DF	0	26.5	MR	0.0	DF	0.0	R	27.5	MR

ZONAL TRIAL: NORTH ZONE

Table 36: Br-24 a – Coordinated Variety trial of *G. arboreum* under protected condition.

Code 2nd	Code 1st	Entry	Average Percent Disease Index (PDI %) & Disease reaction (DR)			
			Faridkot			
			Bacterial leaf blight		FFS	
			PDI		PDI	DR
40001	103	**FDK 124(ZC)**	0.0	DF	0.0	DF
40002	104	FDK 331	0.0	DF	0.0	DF
40003	102	RG 913	0.0	DF	0.0	DF
40004	105	**Local Check**	0.0	DF	0.0	DF
40005	101	FDK 341	0.0	DF	0.0	DF

Table 37: Br-25 a Coordinated Desi Hybrid trials Protected condition.

Code 2nd	Code 1st	Entry	Average Percent Disease Index (PDI %) & Disease reaction (DR)			
			Faridkot			
			BLB		FFS	
			PDI	DR	PDI	DR
4011	120	**Local Check**	0.0	DF	0.0	DF
4012	114	CISAA 22-3	0.0	DF	0.0	DF
4013	111	CISAA 22-1	0.0	DF	0.0	DF
4014	117	KR 162	0.0	DF	0.0	DF
4015	119	KR 165	0.0	DF	0.0	DF
4016	115	KR 164	0.0	DF	0.0	DF
4017	112	KR 163	0.0	DF	0.0	DF
4018	118	KR 161	0.0	DF	0.0	DF
4019	116	**Zonal Check (KR 64)**	0.0	DF	0.0	DF
4020	113	KR 160	0.0	DF	0.0	DF

ZONAL TRIAL: CENTRAL ZONE

Table 38a. Br. 03(c) Preliminary Varietal Trial (PVT) of *G. hirsutum* under organic condition -Khandwa

Code 2nd	Code 1st	Entry	Average Percent Disease Index (PDI %) & Disease reaction (DR)									
			BLB		ALS		CoLS		ALS		GM	
			Surat		Surat		Khandwa (Irrigated)					
			PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR
4101	10	AKH 1514	0.00	DF	0.00	DF	12.5	R	2.5	R	0.0	R
4102	4	GSHV 269	0.00	DF	0.00	DF	7.5	R	10.0	R	7.5	R
4103	2	Zonal Check [Phule	0.00	DF	0.00	DF	7.5	R	12.5	R	2.5	R
4104	7	Local Check	0.00	DF	0.00	DF	5.0	R	17.5	R	2.5	R
4105	6	GBHV 257	0.00	DF	0.00	DF	7.5	R	7.5	R	0.0	R
4106	1	AKH 2018-7	0.00	DF	0.00	DF	5.0	R	7.5	R	10.0	R
4107	9	Suraksha (CC)	0.0	R	0.00	DF	10.0	R	17.5	R	5.0	R
4108	5	GSHV 266	0.00	DF	0.00	DF	7.5	R	15.0	R	7.5	R
4109	8	TCH 1999	0.00	DF	0.00	DF	7.5	R	10.0	R	10.0	R
4110	3	AKH 10-3	0.00	DF	0.00	DF	12.5	R	5.0	R	2.5	R

Table 38b: Br. 03c: PVT of *G. hirsutum* under organic conditions (Rainfed) (Year 2024) - Surat

Code 2nd	Code 1st	Entry	Bacterial leaf blight			Alternaria leaf spot		
			PDI	Max Grade	DR	PDI	Max Grade	DR
4101	10	AKH 1514	0.00	0	DF	0.00	0	DF
4102	4	GSHV 269	6.66	1	R	0.00	0	DF
4103	2	Zonal Check [Phule Yamuna]	0.00	0	DF	0.00	0	DF
4104	7	Local Check	0.00	0	DF	0.00	0	DF
4105	6	GBHV 257	0.00	0	DF	0.00	0	DF
4106	1	AKH 2018-7	0.00	0	DF	0.00	0	DF
4107	9	Suraksha (CC)	21.66	1	R	0.00	0	DF
4108	5	GSHV 266	0.00	0	DF	0.00	0	DF
4109	8	TCH 1999	0.00	0	DF	0.00	0	DF
4110	3	AKH 10-3	0.00	0	DF	0.00	0	DF

Table 39a: Br. 05(a) Co-ordinated Hybrid Trial (CHT) of *G. hirsutum* under organic condition- Khandwa

Code 2nd	Code 1st	Entry	Average Percent Disease Index (PDI %) & Disease reaction (DR)									
			BLB		ALS		ALB		GM		CoLS	
			Surat				Khandwa					
			PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR
4121	5	KGHH-bio-2409	0.0	DF	0.0	DF	2.5	R	12.5	R	2.5	R
4122	10	KGHH -VS-2318-1	0.0	DF	0.0	DF	10.0	R	15.0	R	0.0	DF
4123	7	GSHH 08/2019	0.0	DF	0.0	DF	17.5	R	2.5	R	7.5	R
4124	1	Partech 29	0.0	DF	0.0	DF	17.5	R	2.5	R	5.0	R
4125	9	Partech 30	0.0	DF	0.0	DF	17.5	R	30.0	MR	17.5	R
4126	2	Bunny (CC)	0.0	DF	0.0	DF	20.0	R	27.5	MR	17.5	R
4127	8	Zonal Check (NHH 44)	0.0	DF	0.0	DF	25.0	R	20.0	R	10.0	R
4128	4	Partech 30 Plus	0.0	DF	0.0	DF	27.5	MR	7.5	R	7.5	R
4129	6	Partech 28	0.0	DF	0.0	DF	10.0	R	10.0	R	10.0	R
4130	3	KGHH- bio- 2408	0.0	DF	0.0	DF	5.0	R	22.5	R	0.0	DF

Table 39b: Br. 05c: CHT of H x H hybrids under organic conditions (Rainfed): CZ (Surat)

Code 2nd	Code 1st	Entry	Bacterial leaf blight			Alternaria leaf spot		
			PDI	Max Grade	Reaction	PDI	Max Grade	Reaction
4121	5	KGHH-bio-2409	0.00	0	DF	0.00	0	DF
4122	10	KGHH -VS-2318-1	0.00	0	DF	0.00	0	DF
4123	7	GSHH 08/2019	0.00	0	DF	0.00	0	DF
4124	1	Partech 29	0.00	0	DF	0.00	0	DF
4125	9	Partech 30	0.00	0	DF	0.00	0	DF
4126	2	Bunny (CC)	0.00	0	DF	0.00	0	DF
4127	8	Zonal Check (NHH 44)	0.00	0	DF	0.00	0	DF
4128	4	Partech 30 Plus	0.00	0	DF	0.00	0	DF
4129	6	Partech 28	12.66	1	R	0.00	0	DF
4130	3	KGHH- bio- 2408	0.00	0	DF	0.00	0	DF

Table 40: Br-03 a/b – PVT Coloured cotton –Rainfed

Code 2nd	Code 1st	Entry	Average Percent Disease Index (PDI %) & Disease reaction (DR)													
			ALS		BLB		ALS		BLB		CoLS		ALS		GM	
			Surat (Rainfed)				Junagarh				Khandwa					
			PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR
4141	3	FC4001	0.0	DF	0.0	DF	11.8	R	1.0	R	7.5	R	7.5	R	2.5	R
4142	6	CNH-22196 (CC)	0.0	DF	5..3	R	14.5	R	1.2	R	2.5	R	2.5	R	15.0	R
4143	1	CNH-22197 (CC)	0.0	DF	0.0	DF	19.3	R	2.2	R	7.5	R	12.5	R	2.5	R
4144	5	FC 4002	0.0	DF	0.0	DF	14.3	R	1.5	R	5.0	R	15.0	R	2.5	R
4145	7	FC 4003	0.0	DF	0.0	DF	18.8	R	1.0	R	7.5	R	7.5	R	15.0	R
4146	4	Local Check	0.0	DF	0.0	DF	12.8	R	1.8	R	2.5	R	17.5	R	10.0	R
4147	2	Phule Yamuna (ZC)	0.0	DF	3.3	R	27.7	MR	1.5	R	22.5	R	25.0	R	17.5	R
4148	8	16301 DB	0.0	DF	0.0	DF	25.7	MR	1.0	R	5.0	R	22.5	R	27.5	MR

Table 41: Br. 24b: CVT- *G. arboreum*

Code 2nd	Code 1st	Entry	Average Percent Disease Index (PDI %) & Disease reaction (DR)											
			Akola						Khandwa					
			Myrothecium leaf spot		Bacterial blight		Grey Mildew		CoLS		ALS		GM	
			PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR
4151	6	ZC (CNA1032)	11.3	R	13.8	R	20.0	R	12.5	R	12.5	R	7.5	R
4152	7	CNA 1085	16.3	R	8.8	R	18.8	R	10.0	R	7.5	R	10.0	R
4153	5	JLA 1707	13.8	R	6.3	R	20.0	R	15.0	R	7.5	R	17.5	R
4154	1	GAM 296	11.3	R	11.3	R	17.5	R	7.5	R	5.0	R	12.5	R
4155	4	Local Check	10.0	R	16.3	R	20.0	R	27.5	MR	10.0	R	2.5	R
4156	3	CNA 2248	10.0	R	17.5	R	22.5	R	10.0	R	12.5	R	2.5	R
4157	8	AKA 2016-3	12.5	R	13.8	R	21.3	R	17.5	R	12.5	R	12.5	R
4158	2	CNA - 2249 (CC)	8.8	R	8.8	R	20.0	R	10.0	R	12.5	R	30.0	MR

ZONAL TRIALS: SOUTH ZONE

Table 42: Br. 03 C- Compact hirsutum

Code 2nd	Code 1st	Entry	Average Percent Disease Index (PDI %) & Disease reaction (DR)							
			Alternaria blight		Bacterial blight		Grey Mildew		Rust	
			Dharwad							
			PDI	DR	PDI	DR	PDI	DR	PDI	DR
4201	2	Zonal check (suraj)	24.1	R	20.0	R	24.4	R	24.3	R
4202	5	Suraksha (CC)	24.9	R	22.8	R	29.8	MR	26.3	MR
4203	4	AKH 10-3	24.3	R	21.6	R	27.3	MR	24.1	R
4204	3	Local Check	27.1	R	25.8	MR	28.4	MR	27.3	MR
4205	1	GBHV 257	25.8	MR	25.3	MR	25.3	MR	26.8	MR
		Jaydhar (SC)	54.5	MS	0.0	DF	51.2	MS	51.2	MS
		Abhadita (SC)	55.5	MS	53.3	MS	53.5	MS	53.5	MS

Table 43. Br. 05 C (Compact hybrid)

Code 2nd	Code 1st	Entry	Average Percent Disease Index (PDI %) & Disease reaction (DR)							
			Alternaria blight		Bacterial blight		Grey mildew		Rust	
			Dharwad							
			PDI	DR	PDI	DR	PDI	DR	PDI	DR
4211	4	Partech 28	18.6	R	25.4	MR	28.6	MR	26.4	MR
4212	5	Zonal Check (Mallika)	20.6	R	25.4	MR	30.3	MR	25.8	MR
4213	2	Bunny (CC)	24.8	R	29.0	MR	26.5	MR	25.6	MR
4214	6	Partech 29	24.6	R	25.8	MR	27.5	MR	24.9	MR
4215	3	KGHH-VS-2318-1	26.1	MR	26.6	MR	25.8	MR	25.9	MR
4216	1	Partech 30 Plus	26.5	MR	26.0	MR	25.0	R	24.5	R
		Jaydhar (SC)	54.5	MS	0.0	DF	51.2	MS	51.2	MS
		Abhadita (SC)	55.5	MS	53.3	MS	53.5	MS	53.5	MS

Table 44. Br. 03b/CC- PVT *G. hirsutum*

Code 2nd	Code 1st	Entry	Average Percent Disease Index (PDI %) & Disease reaction (DR)							
			Dharwad							
			Alternaria blight		Bacterial blight		Grey Mildew		Rust	
			PDI	Reaction	PDI	Reaction	PDI	Reaction	PDI	Reaction
4221	5	Local Check	26.1	MR	10.4	R	27.0	MR	23.5	R
4222	7	DHCC 2351	24.8	R	12.1	R	25.6	MR	24.1	R
4223	6	CNH-22196 (CC)	25.1	MR	13.0	R	29.0	MR	24.0	R
4224	1	FC 4003	23.3	MR	9.5	R	28.0	MR	23.8	R
4225	4	FC 4001	24.9	MR	0.0	R	24.9	R	24.5	R
4226	2	Suraj (Zonal Check)	25.5	MR	0.0	R	22.9	R	23.0	R
4227	8	FC 4002	23.3	MR	0.0	R	25.6	MR	23.1	R
4228	3	CNH-22197 (CC)	24.0	R	13.3	R	24.6	R	22.9	R
		Jaydhar (SC)	54.5	MS	0.0	DF	51.2	MS	51.2	MS
		Abhadita (SC)	55.5	MS	53.3	MS	53.5	MS	53.5	MS

Table 45: Br. 14a CVT- *G. barbadense*

Code 2nd	Code 1st	Entry	Average Percent Disease Index (PDI %) & Disease reaction (DR)													
			Dharwad								TNAU, Coimbatore					
			Alternaria blight		Bacterial blight		Grey Mildew		Rust		ALB		Collar/Root Rot		Boll rot	
			PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR
4231	8	CCB 22-1	26.4	MR	26.0	MR	0.0	DF	0.0	DF	65.4	MS	23.3	R	12.3	R
4232	6	SIMA B-8	25.8	MR	25.1	MR	0.0	DF	0.0	DF	23.5	R	7.3	R	6.5	R
4233	1	CCB 23-1	26.1	MR	26.8	MR	0.0	DF	0.0	DF	68.7	MS	30.5	MR	14.5	R
4234	3	CCB 22-2	24.1	R	25.6	MR	0.0	DF	0.0	DF	30.5	MR	27.4	MR	12.0	R
4235	7	CCB 24-1	24.1	R	7.0	R	0.0	DF	0.0	DF	70.3	MS	20.6	R	10.7	R
4236	2	ZC (Rhcb-011-CZ; CCB 37-SZ)	20.9	R	25.0	R	0.0	DF	0.0	DF	77.4	S	23.5	R	13.4	R
4237	4	QC (Suvin)	21.0	R	27.1	MR	0.0	DF	0.0	DF	76.3	S	24.7	R	10.5	R
4238	5	CCB-24-2	22.4	R	29.0	MR	0.0	DF	0.0	DF	78.3	S	21.5	R	11.3	R
		Jaydhar (SC)	54.5	MS	0.0	DF	51.2	MS	51.2	MS	-	-	-	-	-	-
		Abhadita (SC)	55.5	MS	53.3	MS	53.5	MS	53.5	MS	-	-	-	-	-	-

Table 46: Br. 24b: CVT- *G. arboreum*

Code 2nd	Code 1st	Entry	Average Percent Disease Index (PDI %) & Disease reaction (DR)							
			Dharwad							
			Alternaria blight		Bacterial blight		Grey Mildew		Rust	
			PDI	DR	PDI	DR	PDI	DR	PDI	DR
4241	3	CNA 1084	24.6	R	0.0	DF	28.6	MR	23.6	R
4242	5	DDCC 1 (CC)	24.0	R	0.0	DF	30.3	MR	23.5	MR
4243	4	Local Check	21.9	R	0.0	DF	26.5	MR	25.4	MR
4244	2	ZC (DLSa 17)	24.0	R	0.0	DF	27.5	MR	24.4	R
4245	1	DWDa 2252	23.1	R	0.0	DF	25.8	MR	23.0	R
4246	6	CNA 1085	25.8	MR	0.0	DF	25.0	R	25.0	R
		Jaydhar (SC)	54.5	MS	0.0	DF	51.2	MS	51.2	MS
		Abhadita (SC)	55.5	MS	53.3	MS	53.5	MS	53.5	MS

Path 2 (b) Confirmation and maintenance of disease-resistant lines

NORTH ZONE

Table 47: Confirmation and maintenance of disease-resistant lines (*G. hirsutum*) against Cotton leaf curl disease (CLCuD) at Faridkot

Entry	Average CLCuD PDI & Disease Reaction (DR) under unprotected conditions			
	2023-24		2024-25	
	PDI	DR	PDI	DR
ARCV 22 Bt	**7.41**	**HR**	**24.65**	**MR**
RS 2909	9.13	HR	51.74	HS
F 2687	8.33	HR	60.17	HS
RAH 1076	8.93	HR	58.33	HS
F 2228	19.05	R	57.29	HS
F 846	41.00	S	56.47	HS
RST 9	40.30	S	58.33	HS
HS 6	40.74	S	58.43	HS
ARC 91*	-	-	**12.50**	**R**
FBT 103*	-	-	35.10	MS
RS 3030*	-	-	52.74	HS

FBT 101*	-	-	53.29	HS
FBT 102*	-	-	53.32	HS
PAU BT 2*	-	-	38.37	MS
PAU BT 3*	-	-	56.25	HS

*Added for screening in 2024

Table 47b: Confirmation and maintenance of disease-resistant lines (*G. hirsutum*) against Cotton leaf curl disease (CLCuD) at Sirsa

Entries	Average CLCuD PDI & Disease Reaction (DR) under unprotected conditions									
	2021-22		2022-23		2023-24		Artificial Screening 2023-24		2024-25	
	PDI	DR	PDI	DR	PDI	DR	PDI	DR		
ARCV 22 Bt	0.3	HR	17.3	R	00	DF	6.66	HR	8.33	HR
PAU Bt3 (Bt ZC)	14.8	R	31.9	MS	16.26	R	46.66	S	-	-
ARCV44 Bt	0.8	HR	28.1	MR	00	DF	23.33	MR	-	-
HS-6 (SC)	49.3	S	87.5	HS	32.46	MS	60.00	HS	62.40	HS
RCH773 (SC)	35.4	MS	88.2	HS	23.43	MR	55.55	HS	48.52	S

CENTRAL ZONE

Table 48: Confirmation and maintenance of disease-resistant lines at MCRS, NAU, Surat (2024-25)

Sr. No.	Name of Entry	Bacterial leaf blight (Grade)			Alternaria leaf spot (Grade)		
		Field reaction	Artificial reaction	Reaction	Field reaction	Artificial reaction	Reaction
1	GISV 323	0.0	0.0	DF	0.0	0.0	DF
2	GISV 319	0.0	0.0	DF	0.0	0.0	DF
3	Gshv 810/17	0.0	0.0	DF	0.0	0.0	DF
4	Gshv 831/17	0.0	0.0	DF	0.0	0.0	DF
5	Gshv 807/17	0.0	0.0	DF	0.0	0.0	DF
6	Gshv 812/17	0.0	0.0	DF	0.0	0.0	DF
7	Gshv 843/17	0.0	0.0	DF	0.0	0.0	DF
Junagarh entries							

8	GJHV 592	0.0	0.0	DF	0.0	0.0	DF
9	GJHV 600	0.0	0.0	DF	0.0	0.0	DF
10	GJHV 604	0.0	0.0	DF	0.0	0.0	DF
11	GJHV 605	13.25	32.5	MR	0.0	0.0	DF
*LRA 5166, SC		58.5	3	MR	-	-	-

***** Susceptible check

Table 49a: Confirmation and maintenance of disease-resistant lines (*G. hirsutum*) against bacterial leaf blight at Junagarh (Gujarat)

S.No.	Entry	PDI and Disease Reaction					
		Screening at CRS, Junagarh					
		BLB		ALS		GM	
		1st year (2024) Field trial		1st year (2024) Field trial		1st year (2024) Field trial	
		PDI	DR	PDI	DR	PDI	DR
1	GJHV-614	1.00	R	13.5	R	16.00	R
2	GJHV-613	1.00	R	9	R	12.50	R
3	GJHV-612	1.00	R	13.5	R	25.00	MR
4	GISV-406	1.00	R	19.5	R	31.50	MR
5	GISV-405	1.00	R	12.5	R	7.00	R
6	LRA-5166 Infector	60	MS	51.0	MS	53.50	MS

Table 49b: Confirmation and maintenance of disease-resistant lines (*G. hirsutum*) at Junagarh (Gujarat)

S.No.	Entry	PDI and Disease Reaction											
		Screening at CRS, Junagarh											
		BLB				ALS				GM			
		1st year (2023) Field trial		2nd year (2024)		1st year (2023) Field trial		2nd year (2024)		1st year (2023) Field trial		2nd year (2024)	
		PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR
1	GJHV-607	1.00	R	1.00	R	17.25	R	20.5	R	4.50	R	1.00	MR
2	GJHV-608	9.00	R	10.50	R	12.25	R	15.5	R	10.50	R	2.50	R
3	GJHV-610	1.00	R	1.50	R	14.25	R	17.0	R	17.50	R	2.50	R
4	GISV-399	16.75	R	11.00	R	12.75	R	12.0	R	10.50	R	2.00	R
5	GISV-400	1.00	R	1.00	R	17.5	R	12.5	R	10.00	R	2.00	R
6	LRA-5166 Infector	55.50	MS	60.0	MS	50.50	MS	51.0	MS	58.50	MS	45.0	MR

Table 49c: Confirmation of disease resistance (*G. hirsutum*) against Bacterial Leaf Blight and Alternaria leaf Spot at Junagarh (Gujarat)

S.No.	Entry	Bacterial Leaf Blight (BLB) PDI and Disease Reaction								Alternaria leaf Spot (ALS) PDI and Disease Reaction								Grey mildew (GM) PDI and Disease Reaction							
		Junagarh																							
		BLB								ALS								GM							
		1st year (2022)		2nd year (2023)		3rd year (2024)				1st year (2022)		2nd year (2023)		3rd year (2024)				1st year (2022)		2nd year (2023)		3rd year (2024)			
		Field Trial						Artificial		Field Trial						Artificial		Field Trial						Artificial	
		PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR
1.	GJHV-592	4.0	R	1.0	R	12.0	R	0.0	R	10.5	R	14.8	R	10.0	R	22.5	R	4.5	R	1.0	R	27.0	MR	17.9	R
2.	GJHV-598	6.5	R	6.8	R	1.5	R	0.0	R	2.5	R	12.8	R	15.5	R	24.5	R	10.5	R	2.5	R	16.0	R	18.6	R
3.	GJHV-600	1.0	R	1.0	R	1.5	R	0.0	R	12.0	R	11.3	R	21.0	R	23.8	R	17.5	R	2.5	R	10.5	R	19.5	R
4.	GJHV-604	14.5	R	1.0	R	1.5	R	0.0	R	17.5	R	11.0	R	27.0	R	26.5	MR	10.5	R	2.0	R	11.0	R	21.6	R
5.	GJHV-605	0.5	R	1.0	R	1.0	R	32.5	MR	6.0	R	11.5	R	21.5	R	25.8	MR	10.0	R	2.0	R	13.0	R	22.9	R
6.	LRA-5166 Infector	65.2	MS	55.5	MS	60.0	MS	-	-	55.5	MS	50.5	MS	51.0	MS	-	-	58.5	MS	45.0	MR	53.5	MS		

SOUTH ZONE

Table 50a: Confirmation and maintenance of disease-resistant lines against Alternaria leaf spot at UAS Dharwad

S. No	Entry	Species	Year of start	Average Percent Disease Index (PDI %) & Disease reaction (DR)*															
				Alternaria leaf spot															
				4th year (2021-22)				5th year (2022-23)				6th year (2023-24)				7th year (2024-25)			
				Field trial		Artificial inoculation		Field trial		Artificial inoculation		Field trial		Artificial inoculation		Field trial		Artificial inoculation	
				PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR
1	DB-14	*Barbadens*	2021-22	**13.3**	**R**	**11.2**	**R**	*	-	*	-	*		*		*			
2	**SVA-1118**	***Arboreum***		**0.0**	**DF**	**0.0**	**DF**	**12.5**	**R**	**14.5**	**R**	**0.0**	**0.0**	**0.0**	**DF**	18.5	R	24.6	R
3	**DB-40**	***Barbadens***		**16.5**	**R**	**14.5**	**R**	**24.8**	**R**	**28.7**	**MR**	**19.5**	**R**	**23.7**	**R**	16.5	R	26.5	MR
4	SCS-1206	*Hirsutum*		17.0	R	15.3	R	23.4	R	27.6	MR	*		*		*			
5	CPD-2052	*Hirsutum*		15.6	R	17.9	R	26.0	MR	30.6	MR	*		*		*			

6	DSC-1951	*Hirsutum*		17.5	R	19.6	R	19.6	R	26.5	MR	*		*		*			
7	DSC-2051	*Hirsutum*		17.5	R	19.6	R	25.8	R	29.7	MR	*		*		*			
8	**NDLA-3118-3**	***Hirsutum***		**14.9**	**R**	**22.1**	**R**	**28.8**	**MR**	**32.5**	**MR**	**19.0**	**R**	**26.7**	**MR**	19.8	R	25.1	MR
9	CNA-1042	*Arboreum*		15.2	R	19.8	R	12.7	R	18.7	R	*		*		*			
10	PA-778	*Arboreum*		14.4	R	21.2	R	14.4	R	16.8	R	*		*		*			
11	GBhv-206	*Hirsutum*		13.6	R	19.8	R	13.0	R	15.6	R	*		*		*			
12	AKH-2013-3	*Hirsutum*	2022-23	*				16.5	R	18.4	R	*		*		18.7	R	24.9	R
13	CCH-19-2	*Hirsutum*		*				16.8	R	17.9	R	*		*		16.6	R	23.7	R
14	CCB-26	*Barbadens*		*				16.5	R	18.4	R	*		*		18.5	R	24.8	R
15	CCB-06	*Barbadens*		*				17.6	R	19.7	R	16.8	R	20.7	R	16.8	R	22.5	R
16	SBSD-5-6	*Barbadens*		*				10.4	R	12.5	R	8.0	R	11.0	R	15.9	R	21.5	R
17	CNA-1072	*Arboreum*		*				18.1	R	19.5	R	18.5	R	21.3	R	18.5	R	26.5	MR
18	NDLA-3104-4	*Arboreum*		*				17.0	R	18.6	R	18.8	R	20.6	R	17.5	R	23.7	R
19	RAH 1046	*Hirsutum*	2023-24									14.6	R	19.9	R	14.6	R	22.7	R
20	PAIG-411	*Arboreum*										13.7	R	19.0	R	16.8	R	24.5	R
21	CNA-1086	*Arboreum*										12.4	R	20.7	R	18.7	R	25.0	R
22	Dwda-2051	*Arboreum*										15.3	R	19.8	R	16.9	R	26.5	MR
23	MDL-2674	*Arboreum*										16.4	R	18.6	R	16.5	R	24.9	R
24	Abhadita (Check)	*Hirsutum*		35.0	MR	42.5	MR	35.0	MR	42.5	MR	40.3	MR	54.5	MS	35.0		50.5	
25	Jaydhar (Check)	*Herbaceum*		40.5	MR	55.0	MS	40.5	MR	55.0	MS	39.7	MR	55.5	MS	40.5		55.0	

* Not Planted during 2022-23

Table 50b: Confirmation and maintenance of disease-resistant lines against grey mildew at UAS Dharwad

S. No	Entry	Species	Year of start	Average Percent Disease Index (PDI %) & Disease reaction (DR)															
				Grey mildew															
				4th year (2021-22)				5th year (2022-23)				6th year (2023-24)				7th year (2024-25)			
				Field trial		Artificial		Field trial		Artificial		Field trial		Artificial		Field trial		Artificial	
				PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR
1	DB-14	*Barbadens*	2021-22	5.2	R	6.5	R	*	-	*	-	*		*		*			
2	**SVA-1118**	***Arboreum***		**3.5**	**R**	**4.6**	**R**	**2.5**	**R**	**3.7**	**R**	**0.0**		**0.0**	**DF**				
3	**DB-40**	***Barbadens***		**6.7**	**R**	**7.7**	**R**	**6.5**	**R**	**8.6**	**R**	**7.3**	**R**	**9.0**	**R**	**8.5**	**R**	**12.00**	**R**
4	SCS-1206	*Hirsutum*		8.4	R	10.4	R	6.8	R	9.5	R	*		*		*			
5	CPD-2052	*Hirsutum*		5.3	R	7.3	R	6.0	R	7.3	R	*		*		*			
6	DSC-1951	*Hirsutum*		3.6	R	5.6	R	4.6	R	6.7	R	*		*		*			
7	DSC-2051	*Hirsutum*		8.6	R	11.6	R	5.7	R	8.5	R	*		*		*			
8	**NDLA-3118-3**	***Hirsutum***		**10.7**	**R**	**11.2**	**R**	**9.0**	**R**	**10.3**	**R**	**8.5**	**R**	**11.1**	**R**	16.7	R	26.1	MR
9	CNA-1042	*Arboreum*		10.2	R	12.4	R	5.5	R	7.6	R	*		*		*			
10	PA-778	*Arboreum*		8.6	R	9.4	R	4.5	R	5.3	R	*		*		*			
11	GBhv-206	*Hirsutum*		6.5	R	7.3	R	5.9	R	8.7	R	*		*		*			
12	TSH-354	Hirsutum		-	-	-	-	-	-	-	-	-	-	-	-	14.5	R	22.60	R
13	AKH-2013-3	*Hirsutum*	2022-23	-	-	-	-	5.7	R	8.0	R	*		*					
14	CCH-19-2	*Hirsutum*		-	-	-	-	8.6	R	10.3	R	*		*					
15	CCB-26	*Barbadens*		-	-	-	-	7.8	R	10.4	R	*		*					
16	CCB-06	*Barbadens*		-	-	-	-	6.9	R	9.7	R	6.3	R	08.1	R	06.8	R	12.5	R
17	SBSD-5-6	*Barbadens*		-	-	-	-	8.3	R	12.5	R	*		*		04.9	R	11.3	R
18	CNA-1072	*Arboreum*		-	-	-	-	6.8	R	9.3	R	*		*		19.0	R	26.8	MR
19	NDLA-3104-4	*Arboreum*		-	-	-	-	7.0	R	9.6	R	6.0	R	8.7	R	18.5	R	24.6	R
20	RAH-1081	*Hirsutum*		-	-	-	-	-	-	-	-	-	-	-	-	14.3	R	20.5	R
21	GISV-310	*Hirsutum*		-	-	-	-	-	-	-	-	-	-	-	-	12.5	R	18.5	R
22	GISV-323	*Barbadens*		-	-	-	-	-	-	-	-	-	-	-	-	8.5	R	14.0	R
23	RAH-1046	*Hirsutum*	2023-24									7.8	R	11.5	R	13.7	R	23.6	R
24	PAIG-411	*Arboreum*														6.0	R	8.0	R
25	CNA-1086	*Arboreum*										7.8	R	9.2	R	18.8	R	26.0	MR
26	Dwda-2051	*Arboreum*										6.8	R	8.1	R	18.9	R	27.5	MR
27	MDL-2674	*Arboreum*										5.0	R	7.0	R	18.5	R	24.8	R
28	RHC-1409	*Hirsutum*	2023-													16.3	R	24.5	R
	Abhadita	*Hirsutum*		38.5	MR	42.5	MR	38.5	MR	42.5	MR	45.3	MR	51.2	MS	35.0	MR	55.5	MS
	Jaydhar	*Herbaceum*		42.5	MR	55.0	MS	42.5	MR	55.0	MS	48.7	MR	53.5	MS	40.5	MR	65.0	MS

*** Not Planted during 2022-23**

Table 51: Confirmation and maintenance of disease-resistant lines during *Kharif*, 2024-25 at RARS, Lam, Guntur

Entry Code	Entry Name	Species	Year of start	Corynepsora leaf spot		Grey mildew		Rust	
				PDI	DR	PDI	DR	PDI	DR
304	TSH 354	*G. hirsutum*	2020	34.8	MR	26.8	MR	32.8	MR
319	RAH 1083	*G. hirsutum*	2020	33.0	MR	26.8	MR	34.8	MR
402	**CNH 20-31**	***G. hirsutum***	**2020**	**21.0**	**R**	**15.5**	**R**	28.5	MR
409	RAHC 1032	*G. hirsutum*	2020	29.5	MR	27.0	MR	25.3	MR
1212	DHCC 2151	*G. hirsutum (cc)*	2021	40.3	MR	25.5	MR	32.5	MR
1233	RAH 1083	*G. hirsutum*	2021	33.8	MR	27.0	MR	33.0	MR
1240	CPD 1902	*G. hirsutum*	2021	28.0	MR	26.3	MR	28.0	MR
1242	**RHC 1409**	***G. hirsutum***	**2021**	**25.0**	**R**	**15.0**	**R**	28.5	MR
2201	DHCC 2002	*G. hirsutum*	2022	39.5	MR	28.0	MR	26.3	MR
2203	DHCC 2151	*G. hirsutum*	2022	25.5	MR	34.8	MR	26.8	MR
2204	**Sivanandi (LC)**	***G. hirsutum***	**2022**	**25.3**	**R**	**17.8**	**R**	26.5	MR
2211	RAH 1083	*G. hirsutum*	2022	32.5	MR	29.0	MR	25.5	MR
2213	RAH 1081	*G. hirsutum*	2022	28.0	MR	26.3	MR	27.8	MR
2216	RAH 1082	*G. hirsutum*	2022	31.0	MR	29.0	MR	33.0	MR
2507	RAH 1046	*G. hirsutum*	2020	27.5	MR	42.0	MR	26.8	MR
2511	**DHCC 1801**	***G. hirsutum***	**2020**	**24.0**	**R**	**16.0**	**R**	29.5	MR
2516	CNH 17395	*G. hirsutum*	2020	37.8	MR	28.3	MR	32.5	MR
2518	**DHCC 1902**	***G. hirsutum***	**2020**	26.8	MR	27.8	MR	32.5	MR
2534	RAH 1075	*G. hirsutum*	2020	34.8	MR	28.5	MR	26.8	MR
2553	**RHC-HD 1312**	***G. hirsutum***	**2020**	**18.3**	**R**	**22.3**	**R**	31.0	MR
2556	RHC-HD 1438	*G. hirsutum*	2020	27.0	MR	29.3	MR	25.8	MR
352	GSHV 269	*G. hirsutum*	2023	26.0	MR	27.5	MR	30.0	MR
354	CNH 1124	*G. hirsutum*	2023	28.3	MR	27.5	MR	33.5	MR
357	L 1546	*G. hirsutum*	2023	30.0	MR	26.0	MR	27.8	MR
358	GTHV 13/28	*G. hirsutum*	2023	31.0	MR	29.0	MR	28.5	MR
361	GSHV 266	*G. hirsutum*	2023	26.8	MR	28.0	MR	29.0	MR
363	CNH 1154	*G. hirsutum*	2023	28.5	MR	26.5	MR	28.5	MR
368	GBHV 257	*G. hirsutum*	2023	29.0	MR	28.5	MR	29.0	MR
3201	FC 4001	*G. hirsutum* (CC)	2023	32.5	MR	26.5	MR	27.3	MR
374	Partech 28	*G. hirsutum*	2023	29.3	MR	29.0	MR	27.0	MR
376	Zonal Check (NHH 44 (CZ) / Mallika (SZ)	*G. hirsutum*	2023	28.0	MR	28.5	MR	29.0	MR
377	Partech 30 Plus	*G. hirsutum*	2023	26.0	MR	25.8	MR	28.0	MR
AkiraC				28.3	MR	29.5	MR	30.5	MR
NDLH 1938C				28.8	MR	30.5	MR	29.0	MR
SiriC				30.5	MR	26.0	MR	35.3	MR

Table 52a: Confirmation and maintenance of disease-resistant lines against Alternaria leaf spot at TNAU Coimbatore

S.No.	Entry Code	Entry Name	Species	Year of Start	Alternaria leaf spot (ALS) PDI and Disease reaction											
					1st Year (2022)				2nd Year (2023)				3rd Year (2024)			
					Field trial		Artificial Inoculation		Field trial		Artificial Inoculation		Field trial		Artificial Inoculation	
					PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR	PDI	DR
Br14a (ZT)																
1.	1254	DB 1901	*G.barbadense*	2022	9.5	R	23.5	R	15.5	R	24.0	R	17.5	R	22.7	R
2.	1259	CCB 6	*G.barbadense*	2022	8.3	R	19.3	R	12.3	R	20.7	R	16.3	R	24.5	R
3.	Check	RCHIIBGII	*G.hirsutum*	2022	43.5	MR	79.4	S	70.7	MS	77.0	S	68.4	MS	79.0	S

Table 52b: Confirmation and maintenance of disease-resistant lines against Alternaria leaf spot at TNAU Coimbatore

S.No.	Entry Code	Entry Name	Species	Year of start	Alternaria leaf spot (ALS) PDI and Disease reaction							
					Field Trial		Artificial Inoculation		Field Trial		Artificial Inoculation	
					First Year				Second Year			
					PDI	DR	PDI	DR	PDI	DR	PDI	DR
Br14a (ZT)												
1	0221	CCB 26	*G. barbadense*	2023	29.7	MR	42.5	MR	26.3	MR	37.5	MR
2	0222	CCB22- 2	*G. barbadense*	2023	31.5	MR	40.5	MR	28.7	MR	35.5	MR
3	0224	CCB22- 1	*G. barbadense*	2023	11.5	R	21.3	R	12.5	R	24.3	R
4	Susceptible Check	RCHIIBGII	*G. hirsutum*	2023	70.7	MS	77.0	S	68.5	MS	77.3	S

Table 52c: Confirmation and maintenance of disease-resistant lines against Alternaria leaf spot at TNAU Coimbatore

S.No	Entry code	Entry Name	Year of Start	Field trial		Artificial inoculation	
				PDI	DR	PDI	DR
Br14a (ZT) *Gossypium barbadense*							
1	3215	SIMA B-8	2024	27.7	MR	33.8	MR
2	3216	CCB 23-1	2024	15.3	R	23.5	R
3.	Susceptible Check	RCHIIBGII	2024	65.3	MS	76.5	S

Path 2 (c): Monitoring of resistance against CLCuD in cotton

Table 53: Monitoring of resistance against CLCuD in North Zone

Name of variety/ hybrid	Disease reaction	Sriganganagar			Hisar			Bathinda		
		CLCuD		WF adult per 3 leaves	CLCuD		WF adult per 3 leaves	CLCuD		WF adult per 3 leaves
		PDI	DR		PDI	DR		PDI	DR	
HS 6	Susceptible Variety	53.57	HS	21.36	44.12	S	22.67	52.10	HS	21.06
F 846	Susceptible Variety	50.21	HS	20.21	47.07	S	25.00	58.64	HS	21.50
RST 9	Susceptible Variety	56.66	HS	21.45	48.78	S	23.67	47.90	S	20.44
RS-2818	Tolerant Variety	36.87	MR	20.27	44.87	S	18.67	42.72	S	20.94
PAU Bt-3	Tolerant Variety	26.47	MR	19.41	47.35	S	18.00	30.83	MR	18.89
RCH-773	Moderately susceptible	36.11	MR	19.49	46.22	S	16.33	42.59	S	18.22
RCH-926	Tolerant	22.61	R	15.38	27.36	MR	12.00	20.00	R	15.50
ACH-177-2	Tolerant	27.38	MR	16.64	26.48	MR	8.33	25.93	MR	13.44

Path 3: Management of Diseases of cotton

Path 3 (j): Management of boll rot and foliar diseases of Cotton through CIB&RC recommended new chemical pesticides and their Combinations

Table 54: List of treatments for Management of boll rot and foliar diseases of Cotton through CIB&RC recommended new chemical pesticides and their Combinations

Treatments	Details
T1	Kresoxim methyl 44.3% SC @ 1 ml/litre of water
T2	Propiconazole 25% EC @ 1 ml/litre of water
T3	Propineb 70% WP @ 2.5 g/litre of water
T4	Fluxapyroxad 167 g/litre + Pyraclostrobin 333 g/litre SC @ 0.6 g/litre of water
T5	Metiram 55% + Pyraclostrobin 5% WG @ 2 g/litre of water

T6	Azoxystrobin 18.2% w/w + Difenoconazole 11.4% w/w SC @ 1 ml/ litre of water
T7	Copper sulphate 47.15% + Mancozeb 30% WDG @ 5 g/ litre of water
T8	Captan 70 % + Hexaconazole 5 % WP @ 1.5 g/ litre of water
T9	Copper oxychloride 50 % WP @ 2.5 g
T10	Flonicamid 80 g/acre (60 & 90 days)/ Diafenthiuron/ Dinotefuran (110 – 120 days)
T11	Fluvalinate (for bugs)
T12	Control (Water spray)

Table 55: Management of boll rot and foliar diseases of Cotton through CIB&RC recommended new chemical pesticides (Sriganganagar)

Treatment	Sriganganagar				
	Boll rot (% Incidence)		Boll rot (Reduction % over control)		Yield (Q/ha)
	I Spray	II Spray	I Spray	II Spray	
T1	2.21 (8.55)	6.46 (14.72)	33.43	27.33	1942.8
T2	2.29 (8.71)	6.09 (14.29)	31.02	31.50	1969.4
T3	2.38 (8.88)	5.95 (14.11)	28.31	33.07	2024.1
T4	2.46 (9.01)	5.28 (13.28)	25.90	40.61	2069.1
T5	2.59 (9.26)	5.40 (13.44)	21.99	39.26	2045.6
T6	2.71 (9.47)	5.83 (13.97)	18.37	34.42	2010.7
T7	2.46 (9.01)	6.91 (15.23)	25.90	22.27	1963.5
T8	2.77 (9.57)	7.28 (15.65)	16.57	18.11	1951.2
T9	2.53 (9.14)	6.61 (14.89)	23.80	25.65	1923.6
T10	2.90 (9.80)	7.05 (15.39)	12.65	20.70	1917.4
T11	2.86 (9.73)	7.42 (15.80)	13.86	16.54	1832.4
T12	3.32 (10.49)	8.89 (17.34)			1705.6
CD at 5%	**0.9**	**1.2**			**258.6**
S.E.(m)±	**0.32**	**0.41**			**88.1**
CV%	**6.0**	**4.8**			**7.8**

Table 56: Management of boll rot and foliar diseases of Cotton through CIB&RC recommended new chemical pesticides (Khandwa)

Treatment	Boll rot						CoLS		ALB		GM		Yield (Q/ha)
	First spray			Second spray			Severity%		Severity%		Severity%		
	Incidence%	Severity%	Control %	Incidence %	Severity%	Control %	Ist spray	IInd Spray	Ist spray	IInd Spray	Ist spray	IInd Spray	
T1	8.3	41.7	58.3	14.0	70.0	30.0	5.9	12.3	5.3	8.1	6.8	10.1	18.0
T2	9.0	45.0	55.0	12.3	61.7	38.3	2.7	9.4	6.1	9.5	7.8	11.2	17.8
T3	2.3	11.7	88.3	4.3	21.7	78.3	6.2	14.2	4.9	9.9	4.2	15.3	20.9
T4	5.0	25.0	75.0	6.7	33.3	66.7	3.4	9.1	3.2	7.5	5.7	9.2	19.2
T5	9.7	48.3	51.7	14.0	70.0	30.0	5.3	13.3	4.4	7.3	7.7	15.9	16.3
T6	8.0	40.0	60.0	13.3	66.7	33.3	3.7	9.2	5.1	6.4	8.8	15.0	17.3
T7	6.3	31.7	68.3	8.0	40.0	60.0	6.8	15.6	5.9	11.2	6.1	17.6	17.8
T8	11.3	56.7	43.3	15.3	76.7	23.3	5.4	10.2	5.5	13.0	1.5	18.0	16.4
T9	11.7	58.3	41.7	15.3	76.7	23.3	4.2	13.5	6.0	14.4	7.8	21.2	16.5
T10	15.0	75.0	25.0	15.7	78.3	21.7	5.7	15.3	7.3	15.8	7.4	22.1	15.9
T11	15.3	76.7	23.3	15.3	76.7	23.3	6.0	16.9	7.9	16.3	8.6	21.5	16.2
T12	15.7	78.3	21.7	15.7	78.3	21.7	8.9	21.2	8.7	18.2	9.0	27.5	14.6
CD	0.43	-	-	0.28	-	-	2.02	2.2	1.13	1.344	2.19	2.218	1.519
SE(m)	0.15	-	-	0.10	-	-	0.686	0.742	0.383	0.455	0.742	0.751	0.515
C.V.	0.21	-	-	0.14	-	-	0.969	1.049	0.542	0.644	1.049	1.063	0.728

Table 57: Management of boll rot and foliar diseases of Cotton through CIB&RC recommended new chemical pesticides – Nanded

Treatment	Nanded, 2024-25					
	PDI		Red. over control %		No. of bugs/plant	SCY (Q/ha)
	ALS	GM	ALS	GM		
Kresoxim methyl 44.3% SC @ 1 ml/litre of water	4.5	7.2	46.00	69.93	1.8	11.66
Propiconazole 25% EC @ 1 ml/litre of water	4.8	12.0	42.00	49.65	1.4	10.75
Propineb 70% WP @ 2.5 g/litre of water	4.7	10.2	44.00	57.34	1.6	11.33
Fluxapyroxad 167 g/litre + Pyraclostrobin 333 g/litre SC @ 0.6 g/litre of water	2.7	4.8	68.00	79.72	1.9	13.01
Metiram 55% + Pyraclostrobin 5% WG @ 2 g/litre of water	3.3	9.7	60.00	59.44	1.3	10.68
Azoxystrobin 18.2% w/w + Difenoconazole 11.4% w/w SC @ 1 ml/ litre of water	3.7	10.2	56.00	57.34	1.5	11.03
Copper sulphate 47.15% + Mancozeb 30% WDG @ 5 g/ litre of water	5.5	15.3	34.00	35.66	1.4	9.28
Captan 70 % + Hexaconazole 5 % WP @ 1.5 g/ litre of water	5.3	14.7	36.00	38.46	1.7	8.81
Copper oxychloride 50 % WP @ 2.5 g	5.7	15.8	32.00	33.57	1.5	9.00
Flonicamid 80 g/acre (60 & 90 days)/ Diafenthiuron/ Dinotefuran (110 – 120 days)	7.5	19.7	10.00	17.48	1.5	7.78
Fluvalinate (for bugs)	7.7	20.0	8.00	16.08	0.6	7.66
Control (Water spray)	8.3	23.8	0.00	0.00	2.0	7.27

Table 58: Management of boll rot and foliar diseases of Cotton through CIB&RC recommended new chemical pesticides and their Combinations (Coimbatore)

Treatment	Alternaria Blight		Grey Mildew		Bacterial Blight		Boll rot		SCY (Q/ha)
	PDI	Red. over control (%)	PDI	Red. over control (%)	PDI	Red. over control (%)	PDI	Red. over control (%)	
T1	6.9(15.1)	63.1	5.8 (13.9)	73.9	19.8 (24.9)	26.7	6.6(14.8)	35.9	15.8
T2	9.1 (17.5)	51.3	11.3 (19.6)	49.3	19.3(25.3)	24.6	7.0 (15.3)	32.0	14.2
T3	5.3(13.3)	71.7	9.2 (17.6)	58.7	20 (26.0)	20.6	5.5 (13.5)	46.6	17.0
T4	6.1 (14.2)	67.4	8.7 (17.0)	60.9	13.3(20.9)	47.3	2.9 (9.4)	71.8	18.8
T5	8.0(16.3)	57.2	8.3 (16.7)	62.7	15.9 (22.5)	39.5	3.5 (10.7)	66.0	17.5
T6	6.7(14.9)	64.1	7.8 (16.1)	65.0	16.9 (23.4)	34.5	4.3 (11.9)	58.3	16.4
T7	8.4(16.8)	55.1	12.4 (20.5)	44.3	13.4 (20.1)	51.0	6.1 (14.2)	40.7	14.0
T8	9.5(17.9)	49.2	10.7 (19.0)	52.0	14.5(21.9)	42.4	5.8 (13.9)	43.6	14.7
T9	9.2(17.6)	50.8	13.0 (21.1)	41.7	13.4(21.3)	45.6	5.6 (13.6)	45.6	13.9
T10	15.8(23.4)	15.5	19.4 (26)	13.0	23.4(27.7)	10.6	6.8 (14.9)	33.9	12.7
T11	15.2(22.9)	18.7	18.5 (25.4)	17.0	22.2(27.4)	12.7	8.1 (15.5)	21.3	12.5
T12	18.7(25.6)		22.3 (28.1)		27.3(29.5)		10.3(18.6)		11.0
CD at 5%	**1.46**		**1.33**		**1.22**		**1.50**		**1.63**
S.E.(m)±	**0.75**		**0.62**		**0.52**		**0.54**		**0.86**
CV%	**4.01**		**3.90**		**2.16**		**3.33**		**5.3**

Path 3 (K): Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne disease management

Table 59: Treatment details of field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne disease management

Treatment No	Treatment Details
1	*Trichoderma* spp. isolate (CICR-Rf-B/Th-11) as seed treatment @ 5 g/kg seed
2	*Trichoderma* spp. isolate (CICR Rf-B/Th-11) as soil treatment @ 1 kg/acre with 100 kg well-decomposed FYM/Compost at sowing time
3	*Trichoderma* spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time
4	*Trichoderma* spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L
5	*Trichoderma* spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L)
6	*Trichoderma* spp. isolate (CICR Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2 ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L)
7	Seed treatment with carboxin 37.5% + thiram 37.5% @ 3.5g/kg
8	Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/L at 60 and 90 DAS
9	Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L) at 60 and 90 DAS
10	Azoxystrobin 18.2% + Difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L) at 60 and 90 DAS
11	Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L) only
12	Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L) only
13	Untreated control

Table 60: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne disease management – Sirsa

Treatment	Germination %	Mortality%								Reduction over control	Plant Morphology							
		40 DAS	55 DAS	70 DAS	85 DAS	100 DAS	115 DAS	130 DAS	145 DAS		Height	Monopod	Sympod	No of Bolls	Boll weight (gm)	SCY (kg/ha)	AUDPC	SPAD value
T1	62.1	2.0 (8.1)	3.4 (10.6)	4.0 (11.5)	6.0 (14.2)	8.1 (16.5)	9.4 (17.8)	9.4 (17.8)	10.7 (19.1)	59.9	155.0	2.4	13.6	34.2	3.6	3369	699.8	47.9
T2	64.2	1.9 (7.9)	1.9 (7.9)	3.9 (11.4)	5.8 (13.9)	6.5 (14.8)	8.4 (16.8)	9.1 (17.5)	10.4 (18.8)	63.8	158.0	1.9	13.6	34.3	3.5	3409	626.3	46.3
T3	65.4	0.0 (0.5)	1.9 (7.9)	3.2 (10.3)	4.4 (12.1)	5.1 (13.0)	6.3 (14.5)	7.6 (16.0)	8.3 (16.7)	72.2	149.4	2.0	12.6	34.8	3.4	3506	489.8	48.9
T4	64.6	0.6 (4.4)	1.9 (7.9)	3.9 (11.4)	4.5 (12.2)	5.8 (13.9)	7.1 (15.4)	7.7 (16.1)	9.0 (17.5)	69.4	176.1	2.2	14.8	35.4	3.6	3646	535.5	48.1
T5	65.8	0.0 (0.5)	1.9 (7.9)	2.5 (9.09)	3.1 (10.1)	4.4 (12.1)	5.7 (13.8)	6.9 (15.2)	6.9 (15.2)	76.2	164.0	1.7	14.9	32.7	3.6	3561	419.3	48.5

T6	68.3	0.0 (0.5)	0.6 (4.44)	1.8 (7.71)	2.4 (8.9)	3.0 (10.0)	3.7 (11.1)	4.2 (11.8)	5.5 (13.6)	84.0	164.5	1.9	13.9	34.1	3.4	3698	276.8	49.5
T7	58.8	2.1 (8.3)	4.3 (12.0)	6.4 (14.7)	8.5 (16.9)	10.6 (19.0)	12.0 (20.3)	13.5 (21.5)	15.6 (23.3)	44.8	171.1	2.0	16.0	31.8	4.0	3095	962.3	47.4
T8	61.7	2.0 (8.1)	4.1 (11.7)	4.7 (12.5)	6.7 (15.0)	7.4 (15.8)	9.5 (17.9)	10.1 (18.5)	12.8 (21.0)	56.7	169.4	2.0	15.6	34.1	3.6	3359	748.5	47.7
T9	60.0	2.1 (8.3)	4.9 (12.8)	6.3 (14.5)	8.3 (16.7)	9.0 (17.5)	11.1 (19.5)	11.8 (20.1)	15.3 (23.0)	48.0	176.6	1.9	16.8	32.9	3.9	3180	901.5	47.1
T10	60.4	2.1 (8.3)	4.1 (11.7)	5.5 (13.6)	6.9 (15.2)	8.3 (16.7)	10.3 (18.7)	11.7 (20.0)	13.8 (21.8)	52.6	163.1	1.9	15.6	32.2	3.8	3147	821.3	47.2
T11	57.5	2.9 (9.8)	4.4 (12.1)	6.5 (14.8)	8.7 (17.1)	10.1 (18.5)	12.3 (20.5)	14.5 (22.4)	16.7 (24.1)	42.4	183.4	1.9	17.1	33.8	4.1	3239	994.5	46.9
T12	58.8	2.1 (8.3)	4.3 (12.0)	6.4 (14.6)	8.5 (16.9)	9.9 (18.3)	12.1 (20.3)	14.2 (22.1)	16.3 (23.8)	44.2	169.2	1.9	16.4	30.2	4.2	3043	969.0	47.1
T13	42.5	5.1 (13.0)	7.6 (16.0)	10.1 (18.5)	13.4 (21.5)	17.6 (24.8)	21.9 (27.9)	26.1 (30.7)	30.4 (33.4)	0.0	166.1	2.3	14.4	27.4	4.1	1895	1716.8	42.3
C.D.	**2.0**	**0.2**	**0.3**	**0.2**	**0.3**	**0.4**	**0.3**	**0.4**	**0.6**		**9.45**	**0.08**	**0.57**	**1.44**	**0.16**	**150.20**		1.8
SE(m)	**0.7**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.2**		**3.22**	**0.03**	**0.19**	**0.49**	**0.06**	**51.16**		0.6
SE(d)	**1.0**	**0.1**	**0.1**	**0.1**	**0.1**	**0.2**	**0.1**	**0.2**	**0.3**		**4.55**	**0.04**	**0.27**	**0.69**	**0.08**	**72.35**		0.9
C.V.	**2.0**	**1.7**	**1.5**	**1.0**	**1.1**	**1.3**	**1.0**	**1.3**	**1.6**		**3.34**	**2.41**	**2.24**	**2.57**	**2.52**	**2.73**		2.2

Table 61: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne disease management – Hisar

Treatment	Germination (%)	Plants Mortality (%)				Reduction over control	CLCuD (PDI)			FFS (Incidence)	Plant Height (cm)	Sympods	SCY (Q/ha)
		30 DAS	60 DAS	90 DAS	120 DAS		60 DAS	90 DAS	120 DAS				
T1	77.67	0.67	1.67	4.00	5.33	66.0	26.33	15.21	38.00	56.67	114.00	19.33	5.65
T2	76.33	1.00	2.33	4.67	5.67	63.8	21.33	12.25	27.00	49.33	99.87	16.67	5.02
T3	78.67	0.67	1.33	3.67	5.00	68.1	20.33	10.74	25.67	47.67	117.23	24.33	5.87
T4	80.33	0.33	1.33	3.67	4.33	**72.4**	20.67	10.68	24.33	42.33	134.00	26.67	5.98
T5	80.67	0.00	0.33	1.67	4.00	**74.5**	12.33	10.56	19.33	40.00	157.00	30.67	**6.45**
T6	82.33	0.00	0.33	2.00	4.67	**70.2**	15.67	11.21	20.33	39.67	149.00	29.00	**6.23**
T7	82.67	0.00	0.67	3.33	5.00	68.1	26.33	12.56	34.33	52.33	107.56	17.00	5.12
T8	75.21	1.67	5.00	9.33	9.67	38.3	22.67	11.50	23.00	49.67	113.70	20.67	5.45
T9	75.13	2.00	5.33	9.67	10.33	34.1	17.33	6.78	16.00	42.67	108.56	18.00	5.39
T10	74.94	2.00	5.33	10.00	11.00	29.8	19.67	7.75	17.67	43.00	90.00	16.00	4.98
T11	75.23	2.33	6.00	10.33	14.33	8.6	28.67	13.98	31.00	53.67	80.00	16.33	4.56
T12	75.11	2.33	6.33	10.67	14.67	6.4	27.00	13.93	33.33	56.00	71.07	15.33	4.34

T13	75.28	2.67	6.67	12.33	15.67	0.0	29.33	15.23	38.33	62.67	61.00	14.00	4.02

Table 62: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne disease management – Bathinda

Treatments	Germination (%)	Plants Mortality (%)				Reduction over control	FFS (PDI)		BLB (PDI)	Mono-pods	Sympods	Plant Height (cm)	No. of open bolls/ plant	SCY (Q/ha)
	7 DAS	30 DAS	60 DAS	90 DAS	120 DAS		90 DAS	120 DAS	120 DAS					
T1	83.3	19.33	19.33	19.33	19.33	25.7	0.83 (5.18)	6.83 (15.13)	2.17 (8.44)	0.66	14.00	127.33	24.11	15.06
T2	84.0	18.00	18.00	18.00	18.00	**30.8**	1.17 (6.17)	7.83 (16.23)	2.67 (9.39)	0.89	14.78	130.33	24.78	15.32
T3	84.7	18.67	18.67	18.67	18.67	28.2	1.00 (5.74)	7.00 (15.33)	2.00 (8.13)	1.33	17.22	133.51	27.11	16.69
T4	84.7	18.67	19.33	19.33	19.33	25.7	0.83 (5.18)	6.33 (14.55)	2.17 (8.45)	0.77	14.22	127.22	24.33	18.57
T5	85.3	18.00	18.00	18.00	18.00	**30.8**	0.83 (5.18)	5.83 (13.95)	2.67 (9.39)	1.22	16.33	135.33	25.22	18.57
T6	84.7	18.67	18.67	18.67	18.67	**28.2**	1.33 (6.60)	5.33 (13.32)	2.33 (8.77)	1.22	17.22	132.33	23.88	18.11
T7	**86.0**	17.33	17.33	17.33	17.33	**33.3**	1.17 (6.17)	7.33 (15.69)	2.00 (8.13)	1.00	15.67	136.67	27.44	19.26
T8	78.0	22.67	23.34	24.00	24.00	7.7	0.67 (4.61)	3.83 (11.25)	1.67 (7.33)	1.11	16.89	137.33	26.22	19.43
T9	82.7	20.67	22.00	22.00	22.00	15.4	0.33 (2.70)	2.83 (9.63)	0.83 (5.18)	1.44	20.44	139.33	36.33	20.38
T10	82.0	20.00	20.66	22.00	22.66	12.8	0.50 (4.05)	3.33 (10.47)	1.33 (6.60)	1.33	17.22	137.67	27.44	19.95
T11	81.3	20.66	23.34	24.00	24.00	7.7	0.67 (4.61)	8.33 (16.76)	3.33 (10.50)	1.22	14.78	136.11	25.22	14.60
T12	77.3	23.34	24.00	24.66	24.66	5.2	1.17 (6.17)	7.83 (16.23)	2.50 (9.09)	1.00	16.22	132.00	25.44	13.61
T13	76.7	24.00	24.66	26.00	26.00	0.0	2.00 (8.13)	8.83 (17.27)	4.17 (11.75)	0.66	13.33	121.67	21.22	13.57
CD(5%)							1.66	0.37	1.10	N/A	3.60	N/A	4.65	2.85
CV							18.19	1.53	7.66	49.73	13.26	8.62	10.53	9.86

Table 63: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil-borne disease management – Junagarh

Treatment	Germination (%)	Plant mortality %		Reduction over control	Fungal PDI		Sympodial branches	Monopodial	No of Boll	Boll weight (g)	Yield (Kg/ha)
		90 DAS	120 DAS		90 DAS	120 DAS					
T1	96.60	1.23	2.58 (1.56)	50.5	22.50 (28.07)	33.67 (35.19)	14.54	1.18	33.00	4.08	1778
T2	94.92	1.23	2.49 (1.55)	52.2	24.72 (29.37)	38.89 (38.35)	14.99	1.17	32.22	4.00	1725
T3	97.46	1.51	2.43 (1.53)	53.4	17.89 (24.85)	32.17 (34.15)	14.63	1.18	32.62	3.93	1748
T4	92.89	1.07	2.08 (1.41)	**60.1**	22.28 (28.10)	35.78 (36.48)	15.37	1.22	32.88	4.01	1645
T5	93.49	1.21	1.94 (1.38)	**62.8**	19.19 (25.64)	33.44 (34.97)	14.48	1.11	32.29	3.81	1628
T6	92.06	1.38	2.52 (1.55)	**51.6**	18.39 (25.24)	31.33 (33.63)	15.08	1.20	33.07	3.93	1670
T7	92.06	1.41	3.51 (1.79)	32.6	18.89 (25.57)	31.04 (33.22)	15.68	1.13	33.40	3.99	1658
T8	92.14	1.59	3.37 (1.78)	35.3	11.00 (18.96)	20.00 (26.03)	15.03	1.18	34.67	4.20	1984
T9	92.13	1.50	1.94 (1.36)	62.8	10.00 (18.29)	17.67 (24.42)	15.48	1.18	35.39	3.99	1944
T10	93.13	2.18	3.11 (1.67)	40.3	9.57 (17.71)	16.44 (23.44)	14.94	1.19	34.26	3.84	1796
T11	90.62	1.66	3.48 (1.82)	33.2	16.56 (23.70)	29.28 (32.37)	14.41	1.09	34.60	3.79	1715
T12	89.74	1.35	2.97 (1.68)	43.0	15.72 (23.22)	28.33 (31.76)	14.72	1.40	34.48	3.96	1689
T13	88.23	1.30	5.21 (2.22)*	0.0	27.11 (31.30)#	39.06 (38.50)#	14.92	1.13	33.58	3.64	1685
S.Em.±	2.00		0.187		1.00	0.98	0.43	0.083	1.00	0.125	71.06
CD	NS		NS		2.82	2.77	NS	NS	NS	NS	207.4
CV%	6.49		11.98		13.55	10.09	8.70	21.20	8.97	9.55	7.06

Table 64: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne disease management – Nanded

Treatment	Germination (%)	Mortality (%)				ROC%	Plant height (cm)	Alternaria leaf spot		Grey mildew		SCY (Q/ha)
		30 DAS	60 DAS	90 DAS	120 DAS			PDI	% Control	PDI	% Control	
T1	96.5	4.6	6.1	7.1	7.1	64.0	131.7	6.1	34.3	22.0	33.9	17.4
T2	96.0	6.6	8.1	9.6	9.6	51.3	140.6	5.4	41.0	21.3	37.8	16.2
T3	93.9	6.6	7.6	8.6	8.6	56.3	135.8	5.0	45.8	20.1	44.1	17.4
T4	92.4	5.1	6.1	7.6	7.6	61.4	130.1	3.9	57.8	17.8	55.5	17.0
T5	93.4	6.1	7.6	8.1	8.1	58.9	123.2	3.4	62.7	15.3	66.5	16.8
T6	93.4	5.6	6.6	7.1	7.1	64.0	124.6	3.0	67.5	15.4	66.1	16.5
T7	97.0	3.5	5.1	6.1	**6.1**	**69.0**	126.7	4.9	46.4	15.3	66.9	18.0
T8	94.4	5.1	6.1	6.6	6.6	66.5	123.1	2.7	71.1	10.0	85.8	15.4
T9	94.4	6.1	8.6	9.1	9.1	53.8	121.2	2.4	73.5	9.5	87.0	18.1
T10	96.0	4.6	7.6	8.1	8.1	58.9	128.1	2.3	74.7	11.8	79.9	17.9
T11	92.4	10.6	13.6	14.1	14.1	28.4	125.1	2.7	71.1	10.7	83.5	15.7
T12	90.9	10.1	13.1	13.6	13.6	31.0	122.4	3.1	66.3	11.3	81.5	15.2
T13	89.4	15.2	18.7	19.7	19.7	0.0	120.3	9.2	0.0	27.4	0.0	13.9
CD	4.4	5.6	5.0	5.1	5.1		0.4	2.5	-	2.6	-	N/A
S.Em.±	1.5	1.9	1.7	1.7	1.7		0.1	0.9	-	0.9	-	0.4
S.E(d)	2.1	2.7	2.4	2.4	2.4		0.2	1.2	-	1.3	-	0.6
CV%	3.4	22.3	17.5	16.9	16.9		2.1	12.9	-	9.7	-	13.9

Table 65: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil-borne disease management – Dharwad

Treatment	Plants Mortality (%)				Reduction over control	Alternaria blight		BLB		Yield (Q/ha)
	30 DAS	60 DAS	90 DAS	120 DAS		PDI	(%) reduction over control	PDI	(%) reduction over control	
T1	2.4 (8.9)	6.3 (14.5)	6.3 (14.5)	6.3 (14.5)	77.3	25.3 (30.2)	14.0	8.4 (16.9)	3.45	12.75
T2	2.9 (9.8)	7.4 (15.8)	7.4 (15.8)	7.4 (15.8)	73.4	21.6 (27.7)	26.5	8.5 (17.0)	2.30	13.50
T3	3.6 (10.9)	6.0 (14.2)	6.0 (14.2)	6.0 (14.2)	**78.4**	21.2 (27.4)	27.9	8.6 (17.1)	1.03	13.46
T4	3.0 (10.0)	7.9 (16.3)	7.9 (16.3)	7.9 (16.3)	71.6	23.4 (28.9)	20.6	8.5 (16.9)	2.30	13.12
T5	2.1 (8.2)	5.0 (13.0)	5.0 (13.0)	5.0 (13.0)	**82.0**	18.7 (25.7)	36.4	6.8 (15.1)	21.84	14.14
T6	2.4 (8.8)	6.2 (14.4)	6.2 (14.4)	6.2 (14.4)	77.7	20.0 (26.5)	32.0	6.5 (14.7)	25.63	15.02
T7	1.0 (5.7)	4.1 (11.7)	4.1 (11.7)	4.1 (11.7)	**85.3**	18.1 (25.1)	38.4	5.0 (12.9)	34.48	15.68
T8	6.5 (14.8)	9.8 (18.3)	11.3 (19.6)	13.3 (21.4)	52.2	15.4 (23.1)	47.6	4.5 (12.3)	48.16	17.25
T9	7.0 (15.3)	9.1 (17.5)	17.4 (25.0)	19.2 (26.3)	31.1	14.3 (22.2)	51.3	4.0 (11.4)	54.60	17.07
T10	7.5 (15.9)	9.5 (18.0)	18.0 (25.1)	20.0 (26.6)	28.1	10.4 (18.8)	64.6	2.9 (9.8)	66.67	18.92
T11	7..4 (15.8)	8.8 (17.3)	17.2 (24.5)	18.7 (25.6)	32.7	25.7 (30.5)	12.6	6.7 (14.4)	23.21	11.52
T12	7.5 (15.9)	9.1 (17.6)	18.1 (25.2)	19.6 (26.3)	29.5	27.3 (31.5)	7.1	6.7 (15.0)	22.99	12.37
T13	9.5 (18.0)	12.00 (20.27)	24.3 (29.5)	27.8 (31.8)	-	29.4 (32.8)	--	8.7 (17.2)	--	10.47
C.D.	**1.06**	**1.66**	**1.12**	**1.24**	**-**	**1.32**		**1.62**		**1.61**
SE(m)	**0.36**	**0.57**	**0.41**	**0.48**	**-**	**0.45**		**0.56**		**0.55**
C.V.	**5.20**	**6.18**	**5.62**	**3.54**	**-**	**2.90**		**6.56**		**6.70**

Table 66: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne disease management – Lam Guntur

Treatment	Germination %	Seedling vigour	Mortality %				ROC%	Plant height (cm)	CoLS (PDI)			GM (PDI)	Rust (PDI)	Boll rot	SCY (Q/ha)
		30 DAS	30 DAS	60 DAS	90 DAS	120 DAS			60 DAS	90 DAS	120 DAS	120 DAS	120 DAS	% Incidence	
T1	80.00	4438.00	0.0	0.0	0.0	1.12	80.3	169.90	3.00	11.17	13.83	11.58	13.33	5.09	16.79
T2	81.33	4415.67	0.0	0.0	0.0	0.56	90.1	166.30	2.00	9.83	13.25	11.75	13.57	4.67	18.43
T3	84.33	4606.00	0.0	0.0	0.0	0.56	90.1	169.99	1.83	8.33	14.17	10.67	13.25	3.67	17.33
T4	84.33	4466.70	0.0	0.0	0.0	0.0	**100.0**	164.48	1.92	2.25	6.75	6.33	7.83	2.28	19.67
T5	80.00	4524.00	0.0	0.0	0.0	0.0	**100.0**	166.20	0.96	2.00	6.42	6.08	7.20	2.92	22.38
T6	87.33	4679.33	0.0	0.0	0.0	0.0	**100.0**	172.67	1.58	2.08	7.67	7.42	8.33	2.00	21.92
T7	81.33	4712.33	0.0	0.0	1.11	1.11	80.5	168.14	3.92	12.33	13.83	13.25	16.42	4.91	22.46
T8	69.33	4102.00	0.0	1.11	1.11	1.11	80.5	171.00	9.83	10.92	11.08	12.08	16.17	4.67	22.74
T9	68.67	4192.70	0.0	0.56	1.68	1.68	70.4	159.30	9.00	11.33	11.92	11.83	16.00	4.90	22.31
T10	70.33	4043.67	0.0	0.0	0.0	0.0	100.0	167.90	8.33	12.92	13.08	13.42	17.00	5.59	16.79
T11	67.67	4170.00	0.0	0.0	2.22	2.22	60.9	158.90	11.75	13.33	13.57	14.50	18.33	5.50	16.33
T12	66.67	3897.00	0.0	0.0	3.89	3.89	31.5	157.80	11.33	14.17	14.50	15.58	19.67	5.09	16.67
T13	64.00	3690.70	0.0	0.0	3.36	5.68	0.0	144.50	12.50	14.92	15.00	16.17	20.33	6.42	14.74

Table 67: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne disease management – Coimbatore

Treatment	Germination (%)	Root rot				% diseases reduction over control	Alternaria blight		Grey mildew		Growth parameters		SCY (Q/ha)
		30 DAS	60DAS	90DAS	120 DAS		PDI	% Control	PDI	% Control	Plant height cm	No.of sympodial Branches	
T1	80	7.5 (15.8)	22.5 (28.3)	25.0 (29.9)	25.3 (30.1)	44.3	13.8 (21.7)	24.5	14.0 (21.9)	28.2	145.2	19.0	16.7
T2	82	6.0 (14.1)	21.7 (27.7)	23.4 (28.9)	23.6 (29.0)	48.1	13.4 (21.4)	26.8	13.4 (21.5	31.2	147.3	20.0	16.9
T3	84	5.8 (13.9)	20.3 (26.7)	22.5 (28.3)	22.9 (28.5)	49.7	12.7 (20.8)	30.6	12.9 (21.0)	33.8	152.7	22.0	17.3
T4	87	5.0 (12.9)	11.5 (19.8)	15.7 (23.3)	15.9 (23.6)	**65.5**	10.3 (18.7)	43.7	10.4 (18.8)	46.7	164.7	25.0	18.2
T5	**89**	**4.7 (12.5)**	**9.7 (18.1)**	**12.0 (20.2)**	**12.3 (19.4)**	**72.9**	9.8 (18.2)	46.4	10.2 (18.5)	47.6	168.6	27.0	**19.1**
T6	**88**	**5.5 (13.5)**	**10.4 (18.8)**	**13.5 (21.6)**	**13.8 (21.8)**	**69.7**	10.1 (18.4)	44.8	10.9 (19.2)	44.1	167.1	26.0	18.5
T7	86	8.2 (16.6)	23.7 (29.1)	24.4 (29.6)	24.9 (30.0)	42.3	13.4 (21.4)	26.7	13.1 (21.2)	32.8	135.2	20	16.0
T8	79	13.0 (21.1)	25.0 (30.0)	24.1 (29.3)	24.5 (30.3)	46.1	7.8 (16.1)	**57.3**	6.8 (15.0)	**65.1**	136.3	15	15.3
T9	82	13.5 (21.5)	24.0 (29.3)	22.2 (28.1)	22.7 (28.5)	50.1	7.3 (15.6)	**60.1**	7.2 (15.3)	**63.0**	138.9.	16	15.5
T10	81	12.8 (20.9)	24.3 (29.5)	23.7 (29.1)	24.0 (29.4)	47.0	7.6 (15.8)	**58.4**	7.4 (15.7)	**62.0**	137.7	17	15.0
T11	77	13.3 (21.4)	25.4 (30.3)	30.7 (33.6)	31.1 (33.7)	31.6	15.5 (23.1)	15.3	15.5 (23.1)	20.5	133.8	14	14.2
T12	76	14.0 (21.9)	25.1 (30.1)	31.5 (34.1)	31.7 (34.9)	30.3	15.8 (23.4)	13.7	15.9 (23.4)	18.5	132.7	14	14.0
T13	72	27.0 (31.3)	40.0 (39.2)	45.0 (42.1)	45.5 (42.4)	0.0	18.3 (25.2)	-	19.5 (26.2)	-	127.3	12	11.7
CD at 5%	**2.30**	**1.20**	**1.07**	**1.20**	**1.10**	**-**	**1.30**		**1.80**		**3.0**	**1.33**	**1.58**
S. E(m)	**1.94**	**1.00**	**0.40**	**0.23**	**0.43**	-	**0.58**		**1.23**		**1.19**	**0.62**	**0.88**
Cv %	**1.70**	**5.40**	**2.32**	**1.66**	**2.22**	-	**3.80**		**5.55**		**3.21**	**3.73**	**5.38**

Path 3(L): Field evaluation of Endophytic BCAs along with chemicals for seed and soil-borne diseases

Table 68: Treatment details of field evaluation of Endophytic BCAs along with chemicals for seed and soil-borne diseases

Treatment No	Treatment Details
1	Seed treatment (ST) with *Diaporthe longicolla* CEL-48 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS
2	Seed treatment (ST) with *Diaporthe eschscholtzii* M1-4 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS
3	Seed treatment (ST) with *Diaporthe melonis CFS-5* @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS
4	Seed treatment (ST) with consortium ECN-1 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS
5	Seed treatment (ST) with consortium ECN-2 @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS
6	Seed treatment (ST) with commercial formulation (BCA) @ 5g/kg seed + Foliar spray (FS) @ 5g/lit water at 60 and 90 DAS
7	Seed treatment (ST) with Carboxin + Thiram @ 3.5g/kg seed + Foliar spray (FS) of Propineb @ 2.5g/lit water at 60 and 90 DAS
8	Control

Table 69: Field evaluation of Endophytic BCAs along with chemicals has to be done for seed and soil-borne diseases - Hisar

Treatment	Germination (%)	Height of the per plant (cm)	No. of sympodia per plant	Root Rot		Leaf Spot		Boll Rot		Seed cotton yield (Q/ha)
				Disease Incidence (%)	Disease Severity (%)	Disease Incidence (%)	Disease Severity	Disease Incidence (%)	Disease Severity	
T1	84.97	99	17.45	16.67	6.67	25.34	13.67	5.13	2.56	4.32
T2	83.67	127	26.56	14.44	6.45	16.54	6.11	6.22	3.12	5.13
T3	84.76	129	31.77	7.67	3.89	10.45	4.73	6.47	3.30	5.41
T4	83.11	137	30.23	13.89	5.87	14.09	8.66	6.88	3.87	5.63
T5	82.54	117	18.69	12.72	4.34	13.56	6.25	6.65	3.72	4.92
T6	86.74	112	18.23	15.76	6.86	21.10	11.45	7.56	3.90	4.77
T7	81.89	119	24.45	12.90	5.78	18.58	9.76	8.11	4.21	5.32
T8	78.98	69	21.78	18.33	9.87	27.92	15.83	8.69	4.43	4.04

Table 70: Field evaluation of Endophytic BCAs along with chemicals for seed and soil-borne diseases-RRS Faridkot

Treatment	Germination (%)	FFLS (PDI)	CLCuD PDI	Height	Monopods	Sympods	Yield (Q/Ha)
T1	95.33	5.28 (13.28)	57.21	147.2	1.3	19.8	13.20
T2	96.00	5.83 (13.98)	58.43	150.0	1.4	20.4	15.40
T3	96.67	6.39 (14.64)	58.55	148.3	1.3	20.4	14.30
T4	95.33	5.00 (12.92)	56.02	145.1	1.3	20.9	15.80
T5	96.00	5.83 (13.98)	55.80	150.0	1.3	19.8	14.50
T6	98.67	6.11 (14.31)	59.71	153.3	1.6	21.3	15.40
T7	96.00	4.17 (11.78)	58.80	152.2	1.4	20.7	16.60
T8	90.67	7.78 (16.19)	63.36	142.6	1.0	18.9	12.10
CD (5%)	-	1.9		-	-	-	NS
CV	-	7.8		-	-	-	15.44

Table 71: Field evaluation of Endophytic BCAs along with chemicals has to be done for seed and soil-borne diseases (Bathinda)

Treatments	Germination (%)	FLS		BLB		Monopod	No. of Sympods	Plant Height (cm)	No. of open bolls	SCY (Q/ha)
		PDI	DR	PDI	DR					
T1	91.3	5.00 (12.84)	R	1.00 (5.60)	R	1.1	9.9	114.6	14.4	12.9
T2	90.7	5.67 (13.71)	R	1.17 (6.16)	R	1.0	9.0	109.2	14.7	13.4
T3	92.7	6.00 (14.08)	R	1.17 (5.97)	R	0.9	9.1	109.7	15.3	12.7
T4	89.3	5.17 (13.11)	R	0.83 (5.17)	R	1.1	9.2	108.2	14.3	13.6
T5	88.7	5.83 (13.89)	R	1.17 (6.16)	R	1.2	10.0	112.7	14.6	13.3
T6	86.0	5.50 (13.49)	R	1.00 (5.60)	R	1.1	9.7	113.9	14.0	12.8
T7	94.7	3.67 (10.92)	R	0.67 (4.61)	R	1.3	10.3	117.0	16.9	13.8
T8	84.0	6.83 (15.10)	R	2.00 (8.08)	R	0.8	8.8	105.4	13.1	11.7
C.D.		2.05		1.37		N\A	N\A	N\A	N\A	0.4
C.V.		8.65		13.13		36.0	9.5	6.3	12.1	2.0

Table 72: Field evaluation of Endophytic BCAs along with chemicals for seed and soil borne diseases- Junagarh (Gujarat)

Treatment	Germination %	Root Rot incidence 120 DAS	Fungal Disease Intensity (%)	BLB PDI 120 DAS	No of Sympodia/ *Plant*	Height (cm)	No of Boll	Boll weight (g)	Yield (Kg/ha)
T1	95.54	**3.15 (1.76)**	**16.50 (4.06)**	10.33 (3.21)	16.33	121.00	37.13	4.40	2160
T2	97.57	**3.66 (1.89)**	**14.17 (3.75)**	10.33 (3.21)	17.93	118.33	38.53	4.10	1957
T3	97.50	4.74 (2.16)	34.17 (5.84)	18.83 (4.33)	17.20	118.67	41.20	4.23	2141
T4	97.62	**3.17 (1.76)**	**20.30 (4.51)**	18.47 (4.29)	18.07	119.67	41.20	4.43	2044
T5	96.89	3.48 (1.85)	31.17 (5.58)	18.17 (4.25)	17.40	113.00	36.60	4.57	2035
T6	97.25	3.60 (1.89)	32.33 (5.68)	19.17 (4.38)	16.87	124.00	39.40	4.47	2047
T7	96.01	6.13 (2.47)	14.00 (3.74)	18.83 (4.34)	17.40	115.67	34.67	4.17	1943
T8	92.17	15.69 (3.96)	38.50 (6.20)	20.00 (4.47)	17.93	121.67	39.73	4.30	2025
S.Em.±	1.20	0.17	0.15	0.14	0.73	3.49	2.87	0.14	148.06
CD	NS	0.51	0.46	0.43	NS	NS	NS	NS	NS
CV%	2.26	13.22	5.28	6.00	7.28	5.08	12.90	5.49	12.55

Table 73: Field evaluation of Endophytic BCAs for the management of cotton diseases and plant growth (Nanded)

Treatment	*Aternaria* leaf spot		Grey mildew		Gremination %	Plant hight (cm)	Yield (Q/ha)
	PDI	% control	PDI	% control			
T1	4.83 (12.66)	51.40	11.50 (19.80)	60.00	97.47 (82.86)	140.40	16.14
T2	5.72 (13.77)	42.46	12.67 (12.66)	55.17	95.96 (80.54)	136.80	18.21
T3	4.72 (12.48)	52.51	12.50 (12.50)	**58.62**	95.96 (80.78)	134.20	16.31
T4	3.94 (11.45)	**60.34**	10.67 (10.66)	**63.79**	97.47 (81.14)	144.00	17.54
T5	4.17 (11.72)	**58.10**	12.42 (12.41)	**58.97**	95.45 (77.77)	136.60	16.20
T6	5.00 (12.82)	49.72	12.92 (21.03)	57.24	96.98 (83.51)	140.73	15.69
T7	3.44 (10.65)	**65.36**	9.33 (17.73)	**73.10**	97.98 (85.23)	136.40	18.47
T8	9.94 (18.35)	0.00	25.33 (30.20)	0.00	94.95 (77.65)	131.13	13.58
C.D.	**1.70**		**2.65**		**N/A**		**N/A**
SE(m)	**0.55**		**0.86**		**4.04**		**0.41**
SE(d)	**0.78**		**1.22**		**5.71**		**0.58**
C.V.	**8.63**		**5.01**		**8.62**		**13.30**

Table 74: Field evaluation of Endophytic BCAs for antimicrobial activity and growth promotion- Coimbatore

Treatment	Germination %	Plant height (cm)	Root rot		*Alternaria* leaf *blight*		Grey mildew		Boll rot		SCY (Q/ha)
			% incidence	% Control	PDI	% Control	PDI	% Control	% incidence	% Control	
T1	94.0	152.5	13.5 (21.5)	60.0	10.6 (18.9)	42.7	11.9 (20.1)	45.2	8.5 (16.9)	32.0	15.3
T2	91.0	152.3	14.9 (22.6)	55.7	11.7 (20.0)	36.7	13.4 (21.4)	38.2	9.3 (17.7)	25.6	14.1
T3	90.0	149.6	15.3 (23.0)	54.5	12.1 (20.3)	34.5	13.8 (21.8)	36.4	9.5 (17.9)	24.0	14.5
T4	96.3	167.5	10.3	**69.4**	8.4	54.5	10.6	51.1	6.7	46.4	18.3

			(18.6)		(16.8)		(18.9)		(14.9)		
T5	95.0	163.3	11.6 (19.9)	**65.6**	8.7 (17.0)	52.9	11.4 (19.7)	47.4	7.3 (15.4)	41.6	17.9
T6	90.0	158.3	13.2 (21.2)	60.8	9.9 (18.2)	46.4	12.6 (20.2)	41.9	8.3 (16.7)	33.6	16.2
T7	93.0	157.0	7.2 (15.4)	**78.6**	5.3 (13.2)	71.4	8.2 (16.6)	62.2	5.6 (13.6)	55.2	17.6
T8	80.0	130.6	33.7 (35.4)	-	18.5 (25.4)	-	21.7 (27.7)	-	12.5 (20.6)	-	12.0
CD	**2.23**	**1.30**	**1.50**		**1.30**		**1.19**		**1.20**		**1.71**
S.Em.±	**1.39**	**0.55**	**0.32**		**0.60**		**0.46**		**0.38**		**0.96**
CV%	**1.39**	**3.10**	**2.57**		**4.1**		**3.26**		**3.68**		**6.2**

Table 75: Field evaluation of Endophytic BCA's for seed and soil borne diseases of Cotton- Dharwad

Treatment	Seedling mortality		Alternaria blight		Bacterial blight		SCY Q./ha
	Mortality (%)	(%) reduction over control	PDI	(%) reduction over control	PDI	(%) reduction over control	
T1	7.50 (15.89)	40.94	14.90 (22.71)	**35.21**	6.40 (14.68)	20.91	12.12
T2	8.30 (16.74)	34.65	17.50 (24.70)	23.91	7.30 (15.68)	9.88	11.42
T3	8.40 (16.85)	33.85	16.60 (24.02)	27.83	7.00 (15.38)	13.58	12.77
T4	5.20 (13.18)	**59.06**	15.10 (22.83)	**34.35**	5.00 (12.98)	38.27	13.57
T5	6.50 (14.77)	**48.82**	16.10 (23.65)	30.00	5.90 (14.11)	27.16	12.95
T6	3.20 (10.30)	**74.80**	13.10 (21.18)	**43.04**	4.90 (12.79)	39.51	13.58
T7	2.30 (8.72)	**81.89**	11.10 (19.48)	**51.74**	3.90 (11.39)	51.85	14.75
T8	12.70 (20.88)	--	23.00 (28.63)	--	8.10 (16.54)	--	9.08
CD	**0.82**		**1.71**		**1.10**		**0.87**
S.Em.±	**0.27**		**0.57**		**0.36**		**0.28**
CV%	**3.20**		**4.19**		**4.44**		**3.96**

Table 76: Field evaluation of Endophytic BCA's for seed and soil-borne diseases of Cotton – Lam, Guntur

Treatment	Germination at 7 DAS (%)	Seedling vigour at 30 DAS	Plant height (cm)	No. Sympodia	No. Bolls	Per cent Disease Index (PDI)						Incidence (%)	SCY (q/ha)
						60DAS	90DAS		120DAS				
						CoLS	CoLS	GM	CoLS	GM	Rust	Boll Rot	
T1	89.50	3836.33	166.30	22.67	44.03	3.97	13.00	10.83	21.33	13.17	17.33	1.36	18.86
T2	91.80	3897.00	164.60	22.87	44.00	4.00	12.67	10.92	20.83	11.58	16.83	1.40	18.68
T3	90.00	4805.67	167.90	21.77	43.67	4.08	12.33	11.25	19.83	11.83	16.67	1.45	18.96
T4	98.50	4942.90	175.80	23.27	46.00	3.90	12.50	9.83	19.34	10.92	15.45	1.84	19.00
T5	98.00	5055.50	172.67	24.00	45.60	4.00	12.00	9.00	20.07	11.00	15.58	1.07	19.33
T6	92.50	4697.33	172.40	23.67	46.53	3.90	12.67	9.75	19.67	11.25	16.17	1.20	19.05
T7	90.00	4712.33	171.00	24.33	47.33	3.67	12.83	9.42	19.00	10.67	14.33	0.77	20.43
T8	86.60	4043.67	160.00	19.67	40.33	4.13	17.89	14.58	25.36	16.80	20.07	2.00	16.59

Path.3. (m): Management of TSV disease on cotton through its vector management

Table 77: Treatment details for field evaluation of chemicals for vector management of TSV disease

Tr. No.	Insecticides	Dosage ml/g/ha	Foliar Spray schedule					
			Drenching 30 DAS	FS 45 DAS	FS 60 DAS	FS 75 DAS	FS 90 DAS	FS 120 DAS
T1	Spinetoram 11.70 % SC	420	√	√	√	√	√	√
T 2	Diafenthiuron 50%WP SC	500	√	√	√	√	√	√
T 3	Profenofos 50 % EC	1000	√	√	√	√	√	√
T 4	Tolfenpyrad 15 % EC	1000	√	√	√	√	√	√
T 5	Dinotefuron 20 SG	150	√	√	√	√	√	√
T 6	Flonicamid 50 WG	150	√	√	√	√	√	√
T 7	Control (Water spray)	-	√	√	√	√	√	√

Table 78: Field evaluation of chemicals for TSV disease – Rahuri

Treatment	Tobacco streak virus disease PDI						Mean	Per cent disease control	AUDPC
	30 DAS	45 DAS	60 DAS	75DAS	90DAS	120DAS			
T1	5.34 (13.4)	7.1 (15.5)	8.4 (16.8)	9.8 (18.3)	12.5 (20.7)	14.3 (22.3)	9.6 (18.0)	**23.5**	**98.88**
T2	5.9 (14.1)	7.6 (16.0)	8.9 (17.4)	10.5 (18.9)	13.5 (21.6)	15.3 (23.1)	10.3 (18.7)	17.8	106.75
T3	5.4 (13.4)	6.8 (15.1)	8.2 (16.7)	9.7 (18.1)	12.1 (20.3)	14.1 (22.0)	9.4 (17.8)	**25.3**	**98.63**
T4	5.7 (13.74)	7.6 (16.0)	8.9 (17.3)	10.4 (18.8)	13.3 (21.4)	15.3 (23.0)	10.2 (18.6)	18.7	107.92
T5	5.6 (13.7)	7.33 (15.7)	8.8 (17.3)	10.3 (18.8)	12.9 (21.1)	14.6 (22.5)	9.9 (18.4)	20.7	102.38
T6	5.4 (13.4)	7.0 (15.3)	8.4 (16.8)	9.8 (18.3)	12.1 (20.4)	14.1 (22.1)	9.5 (17.9)	24.4	100.19
T7	7.9 (16.3)	10.2 (18.6)	11.7 (20.0)	13.3 (21.4)	15.1 (22.8)	17.0 (24.4)	12.5 (20.7)	0.0	119.00
SE(m)	0.23	0.09	0.05	0.03	0.11	0.09	0.091	-	-
C.D.	0.73	0.28	0.15	0.092	0.35	0.29	0.282	-	-
C.V.	2.89	0.98	0.48	0.269	0.89	0.7	0.962	-	-

*Figures in parentheses are arcsine transformed values for percentage

Table 79: Field evaluation of chemicals for vector management of TSV disease – Rahuri

Treatment	Thrips per 3 leaves						Mean	%ROC**	No. of square dried / plant	Total No. of square/plant	Per cent square dried/ plant	Yield (q/ha)
	30 DAS	45 DAS	60 DAS	75DAS	90DAS	120DAS						
T1	35.9 (6.0)	19.7 (4.3)	1.6 (1.3)	0.3 (0.9)	0.7 (1.1)	0.8 (1.1)	**9.8 (18.3)**	37.7	4.3 (2.2)	33.8 (5.9)	13.0 (21.1)	19.2
T2	38.1 (6.1)	25.0 (4.8)	2.6 (1.6)	0.3 (0.9)	1.4 (1.4)	1.5 (1.4)	11.5 (19.8)	27.3	5.4 (2.4)	30.4 (5.6)	15.9 (23.5)	16.6
T3	29.1	13.8	1.4	0.2	0.7	0.7	**7.6**	51.7	3.5	36.5	10.8	21.5

	(5.4)	(3.6)	(1.3)	(0.8)	(1.1)	(1.1)	**(16.0)**		(2.0)	(6.1)	(19.2)	
T4	37.4 (6.1)	21.4 (4.5)	2.1 (1.5)	0.4 (0.9)	1.0 (1.2)	1.3 (1.3)	10.6 (19.0)	32.9	4.83 (2.31)	31.5 (5.65)	14.3 (22.2)	18.4
T5	36.5 (6.0)	21.0 (4.4)	1.6 (1.3)	0.3 (0.9)	0.8 (1.1)	1.1 (1.3)	10.2 (18.7)	35.3	4.7 (2.3)	32.5 (5.8)	13.9 (21.9)	19.0
T6	32.2 (5.2)	15.9 (3.9)	1.5 (1.4)	0.2 (0.8)	0.6 (1.1)	0.8 (1.1)	**8.5** **(17.0)**	46.1	3.8 (2.1)	34 .7 (5.9)	12.0 (20.2)	19.8
T7	48.6 (7.0)	35.4 (5.8)	4.8 (2.1)	1.1 (1.3)	2.0 (1.5)	2.9 (1.8)	15.8 (23.4)	0.0	7.03 (2.7)	26.9 (5.2)	26.1 (30.7)	9.04
SE(m)	0.10	0.02	0.04	0.03	0.03	0.03	0.04		0.1	0.2	1.3	0.2
C.D.	0.35	0.02	0.12	0.08	0.09	0.09	0.13		0.3	0.3	4.0	0.5
C.V.	2.46	0.32	4.81	4.02	4.02	4.5	3.35		6.4	3.3	9.9	7.1

*Figures in parentheses are square root transformed values for no. of thrips.

** *ROC: reduction over control

Table 80: Management of TSV disease through its vector management (New Experiment) *Kharif*, 2024-2025- Nanded

Sr No	Dosages ml/g/ha	Percent TSV incidence (DAS)										SCY
		30 DAS		45 DAS		60 DAS		75 DAS		90 DAS		
		OV	TV	OV	TV	OV	TV	OV	TV	OV	TV	
T1	420	3.05	2.01	4.85	2.42	18.52	4.42	23.00	4.90	10.58	3.40	17.48
T2	500	3.73	2.17	6.22	2.68	23.53	4.95	26.87	5.28	15.25	4.03	16.13
T3	1000	3.67	2.16	6.62	2.76	24.68	5.07	28.20	5.40	16.33	4.16	15.60
T4	1000	2.77	1.94	5.25	2.50	19.78	4.56	23.15	4.91	10.90	3.45	17.17
T5	781	3.02	2.00	5.82	2.61	20.97	4.69	24.50	5.05	11.78	3.58	16.50
T6		2.90	1.97	5.53	2.56	20.48	4.64	23.77	4.98	11.37	3.51	16.88
T7		7.88	2.98	23.27	4.93	42.77	6.62	43.50	6.67	28.32	5.41	13.13
C.D.			**0.16**		**0.18**		**0.26**		**0.27**		**0.24**	**2.14**
SE(m)			**0.05**		**0.06**		**0.08**		**0.09**		**0.08**	**0.69**
SE(d)			**0.07**		**0.08**		**0.12**		**0.12**		**0.11**	**0.97**
C.V.			**4.02**		**3.45**		**2.93**		**2.77**		**3.36**	**7.37**

Table 81. Management of TSV disease through its vector management (New Experiment) *Kharif*, 2024-2025- Lam, Guntur

Treatment	TSV incidence (%) Hybrid: Akira																		Seed cotton yield (Q/ha)
	Drenching 30 DAS			Foliar spray 45 DAS			Foliar spray 60 DAS			Foliar spray 75DAS			Foliar spray 90DAS			Foliar spray 120DAS			
	Before trt.	7 DAT	15 DAT	Before trt.	7 DAT	15 DAT	Before trt.	7 DAT	15 DAT	Before trt.	7 DAT	15 DAT	Before trt.	7 DAT	15 DAT	Before trt.	7 DAT	15 DAT	
T1 Spinetorum 11.7 % SC	1.3	1.3	1.3	3.5	3.8	4.3	5.1	5.5	5.6	6.2	6.2	6.4	6.5	7.4	7.5	7.7	8.1	8.1	14.9
T2 Diafenthiuron 50 % EC	1.1	1.1	1.2	2.7	2.7	2.8	4.7	4.8	5.9	6.3	6.5	6.8	7.3	7.3	7.5	8.1	8.1	8.1	14.0
T3 Profenofos 50% EC	1.5	1.6	1.6	3.3	3.5	3.5	5.34	5.6	6.1	6.5	6.8	7.3	7.5	7.8	7.8	8.7	9.0	9.0	13.1
T4 Tolfenpyrad 15% EC	1.5	1.5	1.5	3.0	3.2	3.3	4.9	5.0	5.2	6.4	6.5	6.8	6.9	7.1	7.1	7.5	7.9	8.1	14.5
T5 Control (water spray)	1.1	1.3	1.3	3.4	3.6	7.5	7.7	8.0	8.7	9.0	9.0	9.5	10.5	11.5	11.5	11.8	12.0	12.0	11.4

*DAS – Days after sowing; DAT – Days after the treatment; Avg. – Average of three replications

Table 82. Management of TSV disease through its vector management (New Experiment) *Kharif*, 2024-2025- Lam, Guntur

Treatment	TSV incidence (%) Hybrid: Sri																		Seed cotton yield (Q/ha.)
	Drenching 30 DAS			Foliar spray 45 DAS			Foliar spray 60 DAS			Foliar spray 75DAS			Foliar spray 90DAS			Foliar spray 120DAS			
	Before trt.	7 DAT	15 DAT	Before trt.	7 DAT	15 DAT	Before trt.	7 DAT	15 DAT	Before trt.	7 DAT	15 DAT	Before trt.	7 DAT	15 DAT	Before trt.	7 DAT	15 DAT	
	Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg	
T1 Spinetorum 11.7 % SC	1.30	1.31	1.31	3.48	3.50	3.66	5.10	5.28	5.64	6.24	6.20	6.38	6.45	7.48	7.56	7.62	8.14	8.14	16.96
T2 Diafenthiuron 50 % EC	1.06	1.07	1.19	2.94	3.16	3.84	4.86	4.89	5.28	6.36	6.74	6.85	7.48	7.56	7.68	8.22	8.24	8.32	15.83
T3 Profenofos 50% EC	1.49	1.54	1.64	3.89	3.95	4.05	5.88	5.93	6.84	6.68	7.14	7.46	7.52	7.96	8.04	9.10	9.12	9.16	16.18
T4 Tolfenpyrad 15% EC	1.36	1.38	1.50	3.96	4.10	4.14	5.08	5.11	5.14	6.42	6.45	6.56	6.80	7.12	7.15	7.52	8.22	8.30	16.32
T5 Control (water spray)	1.20	1.340	1.41	3.76	3.85	8.40	8.64	8.82	8.90	9.48	9.62	9.78	10.66	11.49	11.63	11.75	12.25	13.10	13.79

*DAS – Days after sowing; DAT – Days after the treatment; Avg. – Average PDI of three replications

Path.4: Crop loss estimation

Pathe 4(e) Crop loss estimation and distribution pattern of CLCuD

Table 83: Number of boll reduction (%) grade-wise in different Bt hybrids in North Zone at Unprotected condition

Grades	US51		Ankur 3078	RCH 773 BGII				NCS 9013 BGII				ACH 177-1 BG II				Overall average
	HSR	SGR	FDK	HSR	FDK	SGR	Avg.	HSR	FDK	SGR	Avg.	HSR	FDK	SGR	Avg.	
0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
1	16.2	-	7.8	12.0	1.2	3.44	5.5	16.9	6.5	1.53	8.3	15.8	2.9	1.25	6.7	7.8
2	16.5	5.40	11.1	12.8	13.5	10.50	12.3	16.0	8.9	8.46	11.1	17.9	7.4	12.76	12.7	11.8
3	29.6	28.54	30.7	24.9	18.6	21.19	21.6	16.3	27.5	25.57	23.1	24.4	18.5	30.39	24.4	24.7
4	25.1	37.33	37.9	18.6	23.8	38.40	26.9	33.8	33.7	41.53	36.3	30.8	24.6	47.24	34.2	32.7
5	24.8	-	46.9	18.5	37.4	-	28.0	33.8	38.6	-	36.2	37.3	36.1	-	36.7	34.2
6	48.6	-	-	42.0	-	-	42.0	48.8	-	-	48.8	41.3	-	-	41.3	45.2
Mixed	23.0	23.7		18.4		18.3	18.4	23.7		19.2	21.5	23.9		22.9	23.4	21.6

Table 84: Boll weight reduction (%) grade-wise in different Bt hybrids in North Zone at Unprotected condition*.

Grades	US51				RCH 773 BGII				NCS 9013 BGII				ACH 177-1 BG II				Overall average
	HSR	FDK*	SGR	Avg.	HSR	FDK*	SGR	Avg.	HSR	FDK*	SGR	Avg.	HSR	FDK*	SGR	Avg.	
0	0.0		-	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0
1	13.3		-	13.3	7.8		0.4	4.1	16.7		1.3	9	3.6		0.7	2.2	6.3
2	25.8		1.1	13.45	13.2		5.2	9.2	19.8		4.9	12.35	12.8		9.6	11.2	11.6
3	32.9		11.9	22.4	20.1		11.2	15.65	31.4		12.5	21.95	23.6		22.6	23.1	20.8
4	53.1		26.7	39.9	23.3		21.9	22.6	34.2		29.5	31.85	33.1		30.5	31.8	31.5
5	55.1		-	55.1	35.6		-	35.6	44.7		-	44.7	39.7		-	39.7	43.8
6	64.1		-	64.1	41.4		-	41.4	46.5		-	46.5	42.7		-	42.7	48.7
Mixed	34.8		10.0	22.4	20.1		7.6	13.85	27.5		9.8	18.65	22.1		12.7	17.4	18.1

*** (-) Data not received**

Table 85: Seed cotton yield (%) reduction disease grade wise in different Bt hybrids in North Zone at Unprotected condition

Grades	US 51		Ankur 3078 BGII	RCH 773 BGII				NCS 9013 BGII				ACH 177-1 BG II				Overall average
	HSR	SGR	FDK	HSR	FDK	SGR	Avg.	HSR	FDK	SGR	Avg.	HSR	FDK	SGR	Avg.	
0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
1	20.6	-	6.7	17.9	2.5	3.01	7.8	11.9	3.2	3.60	6.2	11.5	2.3	2.44	5.4	7.8
2	41.2	8.78	9.9	44.3	15.7	14.88	25.0	36.5	9.1	13.27	19.6	32.8	5.7	21.20	19.9	21.1
3	52.2	36.85	26.0	62.1	20.5	30.76	37.8	56.3	21.3	34.19	37.3	50.1	12.9	45.96	36.3	37.4
4	65.7	53.19	31.2	67.8	25.7	52.91	48.8	66.2	29.7	57.90	51.3	59.3	20.8	63.01	47.7	49.5
5	73.6	-	41.5	71.8	32.4	-	52.1	72.2	35.3	-	53.8	66.4	30.6	-	48.5	53.0
6	83.5	-	-	83.6	-	-	83.6	79.4	-	-	79.4	74.4	-	-	74.4	80.2
Mixed	48.1	32.9	-	49.6	-	25.3	37.5	46.1	-	27.2	36.7	42.1	-	33.1	37.6	38.1

Table 85b: Crop loss estimation due to CLCuD grade-wise in different Bt hybrids at protected conditions (Hisar)

Grades	Percent reduction over Grade 0 (Healthy																			
	US51					RCH 773 BGII					NCS 9013 BGII					ACH 177-1 BG II				
	Boll No	Boll wt	Boll wt. red %	SCY (g/plant)	SCY red %	Boll No	Boll wt	BW red. %	SCY	SCY Red %	Boll No	Boll wt	BW red %	SCY	SC red. %	Boll No	Boll wt	BW red %	SCY	SCY red. %
0	54.6	5.9	0.0	182.2	0.0	60.8	5.6	0.0	237.5	0.0	56.5	4.4	0.0	200.2	0.0	58.6	4.9	0.0	200.2	0.0
1	43.3	5.5	20.6	167.3	8.2	55.9	5.5	8.1	211.3	11.0	50.4	4.1	10.7	177.8	11.2	50.0	4.5	14.6	177.5	11.4
2	39.4	4.8	9.0	147.6	11.8	41.7	4.9	25.4	168.3	20.3	39.6	4.0	21.4	136.3	23.4	40.5	4.0	19.0	150.6	15.2
3	33.2	4.6	15.7	130.3	11.7	27.7	4.2	33.6	109.1	35.2	29.9	3.7	24.5	121.4	10.9	30.8	3.7	24.0	117.3	22.1
4	23.8	4.2	28.6	100.1	23.2	26.5	4.2	4.4	84.3	22.7	16.2	3.2	46.0	80.7	33.5	19.3	3.5	37.2	75.5	35.7
5	14.5	3.8	39.2	46.8	53.3	20.5	3.9	22.4	50.3	40.3	10.2	2.3	36.6	42.5	47.4	14.2	3.1	26.7	51.3	32.0
6	5.9	3.5	59.2	23.7	49.4	13.2	3.7	35.5	29.5	41.4	5.3	3.0	48.1	22.5	46.9	7.7	3.0	45.7	33.7	34.3
Average	30.7	4.6	24.6	114.0	22.5	35.2	4.6	18.5	127.2	24.4	29.7	3.7	26.8	111.6	24.8	31.6	3.8	23.9	115.2	21.5

Table 85c: Loss occurred due to fungal foliar diseases at CRS, JAU, Junagarh (Gujarat)

Sr. No.	*Bt* Hybrids	Yield loss due to fungal foliar diseases (Alternaria leaf spot)						
		Protected			Unprotected			Loss %
		Yield/plot	Average Grade	PDI	Yield/plot	Average Grade	PDI	
1	G. Cot. Hy-8 BG II	7.750	1.06	26.5	7.57	1.82	45.5	2.3
2	G. Cot. Hy-24 BG II	13.650	1.08	27.0	12.23	2.5	62.5	10.4
3	G. Cot. Hy-10 BG II	10.130	0.98	24.5	9.42	2.18	54.5	7.0
4	Platinum BG II	8.350	0.82	20.5	8.16	1.68	42.0	2.3
5	Ajeet 5 BG II	10.500	0.74	18.5	10.30	1.22	30.5	1.9
Average yield loss due to fungal foliar diseases (Alterneria leaf spot)								**4.8**

Pathe 4(e) Crop loss estimation and distribution pattern of TSV

Table 86: Foliar Spray schedule to work out the crop loss due to TSV

Tr. No.	Insecticides	Dosage ml/g/ha	Foliar Spray schedule (Days after sowing)				
			30 DAS	45 DAS	60 DAS	75 DAS	90 DAS
T1	No Spray	-	-	-	-	-	-
T2	Spinetoram 11.70 % SC	420	-	Spinetoram	-	-	-
T3	Diafenthiuron 50%WP SC	500	-	-	Diafenthiuron	-	-
T4	Profenofos 50 % EC	1000	-	-	-	Profenofos	-
T5	Deltamethrin 01.80% EC	781	Drenching	Spinetoram	Diafenthiuron	Profenofos	Deltamethrin
T6	Flonicamid 50 WG/ Drenching of any suitable insecticide for local region		Drenching	-	-	-	-

Central Zone

Table 87a: Yield loss estimation due to TSV severity for Rasi 2 (BG II)-Rahuri

Tr. No	Average percent disease severity (TSV)					Mean	Percent Disease Control	Avg. disease grade	(AUDPC)	No. of boll per plant	Height of plant	Yield of plants (q/ha)
	30 DAS	45 DAS	60 DAS	75DAS	90DAS**							
T1	6.67 (14.96)	10.25 (18.67)	13.50 (21.55)	17.21 (24.51)	18.96 (25.81)	13.00 (21.13)	0.00	**3 (1.87)**	132.78	15.85 (4.04)	3.4 (1.97)	10.15 (3.26)
T2	6.21 (14.43)	8.88 (17.33)	11.79 (20.08)	15.25 (22.99)	16.46 (23.93)	11.15 (19.51)	14.22	**2.25 (1.66)**	116.28	18.55 (4.36)	4 (2.12)	12.5 (3.61)
T3	6.25 (14.48)	9.33 (17.79)	12.12 (20.38)	14.71 (22.55)	16.46 (23.93)	11.24 (19.59)	13.56	**2.75 (1.80)**	118.28	16.5 (4.12)	3.9 (2.10)	11.25 (3.43)
T4	5.59 (13.67)	8.25 (17.16)	11.33 (19.67)	14.42 (22.31)	16.46 (23.93)	10.66 (19.06)	17.95	**2.0 (1.58)**	115.28	21.60 (4.70)	4 (2.12)	13.5 (3.74)
T5	5.33 (13.35)	7.83 (16.25)	9.42 (17.87)	12.25 (21.35)	14.92 (22.72)	9.69 (18.13)	25.49	**1.5. (1.41)**	**104.56**	25.85 (5.13)	5.5 (2.45)	16.25 (4.09)
T6	5.67 (13.77)	8.71 (16.69)	11.46 (19.67)	14.25 (22.18)	15.71 (23.35)	10.67 (19.05)	18.04	**1.75 (1.50)**	110.03	25.2 (5.07)	4.46 (2.23)	14.00 (3.81)
SE(m)	0.174	0.094	0.063	0.161	0.106	0.120		**0.139**		0.049	0.102	0.122
C.D.	0.53	0.286	0.193	0.49	0.322	0.364		N/A		0.15	N/A	0.37
C.V.	2.454	1.075	0.6	1.424	0.884	1.287		17.152		2.153	9.415	6.674

Table 87b: Average percent disease severity (average of 5 sprays) for Jadoo BG II-Rahuri

Treatment	Average TSV percent disease severity					Mean	Percent Disease Control	Disease grade	AUDPC	No. of boll per plant	Height of plant	Yield of plants (q/ha)
	30 DAS	45 DAS	60 DAS	75DAS	90DAS**							
T1	5.67 (14.14)	9.25 (17.71)	12.25 (20.49)	13.67 (21.70)	16.21 (23.74)	11.41 (19.74)	0.00	1.60 (1.45)	113.53	26.90 (5.23)	3.23 (1.93)	10.97 (3.39)
T2	4.83 (12.99)	7.50 (15.89)	9 (17.46)	9.75 (18.19)	10.83 (19.22)	8.32 (16.76)	27.11	1.25 (1.32)	75.25	32.63 (5.76)	4.17 (2.16)	16.03 (4.07)
T3	5.00 (13.00)	8.04 (16.47)	9.12 (17.58)	9.83 (18.28)	10.75 (19.14)	8.55 (17.00)	25.06	1.35 (1.36)	77.25	30.40 (5.56)	4.20 (2.17)	14.86 (3.92)
T4	4.50 (12.66)	7.46 (15.76)	8.875 (17.33)	9.50 (17.79)	10.33 (18.51)	8.13 (16.57)	28.71	1.25 (1.32)	73.75	33.80 (5.86)	4.64 (2.27)	17.19 (4.21)

T5	4.17 (12.01)	7.08 (15.44)	8.00 (16.43)	8.33 (16.78)	9.25 (17.71)	7.37 (15.75)	35.42	1.00 (1.22)	64.75	36.50 (6.08)	5.70 (2.49)	18.93 (4.41)
T6	4.33 (12.40)	7.37 (15.85)	8.625 (17.08)	9.33 (17.95)	10.08 (18.75)	7.95 (16.38)	30.32	1.15 (1.29)	71.75	34.71 (5.93)	5.00 (2.35)	17.54 (4.25)
SE(m)	0.142	0.021	0.063	0.069	0.106	0.082		0.071		0.086	0.078	0.106
C.D.	0.431	0.063	0.193	0.21	0.322	0.2488		N/A		0.262	0.237	0.322
C.V.	2.182	0.277	0.6	0.754	0.884	0.9858		10.8		2.999	7.015	5.253

Table 87c. Yield losses due to TSV over control / healthy plants (Rahuri)

TSV Grades	No of plants	Plant height feet (ave./plant)	No of boll/plant	Reduction over 0 grade	Boll weight in gram/ boll	Reduction over 0 grade	SCY g/plant	Reduction over 0 grade
RCH-2 BGII								
0	0	4.57	52.05	--	6.08	-	316.90	-
1	60	4.17	35.28	16.77	3.20	2.88	113.01	203.89
2	32	4.12	27.91	24.14	3.18	2.90	88.97	227.93
3	08	3.225	17.50	37.67	5.52	0.56	96.74	220.16
4	0	-	-	--	--	-	-	-
Jadoo BGII								
0	0	5.01	55.98	-	7.36	--	411.89	-
1	93	4.35	39.26	16.72	5.47	1.89	214.68	197.21
2	7	3.83	41.57	14.41	5.05	2.31	210.25	201.64
3	0	-	-	-	-	-	-	-
4	0	-	-	-	-	-	-	-

Table 88. Yield losses due to TSV of 100 healthy and control / unprotected plants (Nanded).

Healthy Plants			Control / unprotected plant			Yield losses (HP-CP)	% Yield loss
Bolls /Plants	Height of plant	SCY	Bolls /Plants	Height of plant	SCY	39.61 g/plant	23.25%
36.58	133.01cm	170.31 g/plant	29.73	132.16 cm	130.69g/plant		

Table 89a. TSV incidence (%) for Hybrid Lam, Guntur (Akira)

Treatment	Dosage (ml/ g/ ha.)	TSV incidence (%) Hybrid: Akira															Seed Cotton Yield (Q/ha.)
		Drenching 30 DAS			Foliar spray 45 DAS			Foliar spray 60 DAS			Foliar spray 75DAS			Foliar spray 90DAS			
		Before trt.	7 DAT	15 DAT	Before trt.	7 DAT	15 DAT	Before trt.	7 DAT	15 DAT	Before trt.	7 DAT	15 DAT	Before trt.	7 DAT	15 DAT	
		Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	
T1 No Spray (Unprotected)	-	1.2	1.3	2.5	5.6	7.9	8.4	8.9	9.2	9.9	10.2	10.6	11.0	11.5	11.6	11.6	11.4
T2 Spinetorum 11.70% SC	420	1.1	1.1	1.3	3.5	3.5	3.7	4.4	4.5	4.6	6.2	6.9	6.9	7.0	7.1	7.2	14.9
T3 Diafenthiuron 47.80% SC	500	1.1	1.2	1.4	3.7	3.8	4.0	4.6	4.7	4.8	6.4	7.0	7.1	7.3	7.3	7.3	14.0
T4 Profenopos 50% EC	1000	1.2	1.4	1.6	3.8	3.9	4.2	5.3	5.4	5.7	7.0	7.2	7.6	8.2	8.5	8.8	13.1
T5 Deltamethrin 01.80% EC	781	1.2	1.3	1.7	4.0	4.1	4.2	5.6	6.0	6.4	7.2	7.5	7.9	8.6	8.9	9.5	13.9
T6 Drenching of Fipronil 50 % EC	750	1.2	1.2	1.4	3.7	3.8	4.0	4.6	4.8	4.9	6.4	7.0	7.1	7.3	7.4	7.4	14.0

Table 89b: TSV incidence (%) for Hybrid Siri - Lam, Guntur

Treatment	Dosage (ml/ g/ ha.)	TSV incidence (%) Hybrid: Siri															Seed Cotton Yield (Q/ha.)
		Drenching 30 DAS			Foliar spray 45 DAS			Foliar spray 60 DAS			Foliar spray 75DAS			Foliar spray 90DAS			
		Before trt.	7 DAT	15 DAT	Before trt.	7 DAT	15 DAT	Before trt.	7 DAT	15 DAT	Before trt.	7 DAT	15 DAT	Before trt.	7 DAT	15 DAT	
T1 No Spray (Unprotected)	-	1.2	1.3	2.5	5.7	8.0	8.6	8.9	9.4	9.9	10.8	11.3	11.4	11.6	11.6	11.7	11.3
T2 Spinetorum 11.70% SC	420	1.1	1.1	1.3	3.5	3.5	3.6	4.5	4.5	4.5	6.2	6.2	6.4	6.9	7.1	7.1	14.7
T3 Diafenthiuron 47.80% SC	500	1.1	1.2	1.3	3.7	3.8	4.0	4.7	4.7	4.7	6.4	6.5	7.1	7.2	7.2	7.2	14.5
T4 Profenopos 50% EC	1000	1.1	1.2	1.4	3.6	3.8	4.0	5.2	5.3	5.5	6.1	6.3	7.4	8.0	8.1	8.2	13.7
T5 Deltamethrin 01.80% EC	781	1.2	1.2	1.6	4.0	4.2	4.5	5.8	6.1	6.4	7.2	7.3	7.7	8.3	8.3	8.5	13.9
T6 Drenching of Fipronil 50 % EC	750	1.2	1.2	1.4	3.6	3.7	3.9	4.7	4.7	4.8	6.5	6.7	7.1	7.1	7.2	7.2	14.6

Table 89c: Yield losses due to TSV in Hybrid Akira and Siri - Lam, Guntur

TSV Grades	No of plants	Plant height (ave./plant)	No of boll/ plant	Reduction over 0 grade	Boll weight in gram/boll	Reduction over 0 grade	SCY g/plant	Reduction over 0 grade
Akira								
0	476	171.20	61	--	4.95	--	106.75	--
1	08	163.50	52	09 (14.7%)	4.90	0.05 (1.01%)	89.25	17.5 (16.39%)
2	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-
Sri								
0	446	151.20	46	--	5.22	--	100.05	--
1	10	145.50	43	09 (41.7%)	5.18	0.04 (0.76%)	93.52	6.53 (6.52%)
2	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-

Table 90: Yield losses caused by TSV for Hybrid Jadoo, Coimbatore

Grades	No of plants	Plant height (ave./plant) cm	No of boll/plant	Reduction over 0 grade (%)	Boll weight in gram/boll	Reduction over 0 grade (%)	SCY g/plant	Reduction over 0 grade (%)	Grades
0	80	165.5	55.0	-	5.5	-	302.5	-	0
1	40	153.9	51.0	7.2	5.2	5.5	265.2	12.3	1
2	50	145.5	47.0	14.5	4.6	16.3	216.2	28.5	2
3	20	139.3	43.5	20.9	4.4	20.0	191.4	36.7	3
4	10	132.5	41.0	25.4	4.3	21.8	176.3	41.7	4

Table 91(a): Number of boll reduction (%) grade-wise in different Bt hybrids due to TSV

Grades	Rashi-2BGII, Rahuri		Jadoo BGII, Rahuri		Akira Guntur		Sri Guntur		Coimbatore		Overall average
	Boll No	Reduction	Boll No	Reduction	Boll no	Reduction	Boll No	Reduction	Boll No	Reduction	
0	52.05	-	55.98	-	61	-	46	-	55.0	-	0
1	35.28	32.2	39.26	29.9	52	14.7	43	14.7	51.0	7.2	19.7
2	27.91	46.4	41.57	25.7					47.0	14.5	28.9
3	17.5	66.4							43.5	20.9	43.7
4		--							41.0	25.4	25.4

Table 91(b): Boll weight reduction (%) grade-wise in different Bt hybrids due to TSV

Grades	Rashi-2BGII, Rahuri		Jadoo BGII, Rahuri		Akira Guntur		Sri Guntur		Coimbatore		Overall average
	Boll wt	Reduction	Boll wt	Reduction	Boll wt	Reduction	Boll wt	Reduction	Boll wt	Reduction	
0	6.08	-	7.36	-	4.95	--	5.22	-	5.5	-	0
1	3.2	47.4	5.47	25.7	4.90	1.01	5.18	0.76	5.2	5.5	16.1
2	3.18	47.7	5.05	31.4					4.6	16.3	31.8
3	5.52	9.2							4.4	20.0	14.6
4	-	-							4.3	21.8	21.8

Table 91 (c): Seed cotton yield (%) reduction disease grade wise in different Bt hybrids due to TSV

Grades	Rashi-2BGII, Rahuri		Jadoo BGII, Rahuri		Akira Guntur		Sri Guntur		Coimbatore		Overall average
	SCY g/pl	Reduction	SCY g/pl	Reduction	SCY g/pl	Reduction	SCY g/pl	Reduction	SCY g/pl	Reduction	
0	316.9	-	411.89	-	106.75	-	100.05	-	302.5	-	0
1	113.01	64.3	214.68	47.9	89.25	16.39	93.52	6.52	265.2	12.3	29.5
2	88.97	71.9	210.25	49.0					216.2	28.5	49.8
3	96.74	69.5							191.4	36.7	53.1
4	-	-							176.3	41.7	41.7

Path.4 (e) Expt.2: Distribution pattern of CLCuD on local popular BT hybrid at farmer's field.

Expt 1b: Study on distribution pattern of cotton leaf curl virus disease on local popular Bt hybrid at farmer's fields in Punjab, Rajasthan and Haryana field

Table 92: CLCuD incidence in different districts of the North Zone - Punjab, Rajasthan and Haryana

Sr. No.	Punjab		Rajasthan		Haryana	
	Districts	Mean (PDI) (%)	Districts	Mean (PDI) (%)	Districts	Mean (PDI) (%)
1	Faridkot	33.2	Sriganganagar	26.7	Sirsa	21.3
2	Fazilka	43.8	Hanumangarh	11.5	Fatehabad	22.5
3	Muktsar	37.7			Hisar	17.8
4	Bathinda	28.6			Jind	18.3
					Bhiwani	4.9
					Mahendergarh	3.3
Average		**35.8**		**19.1**		**14.7**

Table 93: Incidence of TSV on Cotton in farmers' fields during *Kharif*, 2024 (Lam Guntur-Andhra Pradesh)

Month	District	Location (Village)	Hybrid (BG II)	Age/ Stage of the crop (days)	TSVD Incidence (%)
July 2024	Guntur	Tadikonda crossroads	Platinum	5	Traces
		Ponnekllu	Akira	7	0
		Ravela	Super Bunty	9	0
		Bezathpuram	Sarkar	8	0
		Nidumukkala	Akira	4	0
		Jonnalagadda	Dharma Gold	3	0
		Damarapalli	US 6072	7	0
		Kondepadu	Platinum	4	0

		Thikkiredypalem	Platinum	6	0
	Palnadu	Chilakaluri peta	Platinum	8	0
		Rajapeta	Super Bunty	9	0
			Janani	10	0
		Kukkapallevaripalem	Akira	5	0
		Boppudi	Platinum	4	0
			Sarkar	11	0
			Akira	15	0
		Kantepudi	Platinum	12	0
		Panidem	Siri	16	0
		Guttikonda	US 4078	20	0
		Kamepalle	Crystal 555	22	0
	NTR / Krishna	Chilllakallu	Platinum	20	0
		Toraguntapalem	Sarkar	18	0
		Vatsavai	Akira	10	0
			US 4078	11	0
		Makkapeta	US 4078	12	0
			Akira	14	0
		Penuganchibrolu	Janani	9	0
		Nawabpeta	Akira	6	0
		Nandigama	Platinum	5	0
		Gollamudi	Super bunny	4	0
		Mundlapadu	Platinum	8	0
Aug.2024	Guntur	Tadikonda crossroads	Super bunty	24	0
		Ponnekllu	Platinum	20	0
		Ravela	Sarkar	25	0
		Bezathpuram	Akira	25-30	Traces
		Nidumukkala	Siri	25-30	0
		Jonnalagadda	US 4078	25-30	0
		Damarapalli	Siri		0
		Kondepadu	US 4078	20-35	0
		Thikkiredypalem	Akira	30-40	0
	Palnadu	Chilakaluri peta	Platinum	25-25	0
		Rajapeta	Siri	35	0

			Siri	35	0
		Kukkapallevaripalem	Super bunty	40-45	Traces
		Boppudi	Super Bunty	35	Traces
			Crystal 555	20	0
			Adhay	15-20	0
		Kantepudi	Swathi	15-20	0
		Panidem	Sarkar	20-25	0
		Guttikonda	Siri	25-30	Traces
		Kamepalle	Platinum	20-25	Traces
	NTR / Krishna	Chilllakallu	Platinum	30-40	Traces
		Toraguntapalem	Sarkar	25-30	0
		Vatsavai	Akira	20-20	Traces
			Platinum	25-30	Traces
		Makkapeta	Akira	30-35	Traces
			Nikhil	30	0
		Penuganchibrolu	Akira	25	0
		Nawabpeta	US 7.67	20	0
		Nandigama	Akira	25-30	0
		Gollamudi	Dhandev	30-35	Traces
		Mundlapadu	Siri	35-40	0
Sep 2024	Guntur	Tadikonda crossroads	Kamala	60-65	Traces
		Ponnekllu	Super Bunty	75-80	0
		Ravela	US 7067	70-75	Traces
		Bezathpuram	Akira	65-70	0
		Nidumukkala	Platinum	60-70	Traces
		Jonnalagadda	Super Bunty	60-75	0
		Damarapalli	Akira	60	Traces
		Kondepadu	Dhandev	70	0
		Thikkiredypalem	Platinum	75	Traces
	Palnadu	Chilakaluri peta	Akira	75-80	0
		Rajapeta	Dhandev	55-60	0
		Kukkapallevaripalem	Akira	75	Traces
		Boppudi	Siri	60-65	0
			Akira	75	0
			US 7067	65-70	0

		Kantepudi	Akira	70-75	0
		Panidem	Bahubali	70	0
		Guttikonda	Akira	60-65	0
		Kamepalle	Platinum	85	0
	NTR / Krishna	Chilllakallu	Bahubali	65-70	0
		Toraguntapalem	US 4078	65-70	0
		Vatsavai	Aadhya	70	Traces
			US 7067	70	0
		Makkapeta	Dhandev	65-70	0
			Akira	85	0
		Penuganchibrolu	US 7067	75	0
		Nawabpeta	Platinum	65-70	0
		Nandigama	Akira	75	0
		Gollamudi	Rangoli	80-85	0
		Mundlapadu	Akira	85-90	0
Oct 2024	Guntur	Tadikonda crossroads	Platinum	100-110	Traces
		Ponnekllu	Akira	100	0
		Ravela	Swathi	100-120	0
		Bezathpuram	Kamala	100	0
		Nidumukkala	Akira	95	0
		Jonnalagadda	Akira	90	0
		Damarapalli	Platinum	90	0
		Kondepadu	Akira	115	0
		Thikkiredypalem	Akira	115	Traces
	Palnadu	Chilakaluri peta	Nayak	120	0
		Rajapeta	Akira	100	0
			Nayak	100-110	0
		Kukkapallevaripalem	US 4078	110	0
		Boppudi	Siri	100-110	0
			Akira	100	0
			Siri	120	0
		Kantepudi	Akira	100-120	0
		Panidem	Platinum	100-120	0
		Guttikonda	Platinum	110	Traces

		Kamepalle	Nikhil	110	0
	NTR / Krishna	Chilllakallu	Sarkar	110	0
		Toraguntapalem	Super Bunty	95	Traces
		Vatsavai	Platinum	110	0
			Janani 555	120	0
		Makkapeta	US 4078	120	0
			Platinum	120	0
		Penuganchibrolu	Platinum	120	0
		Nawabpeta	Akira	100-120	Traces
		Nandigama	Nikhil	120	0
		Gollamudi	Janani 555	100	0
		Mundlapadu	Janani 555	100	Traces
Nov. 2024	Guntur	Tadikonda crossroads	Akira	140	0
		Ponnekllu	Sarkar	150	0
		Ravela	Super Bunty	145	0
		Bezathpuram	Sarkar	150	0
		Nidumukkala	Super Bunty	150	0
		Jonnalagadda	Speed	150	0
		Damarapalli	Super Bunty	150	0
		Kondepadu	Siri	145	0
		Thikkiredypalem	Satlin	150	0
	Palnadu	Chilakaluri peta	Super Bunty	155	0
		Rajapeta	Siri	150	0
			RCH 659	150	0
		Kukkapallevaripalem	Stalin	145	0
		Boppudi	Platinum	155	0
			Crystal 555	145	0
			Akira	150	Traces
		Kantepudi	Janani 555	140	0
		Panidem	Mahyco hybrid	150	0
		Guttikonda	Siri	145	0
		Kamepalle	Akira	140	0
	NTR / Krishna	Chilllakallu	Siri	150	0
		Toraguntapalem	Akira	150	0
		Vatsavai	Platinum	150	0

		Makkapeta	Sarkar	145	0
		Penuganchibrolu	Super bunty	140	0
		Nawabpeta	Janani 555	140	0
		Nandigama	RCH 659	150	0
		Gollamudi	Nikhil	150	0

Table 94. Distribution of TSV in cotton growing districts of Tamil Nadu

S.No	Districts	TSV incidence(%)
1.	Coimbatore (Farmers field)	3.7- 8.8
	Coimbatore (TNAU Research Farm)	7.0 -18.0
2	Dindigul	3.0 - 14.0
3.	Tuticorin	2.3 - 7.0
4.	Virudhunagar	1.5 – 3.0
5	Tirunelveli	3 – 9.0
6.	Perambalur	2.5 – 7.5

Path 5: Developing and testing of organic nutrient, pest and disease management module in cotton based cropping system

Table 95. Organic modules and treatment details

DAS	Module-1 (Completely on-farm resources)		Module-2 (LEISA Module-low external 30% input sustainable model)	Module -3 (Intensive Module, 30% on-farm, 70% off-farm external inputs (Cost basis)		Control 1: IDM (Location specific)	Control 2 Farmers practice
	Seed and soil borne disease	Foliar disease	Seed and soil borne disease	Seed and soil borne disease	Foliar disease	Seed and soil borne and Foliar disease	Seed and soil borne and Foliar disease
0.30	Resistant genotype, crop rotation/deep ploughing, FYM, NSK@ 250 Kg /ha, seed treatment with Beejamrit@ 200-250ml/kg & foliar (FS) of jeevaamrit @ 10% in 200 L/acre twice at 15 days interval, sorghum/maize Border		Resistant genotype, crop rotation/deep ploughing, Fym, neem cake @250 kg/ha seed treatment with Beejamrit @200-250 ml/kh & foliar spray (FS) of jeevaamrit @10%in 200L/acre twice at 15 days interval, sorghum/maize palanting	Resistant genotype, Crop rotation/deep ploughing, FYM, Neem cake @250 Kg/ha, seed and Soil treatment with *Pseudomonas florescens* and or Trichoderma spp. @10g/kg seed and 2.5kg/ha in 100kg well decomposed FYM/compost		Resistant genotype	Resistant genotype

30-60	Foliar spray of Jeevaamrit@10% in 200 L/acre and or garlic 1%+ ginger 5% for disease management and 3-5 FS of butter milk 5% or Cow urine +Calcium Nitrate (6.6+0.5%) or mustard oil (3%) for vector whitefly management at 15 days interval		Foliar spray of jeevaamrit @10%in 200 L/acre and or garlic 1%+ ginger5% for disease management and 3-5 FS of butter milk 5% or Cow urine + Calcium Nitrate (6.6+0.5%) or mustard oil (3%) for vector whitefly management at 15 days 15 days interval		Foliar spray of Jeevaamrit @10% in 200Lacre and or garlic 1%+ for disease management and 3-5 FS of butter milk5% or Cow urine + Calcium Nitrate (6.6+05) or mustard oil (3%) for whitefly vector management at 15 days interval and YST @ 100/ha			
61-90	Drenching of Ghanjeevamrit @10% in 200L/acre twice at 30 days interval	FS of Jeevamrit @10% in 200L acre and or garlic 1% + ginger 5% or custard apple leaf extract for disease management twice at 15 days interval FS of butter milk 5% or Cow urine+ Calcium Nitrate (6.6+05%) or whitefily vector management at 15 days interval	Drenching of Ghanjeemrit @10% in 200 L/acre twice at 30 days interval	FS of Jeevamrit @10% in 200L/acre and or galic 1% for disease management twice at 15day interval FS of Pseudomonas fluoresces @5ml/L for disease management and Lecanicillium lecanii, Beauveria bassiana @ 5g/L for virus vector (Whitefly.Thrips) management, thrice at forthightly interval	Drenching of Ghaneevamrit @10% in 200L/acre twice at 30days interval	FS of Pseudomonas Fluorescens @ 5l/L for disease management and Lecanicillium lecanii, Beauveria bassiana @5g/L for virus vector (whitefly Thrips) management, thrice at fortnightly interval and YST @100/ha		
91-120	Soil drenching of Jeevamrit @10% in 200 L/acre	FS of Jeevamrit @ 10% in 200L/acre and or garlic 1%+ ginger5% for disease management twice at 15daysintervar FS of butter milk 5% or Cow urine +calcium Nitrate (6.6+ 0.5%) or mustard oil (3%) for whitefly vector management at 15 days interval	Drenching of Ghanjeevamrit @ 10% in 200 L/acre twice at 30 days interval	FS of Jeevamrit @10% in 200L/acre and or garlic 1% for disease management twice at 15 days interval Fs of pseudomonas fluorescens @5m/L for disease management and Lacanicillium lecanii, Beauveria bussian @5g/L for virus vector (whitefly. Thrips) management, thrice at fortnightly interval	Dreching of Trichoderma spp @5g/L water twice or thrice at 30days interval	FS of pseudomonas fluorescens @5ml/L for disease management and Lecanicillium lecanii, Beauveria bassiana @5g/L for virus vector (whitefly. Thrips) management, thrice at forthnightly interval		

North Zone

Table 96: Developing and testing of organic nutrient, pest and disease management module in cotton-based cropping system at Sirsa

Treatment	CLCuD PDI									
	0-30 DAS		31-60 DAS		61-90 DAS		91-120 DAS		121< DAS	
	Before spray	PDI at fortnightly intervals	Before spray	15 after spray	Before spray	15 after spray	Before spray	15 after spray	Before spray	15 after spray
Module-1	0.0	0.0	3.5 (10.8)	3.3 (10.5)	10.6 (19.0)	10.2 (18.6)	15.8 (23.4)	15.1 (22.9)	23.4 (28.9)	23.0 (28.6)
Module-2	0.0	0.0	4.6 (12.4)	4.3 (12.0)	12.4 (20.6)	12.0 (20.3)	18.7 (25.6)	17.9 (25.0)	28.4 (32.2)	28.0 (31.9)
Module-3	0.0	0.0	2.7 (9.5)	2.5 (9.1)	7.5 (15.9)	7.5 (15.9)	10.4 (18.8)	10.3 (18.7)	14.8 (22.6)	**14.7 (22.5)**
Control -1	0.0	0.0	3.1 (10.1)	3.0 (10.0)	10.1 (18.5)	9.8 (18.2)	13.6 (21.6)	13.4 (21.5)	17.3 (24.6)	**17.0 (24.3)**
Control 2	0.0	0.0	4.2 (11.8)	3.9 (11.4)	11.8 (20.1)	11.3 (19.6)	16.1 (23.6)	15.4 (23.1)	24.8 (29.9)	24.3 (29.5)
C.D.	-	-	0.13	0.31	0.49	0.21	0.53	0.50	1.20	0.58
SE(m)	-	-	0.04	0.09	0.15	0.06	0.16	0.15	0.36	0.18
SE(d)	-	-	0.06	0.13	0.21	0.09	0.23	0.21	0.51	0.25
C.V.	-	-	0.64	1.51	1.37	0.58	1.22	1.18	2.28	1.11

Table 97: Developing and testing of organic nutrient, pest and disease management module in cotton-based cropping system at Bathinda

Treatments	CLCuD		PDI of Fungal foliar spot			PDI of Bacterial Blight			
	PDI	DR	90 DAS	120 DAS	Average	60 DAS	90 DAS	120 DAS	Average
Module-1	33.33	MS	2.00 (8.08)	4.83 (12.69)	**2.28**	-	-	2.00 (8.08)	**0.67**
Module-2	31.11	MS	1.50 (6.96)	4.00 (11.52)	**1.83**	-	-	1.50 (6.96)	**0.50**
Module-3	35.00	MS	2.17 (8.41)	5.33 (13.34)	2.50	-	-	2.33 (8.70)	0.78
Control -1	36.11	MS	2.50 (9.06)	5.67 (13.76)	2.72	-	-	2.33 (8.77)	0.78
Control 2	38.33	MS	2.67 (9.39)	6.17 (14.37)	2.95	-	-	2.50 (9.06)	0.83
CD(5%)			0.81	0.49				1.02	
CV			5.04	1.98				6.40	

Table 98: Developing and testing of organic nutrient, pest and disease management module in cotton-based cropping system

Treatments	Average Percent Disease Index (PDI %) & Disease reaction (DR)						
	Surat				Akola		
	BLB		ALS		ALS	BLB	GM
	PDI	DR	PDI	DR	PDI	DR	PDI
Module-1	30.5	MR	0.0	DF	-	-	-
Module-2	21.5	R	0.0	DF	-	-	-
Module-3	**19.8**	R	0.0	DF	-	-	-
Control-1	**20.9**	R	0.0	DF	-	-	-
Control-2	23.9	R	0.0	DF	-	-	-

(-) – Soyabean was sown for crop rotation practices

Table 99: Developing and testing of organic nutrient, pest and disease management module in cotton-based cropping system at Khandwa

Treatment	Mean incidence of CoLS	Mean incidence of ALB	Mean incidence GM	Monopodia	Sympodia	Bolls /plant	Seed cotton Yield Kg/ha
Module -1	37.8	13.6	14.8	0.20	18.85	24.07	1416.86
Module-2	**26.0**	**7.7**	**8.8**	0.50	17.65	34.44	1519.10
Module -3	**30.8**	**11.3**	**11.1**	0.30	17.25	28.15	1555.27
Control -1	35.3	14.1	13.0	0.25	19.15	25.19	1540.80
Control 2	39.6	16.9	16.3	0.60	21.05	25.56	1550.44
C.D.	3.419	2.354	2.195	1.096	8.50	28.15	4.484
SE(m)	1.097	0.756	0.705	0.722	2.841	34.4	120.970
C.V.	6.475	11.881	11.009	0.234	0.922	25.19	39.259

Tab 100: Effect of different organic nutrient, pest and disease management module on cotton plant growth characters, yield attributes and seed cotton yield- Junagarh

Treatments	Plant height (cm)	No. of monopodia	No. of sympodia	No. of boll/sq. m	SCY (kg/ha)	Lint yield (kg/ha)	Seed yield (kg/ha)	Dry weight (kg/ha)	ALS PDI	Root Rot PDI
Module 1	105	1.25	13.50	49.92	1438	466	1438	2588	15.25 (3.65)*	2.67 (1.70)
Module 2	105	1.00	14.50	51.93	1560	507	1560	2809	13.13 (3.79)	3.67 (1.97)
Module 3	108	1.25	14.75	53.53	1691	557	1691	3044	13.00 (3.67)	2.67 (1.72)
Control 1	**134**	1.25	**18.25**	**72.84**	**2394**	**822**	**2394**	**4310**	10.50 (3.33)	2.67 (1.63)
Control 2	**130**	1.50	**18.00**	**66.05**	**2136**	**757**	**2136**	**3844**	21.75 (4.61)	3.33 (1.91)
Sem +	6.3	0.20	0.87	2.69	88	26	88	158	0.20	0.11
CD at 5 %	24.8	NS	3.41	10.54	344	101	344	619	0.60	NS
CV %	10.88	37.95	11.01	9.13	9.50	8.24	9.50	9.50	10.29	12.12

Bacterial leaf blight diseases was not observed during *kharif* season

Concluded Experiment:

Path 3: Management of Diseases of cotton

Path 3 (j): Management of boll rot and foliar diseases of Cotton through CIB&RC recommended new chemical pesticides and their Combinations (Concluded 3 years)

Table 101: List of treatments for Management of boll rot and foliar diseases of Cotton through CIB&RC recommended new chemical pesticides and their Combinations

Treatments	Details
T1	Kresoxim methyl 44.3% SC @ 1 ml/litre of water
T2	Propiconazole 25% EC @ 1 ml/litre of water
T3	Propineb 70% WP @ 2.5 g/litre of water
T4	**Fluxapyroxad 167 g/litre + Pyraclostrobin 333 g/litre SC @ 0.6 g/litre of water**
T5	**Metiram 55% + Pyraclostrobin 5% WG @ 2 g/litre of water**
T6	**Azoxystrobin 18.2% w/w + Difenoconazole 11.4% w/w SC @ 1 ml/ litre of water**
T7	Copper sulphate 47.15% + Mancozeb 30% WDG @ 5 g/ litre of water

T8	Captan 70 % + Hexaconazole 5 % WP @ 1.5 g/ litre of water
T9	**Copper oxychloride 50 % WP @ 2.5 g litre of water**
T10	Flonicamid 80 g/acre (60 & 90 days)/ Diafenthiuron/ Dinotefuran (110 – 120 days)
T11	Fluvalinate (for bugs)
T12	Control (Water spray)

Table 102: Management of boll rot and foliar diseases of Cotton through CIB&RC recommended new chemical pesticides and their combinations (Pooled analysis of 2022-2023, 2023- 2024, 2024-2025) at Coimbatore

Treatment	*Alternaria* blight		Grey mildew		Bacterial blight		Boll rot		Seed Cotton Yield (Q./ha)
	PDI	% Control	PDI	% Control	PDI	% Control	% incidence	% Control	
T_1	7.4 (15.7)	59.0	6.7 (14.9)	**70.9**	15.7 (22.7)	28.3	7.2 (15.7)	35.1	15.8
T_2	9.6 (18.0)	46.6	11.9 (20.1)	48.4	15.8 (23.0)	27.8	7.6 (16.0)	31.5	14.1
T_3	5.6 (13.7)	**68.8**	9.8 (18.2)	57.5	16.8 (23.8)	23.2	6.0 (14.1)	45.9	16.9
T_4	6.5 (14.8)	**63.8**	9.4 (17.8)	59.3	11.1 (19.1)	**49.3**	3.2 (10.1)	**71.1**	18.8
T_5	8.0 (16.4)	55.5	8.9 (17.3)	**61.4**	13.0 (20.7)	40.6	3.9 (11.4)	**64.8**	17.6
T_6	7.1 (15.4)	**60.5**	8.4 (16.8)	**63.6**	13.9 (21.5)	36.5	4.8 (12.6)	**56.7**	16.5
T_7	8.8 (17.2)	51.1	13.0 (21.1)	43.7	10.7 (18.5)	**51.1**	6.7 (15.0)	39.6	14.1
T_8	10.0 (18.4)	44.4	11.3 (19.6)	51.0	12.1 (20.2)	44.7	6.5 (14.7)	41.4	15.0
T_9	10.0 (18.3)	44.4	13.8 (21.7)	40.2	11.3 (19.4)	**48.4**	6.1 (14.2)	45.0	13.9
T_{10}	16.1 (23.7)	10.5	19.6 (26.2)	15.1	18.9 (25.2)	13.6	7.5 (16.0)	32.4	12.8
T_{11}	15.4 (23.1)	14.4	18.6 (25.5)	19.4	18.5 (25.1)	15.5	8.8 (16.9)	20.7	12.6
T_{12}	18.0 (25.9)		23.1 (28.6)		21.9 (27.0)		11.1 (19.3)		11.4
CD=5%	**1.42**		**0.38**		**1.21**		**1.38**		**1.68**
S. E(m)	**0.69**		**0.68**		**0.52**		**0.59**		**0.98**
Cv %	**4.23**		**3.93**		**2.98**		**4.54**		**6.20**

Path 3(k): Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne disease management (Pooled analysis for three years 2022-2023, 2023- 2024, 2024- 2025)

Table. 103. Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne disease management

Treatments	Details
T1	*Trichoderma* spp. isolate (CICR-Rf-B/Th-11) as seed treatment @ 5 g/kg seed
T2	*Trichoderma* spp. isolate (Rf-B/Th-11) as soil treatment @ 1 kg/acre with 100 kg well-decomposed FYM/Compost at sowing time
T3	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time
T4	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L
T5	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L)
T6	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L)
T7	Seed treatment with carboxin 37.5% + thiram 37.5% @ 3.5g/kg
T8	Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L at 60 and 90 DAS
T9	Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L) at 60 and 90 DAS
T10	Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L) at 60 and 90 DAS
T11	Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L)) only
T12	Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L)) only
T13	Control

Table 104a: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Hisar) -Pooled

Treatment	Germination (%)			Pooled	Plants Mortality 30 DAS (%)				Plants Mortality 60 DAS (%)			Pooled	Plants Mortality 90 DAS (%)			
	2022-23	2023-24	2024-24		2022-23	2023-24	2024-24	Pooled	2022-23	2023-24	2024-24		2022-23	2023-24	2024-24	Pooled
T1	76.5	75.3	77.7	76.5	1.0	1.1	0.7	0.9	3.1	3.2	1.7	2.7	5.1	6.2	4.0	5.1
T2	78.3	76.5	76.3	77.0	0.0	0.3	1.0	0.4	1.1	1.5	2.3	1.6	3.4	4.3	4.7	4.1

T3	80.5	79.2	78.7	79.5	0.0	0.2	0.7	0.3	1.1	1.4	1.3	1.3	2.7	2.8	3.7	3.1
T4	80.5	80.3	80.3	80.4	0.0	0.2	0.3	0.2	1.2	1.3	1.3	1.3	3.5	3.2	3.7	3.5
T5	82.3	83.5	80.7	82.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	1.1	1.3	1.7	1.4
T6	84.6	85.3	82.3	84.1	0.0	0.1	0.0	0.0	0.0	0.5	0.3	0.3	1.0	1.0	2.0	1.3
T7	80.5	80.5	82.7	81.2	0.0	0.0	0.0	0.0	1.2	1.3	0.7	1.1	5.2	5.8	3.3	4.8
T8	80.2	81.3	75.2	78.9	0.0	0.1	1.7	0.6	1.5	1.4	5.0	2.6	4.4	4.7	9.3	6.1
T9	82.3	81.5	75.1	79.6	0.0	0.2	2.0	0.7	1.3	1.3	5.3	2.6	3.2	4.1	9.7	5.7
T10	82.3	77.3	74.9	78.2	0.0	0.3	2.0	0.8	1.7	1.6	5.3	2.9	3.4	3.9	10.0	5.8
T11	78.3	77.5	75.2	77.0	1.5	1.4	2.3	1.7	3.0	3.3	6.0	4.1	6.1	6.5	10.3	7.6
T12	76.5	77.3	75.1	76.3	1.3	1.5	2.3	1.7	3.3	3.5	6.3	4.4	5.9	6.3	10.7	7.6
T13	78.3	78.5	75.3	77.4	1.9	2.1	2.7	2.2	5.7	6.2	6.7	6.2	10.2	10.3	12.3	10.9

Table 104b: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Hisar) -Pooled

Treatment	Plants Mortality 120 DAS (%)			Pooled	ROC %				Sympods			Pooled	SCY (q/ha)			
	2022-23	2023-24	2024-24		2022-23	2023-24	2024-24	Pooled	2022-23	2023-24	2024-24		2022-23	2023-24	2024-24	Pooled
T1	7.2	8.2	5.3	6.9	46.3	33.3	66.0	49.9	16.3	17.1	19.3	17.6	4.5	4.9	5.7	5.0
T2	4.5	5.2	5.7	5.1	66.4	57.7	63.8	62.8	18.9	19.5	16.7	18.4	4.9	5.2	5.0	5.0
T3	3.8	3.9	5.0	4.2	71.6	68.3	68.1	**69.3**	22.3	24.5	24.3	23.7	5.1	5.4	5.9	**5.5**
T4	4.0	4.4	4.3	4.2	70.1	64.2	72.4	**69.2**	25.3	26.2	26.7	26.1	5.2	3.5	6.0	**4.9**
T5	1.7	2.1	4.0	2.6	87.3	82.9	74.5	**81.1**	30.7	32.5	30.7	31.3	5.6	6	6.5	**6.0**
T6	1.5	1.9	4.7	2.7	88.8	84.6	70.2	**80.5**	28.4	29.4	29.0	28.9	5.2	5.7	6.2	**5.7**
T7	8.7	7.8	5.0	7.2	35.1	36.6	68.1	48.0	16.6	16.9	17.0	16.8	4.6	4.8	5.1	4.8
T8	6.5	7.3	9.7	7.8	51.5	40.7	38.3	43.3	18.1	19.5	20.7	19.4	4.8	3.4	5.5	4.6
T9	5.1	6.7	10.3	7.4	61.9	45.5	34.1	46.5	16.9	18.6	18.0	17.8	4.7	5.2	5.4	**5.1**
T10	5.1	6.3	11.0	7.5	61.9	48.8	29.8	45.9	15.1	16.8	16.0	16.0	4.3	4.8	5.0	4.7
T11	8.3	8.8	14.3	10.5	38.1	28.5	8.6	24.0	14.6	14.6	16.3	15.2	4	4	4.6	4.2
T12	7.9	8.3	14.7	10.3	41.0	32.5	6.4	25.4	13.8	14.3	15.3	14.5	3.7	3.6	4.3	3.9
T13	13.4	12.3	15.7	13.8	0.0	0.0	0.0	0.0	12.7	12.8	14.0	13.2	3.3	3.4	4.0	3.6

Table 105a: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Sirsa) -Pooled

Treatment	(2022-2023) Mortality %				AUDPC	(2023-2024) Mortality %			AUDPC	(2024-2025) Mortality %								AUDPC	Pooled AUDPC
	30 DAS	60 DAS	90 DAS	120 DAS		90 DAS	105 DAS	120 DAS		45 DAS	60 DAS	75 DAS	90 DAS	105 DAS	120 DAS	135 DAS	150 DAS		
T1	7.5	10.4	22.6	25.2	740.3	2.6	4.6	6.9	**140.3**	2.0	3.4	4.0	6.0	8.1	9.4	9.4	10.7	699.8	526.8
T2	16.2	16.7	23.5	24.6	909.0	2.8	6.6	7.3	174.8	1.9	1.9	3.9	5.8	6.5	8.4	9.1	10.4	626.3	570.0
T3	9.2	11.4	17.0	18.7	635.3	3.1	6.6	7.4	177.8	0.0	1.9	3.2	4.4	5.1	6.3	7.6	8.3	489.8	434.3
T4	7.9	10.4	16.5	18.7	603.0	4.1	5.5	7.0	**165.8**	0.6	1.9	3.9	4.5	5.8	7.1	7.7	9.0	535.5	434.8
T5	9.1	10.4	15.8	18.0	596.3	2.9	4.8	7.7	**151.5**	0.0	1.9	2.5	3.1	4.4	5.7	6.9	6.9	419.3	389.0
T6	2.2	8.7	14.3	15.4	477.0	2.1	4.7	7.2	**140.3**	0.0	0.6	1.8	2.4	3.0	3.7	4.2	5.5	276.8	298.0
T7	10.3	14.9	24.9	29.3	894.0	4.9	7.7	10.5	231.0	2.1	4.3	6.4	8.5	10.6	12.0	13.5	15.6	962.3	695.8
T8	13.2	19.5	25.9	25.2	969.0	3.8	5.5	8.4	174.0	2.0	4.1	4.7	6.7	7.4	9.5	10.1	12.8	748.5	630.5
T9	17.4	26.8	28.3	29.9	1181.3	3.7	6.4	8.7	189.0	2.1	4.9	6.3	8.3	9.0	11.1	11.8	15.3	901.5	757.3
T10	20.5	22.9	27.1	28.9	1120.5	2.9	4.9	8.3	157.5	2.1	4.1	5.5	6.9	8.3	10.3	11.7	13.8	821.3	699.8
T11	18.8	21.5	33.8	35.4	1236.0	8.0	10.6	13.9	323.3	2.9	4.4	6.5	8.7	10.1	12.3	14.5	16.7	994.5	851.3
T12	13.3	18.8	30.6	32.6	1085.3	10.0	10.8	14.6	346.5	2.1	4.3	6.4	8.5	9.9	12.1	14.2	16.3	969.0	800.3
T13	21.5	30.8	41.0	46.6	1587.8	10.3	13.2	16.5	399.0	5.1	7.6	10.1	13.4	17.6	21.9	26.1	30.4	1716.8	1234.5

Table 105b: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Sirsa) -Pooled

		Mortality at 120 DAS				Reduction over control (120 DAS)			
	Treatments	**2022-23**	**2023-24**	**2024-25**	**Pooled**	**2022-23**	**2023-24**	**2024-25**	
T1	*Trichoderma* spp. isolate (CICR-Rf-B/Th-11) as seed treatment @ 5 g/kg seed	25.2	6.9	9.4	13.83	45.92	58.18	57.08	51.17
T2	*Trichoderma* spp. isolate (Rf-B/Th-11) as soil treatment @ 1 kg/acre with 100 kg well-decomposed FYM/Compost at sowing time	24.6	7.3	8.4	13.43	47.21	55.76	61.64	52.58
T3	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time	18.7	7.4	6.3	10.80	59.87	55.15	71.23	61.88
T4	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L	18.7	7.0	7.1	10.93	59.87	57.58	67.58	**61.41**

T5	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L)	18.0	7.7	5.7	10.47	61.37	53.33	73.97	**63.05**
T6	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L)	15.4	7.2	3.7	8.77	66.95	56.36	83.11	**69.06**
T7	Seed treatment with carboxin 37.5% + thiram 37.5% @ 3.5g/kg	29.3	10.5	12.0	17.27	37.12	36.36	45.21	39.05
T8	Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L at 60 and 90 DAS	25.2	8.4	9.5	14.37	45.92	49.09	56.62	49.29
T9	Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L) at 60 and 90 DAS	29.9	8.7	11.1	16.57	35.84	47.27	49.32	41.52
T10	Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L) at 60 and 90 DAS	28.9	8.3	10.3	15.83	37.98	49.70	52.97	44.11
T11	Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L)) only	35.4	13.9	12.3	20.53	24.03	15.76	43.84	27.52
T12	Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L)) only	32.6	14.6	12.1	19.77	30.04	11.52	44.75	30.23
T13	Control	46.6	16.5	21.9	28.33	-	-	-	-

Table 105c: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Sirsa) -Pooled

Treatment	Plant height				Monopod				Sympodia				No. of Bolls			
	2022-23	2023-24	2024-24	Pooled	2022-23	2023-24	2024-24	Pooled	2022-23	2023-24	2024-24	Pooled	2022-23	2023-24	2024-24	Pooled
T1	63.1	169.5	155	129.2	1.3	0.8	2.4	1.5	5.6	19.1	13.6	12.8	4.3	36.6	34.2	25.0
T2	75.4	179.2	158	137.5	2.2	0.9	1.9	1.7	6.7	21.9	13.6	14.1	6.8	35.8	34.3	25.6
T3	78.5	152.2	149.4	126.7	1.9	0.4	2	1.4	6.5	17.7	12.6	12.3	5.9	37.6	34.8	26.1
T4	78.2	173.3	176.1	142.5	2.1	0.9	2.2	1.7	6.5	20.7	14.8	14.0	5.1	36.4	35.4	25.6
T5	75.7	181.4	164	140.4	1.8	0.8	1.7	1.4	6.7	21.2	14.9	14.3	6	31.8	32.7	23.5
T6	80	167.2	164.5	137.2	2.6	0.7	1.9	1.7	8.6	20.7	13.9	14.4	8.1	30.7	34.1	24.3
T7	73.3	172.7	171.1	139.0	2.5	0.4	2	1.6	7.5	21.9	16	15.1	7.4	38.5	31.8	25.9
T8	78.3	185	169.4	144.2	2.1	0.6	2	1.6	7.1	23.3	15.6	15.3	6.7	39.6	34.1	26.8
T9	75.5	156.8	176.6	136.3	2.6	0.3	1.9	1.6	6.8	21.2	16.8	14.9	6.1	33.4	32.9	24.1
T10	82.4	176.4	163.1	140.6	2.4	0.5	1.9	1.6	5.9	21.8	15.6	14.4	5.9	38.3	32.2	25.5
T11	68.4	171.2	183.4	141.0	1.1	0.5	1.9	1.2	4.4	20.9	17.1	14.1	4.3	28.4	33.8	22.2
T12	78.3	167.1	169.2	138.2	1.8	0.6	1.9	1.4	5.9	20.6	16.4	14.3	5.3	27.6	30.2	21.0
T13	56.4	169	166.1	130.5	1.6	0.7	2.3	1.5	3.5	21.1	14.4	13.0	2.8	24.6	27.4	18.3

Table 106a: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Bathinda) -Pooled

Treatment	Germination (%)				Plant Mortality 30 DAS (%)				Plant Mortality 60 DAS (%)				Plant Mortality 90 DAS (%)			
	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled
T1	88.7	92.0	83.3	88.0	12.7	9.3	19.3	13.8	12.7	13.3	19.3	15.1	12.7	14.0	19.3	15.3
T2	88.0	96.0	84.0	89.3	13.3	5.3	18.0	**12.2**	13.3	9.3	18.0	13.6	13.3	10.0	18.0	13.8
T3	89.3	93.3	84.7	89.1	12.0	7.4	18.7	**12.7**	12.0	8.0	18.7	12.9	12.0	8.0	18.7	12.9
T4	90.0	90.0	84.7	88.2	11.3	10.6	18.7	**13.5**	11.3	10.7	19.3	13.8	11.3	10.7	19.3	13.8
T5	91.3	92.7	85.3	89.8	10.0	8.0	18.0	**12.0**	10.0	9.3	18.0	12.4	10.0	9.3	18.0	12.4
T6	89.3	92.0	84.7	88.7	12.0	8.0	18.7	**12.9**	12.0	8.0	18.7	12.9	12.0	8.0	18.7	12.9
T7	89.3	99.3	86.0	91.6	12.0	0.7	17.3	**10.0**	12.7	6.0	17.3	12.0	12.7	6.0	17.3	12.0
T8	88.7	91.3	78.0	86.0	12.7	11.3	22.7	15.6	13.3	16.0	23.3	17.6	13.3	16.0	24.0	17.8
T9	88.0	92.0	82.7	87.6	13.3	10.0	20.7	14.7	14.0	13.3	22.0	16.4	14.0	13.3	22.0	16.4
T10	87.3	91.3	82.0	86.9	14.0	10.0	20.0	14.7	14.0	12.0	20.7	15.6	14.0	12.0	22.0	16.0
T11	86.7	94.7	81.3	87.6	16.0	5.3	20.7	14.0	16.7	7.3	23.3	15.8	16.7	8.0	24.0	16.2
T12	87.3	91.3	77.3	85.3	14.7	10.7	23.3	16.2	15.3	13.3	24.0	17.6	15.3	13.3	24.7	17.8
T13	85.3	89.3	76.7	83.8	17.3	15.3	24.0	18.9	18.0	16.0	24.7	19.6	18.0	16.7	26.0	20.2

Table 106b: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Bathinda) -Pooled

Treatment	Plant Mortality 120 DAS (%)				ROC (%)				No. of open bolls/plant				Seed Cotton Yield (Q/ha.)			
	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled
T1	12.7	14.0	19.3	15.3	29.4	12.5	25.7	23.5	14.9	46.6	24.1	28.5	9.9	21.0	15.1	15.3
T2	13.3	10.0	18.0	13.8	26.1	37.5	30.8	31.0	17.8	41.9	24.8	28.2	10.9	21.4	15.3	15.9
T3	12.0	8.0	18.7	12.9	33.3	50.0	28.2	35.5	19.4	49.1	27.1	31.9	11.5	20.4	16.7	16.2
T4	11.3	10.7	19.3	13.8	37.2	33.1	25.7	31.0	20.0	46.3	24.3	30.2	12.2	20.4	18.6	17.0
T5	10.0	9.3	18.0	12.4	44.4	41.9	30.8	**38.0**	24.8	48.2	25.2	32.7	14.1	22.4	18.6	18.4
T6	12.0	8.0	18.7	12.9	33.3	50.0	28.2	**35.5**	22.4	45.1	23.9	30.5	13.2	20.4	18.1	17.2
T7	**12.7**	**6.0**	**17.3**	**12.0**	**29.4**	**62.5**	**33.3**	**40.0**	16.1	42.9	27.4	28.8	9.9	21.7	19.3	16.9
T8	13.3	16.0	24.0	17.8	26.1	0.0	7.7	11.0	26.6	46.8	26.2	33.2	15.5	21.7	19.4	18.9
T9	14.0	13.3	22.0	16.4	22.2	16.9	15.4	18.0	31.7	59.2	36.3	42.4	18.4	23.7	20.4	20.8
T10	14.0	12.0	22.7	16.2	22.2	25.0	12.8	19.0	31.1	50.6	27.4	36.4	16.8	23.3	20.0	20.0
T11	16.7	8.0	24.0	16.2	7.2	50.0	7.7	19.0	12.1	45.2	25.2	27.5	8.6	20.7	14.6	14.6
T12	15.3	13.3	24.7	17.8	15.0	16.9	5.2	11.0	12.7	46.9	25.4	28.3	9.2	20.4	13.6	14.4
T13	18.0	16.0	26.0	20.0	-	-	-	-	10.1	41.1	21.2	24.2	8.2	18.7	13.6	13.5

Table 106c: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Pooled) - Bathinda

Treatments	PDI of Fungal foliar spot (Pooled)				PDI of Bacterial Blight (Pooled)			
	60 DAS	90 DAS	120 DAS	ROC%	60 DAS	90 DAS	120 DAS	ROC%
T1	0.72	5.16	9.99	17.4	0.39	0.83	3.05	32.1
T2	0.55	5.33	10.61	12.3	0.22	0.89	3.22	28.3
T3	0.5	4.61	8.99	25.7	0.33	0.77	2.66	40.8
T4	0.55	4.94	9.83	18.8	0.22	0.89	2.72	39.4
T5	0.55	5.16	9.49	21.6	0.22	0.66	2.83	37.0
T6	0.55	5.66	10.11	16.4	0.22	1.00	3.11	30.7
T7	0.72	5.77	10.05	16.9	0.39	1.33	3.55	20.9
T8	0.55	3.28	5.60	53.7	0.22	0.61	2.11	53.0
T9	0.39	2.55	4.44	**63.3**	**0.05**	**0.22**	**1.5**	**66.6**
T10	0.39	3.05	5.33	**56.0**	**0.05**	**0.5**	**2.05**	**54.3**
T11	0.55	5.44	10.96	9.4	0.22	1.33	3.77	16.0
T12	0.55	5.83	11.16	7.8	0.22	1.33	3.44	23.4
T13	0.83	6.78	12.10	0.0	0.39	1.5	4.49	0.0

CENTRAL ZONE

Table 107a: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Junagarh)

Treatment	Germination (%)				Plant Mortality 90 DAS (%)				Plant Mortality 120 DAS (%)				Reduction (%)
	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled	
T1	94.3	97.6	97.9	96.6	1.3	1.0	1.2	1.2	3.6	1.2	3.0	2.6	50.00
T2	91.9	94.3	98.6	94.9	1.4	1.4	1.2	1.3	3.1	2.0	2.4	2.5	51.92
T3	95.7	97.6	99.1	97.5	1.7	1.2	1.5	1.5	2.7	1.7	2.9	2.4	53.85
T4	88.1	92.9	97.7	92.9	1.8	1.3	1.1	1.4	3.1	2.0	1.2	2.1	**59.62**
T5	87.6	94.8	98.1	93.5	1.3	1.5	1.2	1.3	2.2	2.2	1.5	1.9	**63.46**
T6	84.8	94.3	97.1	92.1	1.3	1.1	1.4	1.3	3.8	1.3	2.5	2.5	51.92
T7	86.7	93.8	95.7	92.1	1.8	1.3	1.4	1.5	6.2	1.8	2.6	3.5	32.69
T8	91.4	96.2	88.8	92.1	2.3	1.2	1.6	1.7	5.1	1.5	3.5	3.4	34.62
T9	91.9	95.7	88.8	92.1	1.2	1.1	1.5	1.3	1.5	1.2	3.1	1.9	**63.46**
T10	90.5	97.1	91.8	93.1	1.4	1.1	2.2	1.6	2.1	1.3	5.9	3.1	40.38
T11	86.7	93.3	91.9	90.6	1.5	1.3	1.7	1.5	4.6	1.8	4.0	3.5	32.69
T12	87.1	91.4	90.6	89.7	1.9	1.1	1.3	1.4	3.6	1.3	4.0	3.0	42.31
T13	88.1	89.1	87.6	88.2	1.6	1.4	1.3	1.4	5.1	2.5	8.0	5.2	-

Table 107b: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Pooled) - Junagarh

Treatment	FFS (120 DAS)				% reduction over control			
	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled
T1	32.83 (34.93)	21.00 (20.45)	47.17 (43.37)	33.67 (35.19)	25.9	21.7	18.9	22.2
T2	32.17 (34.55)	23.67 (21.81)	48.67 (44.23)	34.80 (35.70)	27.4	11.8	16.3	18.5
T3	27.83 (31.82)	18.83 (19.29)	49.83 (44.90)	32.17 (34.15)	37.2	29.8	14.3	27.1
T4	31.67 (34.23)	23.17 (21.58)	52.50 (46.44)	35.78 (36.48)	28.6	13.6	9.7	17.3
T5	32.50 (34.71)	19.67 (19.70)	48.17 (43.95)	33.44 (34.97)	26.7	26.7	17.2	23.5
T6	26.33 (30.73)	19.67 (19.73)	48.00 (43.84)	31.33 (33.63)	40.6	26.7	17.5	28.3
T7	24.63 (29.46)	18.00 (18.69)	50.50 (45.29)	31.04 (33.22)	44.4	32.9	13.2	30.2
T8	19.50 (26.19)	10.00 (13.80)	30.50 (33.51)	20.00 (26.03)	**56.0**	**62.7**	**47.6**	**55.4**
T9	16.00 (23.55)	10.50 (14.11)	26.50 (30.89)	17.67 (24.42)	**63.9**	**60.9**	**54.4**	**59.7**
T10	14.33 (21.85)	10.17 (13.94)	24.83 (29.88)	16.44 (23.44)	**67.7**	**62.1**	**57.3**	**62.4**
T11	23.67 (29.11)	20.00 (19.78)	44.17 (41.64)	29.28 (32.37)	46.6	25.5	24.1	32.1
T12	25.17 (30.11)	17.17 (18.30)	42.67 (40.78)	28.33 (31.76)	43.2	36.0	26.6	35.3
T13	44.33 (41.74)	26.83 (23.40)	58.17 (49.76)	43.1 (40.74)	0.0	0.0	0.0	0.0

Table 107c: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Junagarh)

Treatment	No. of bolls/plant				Boll weight				Monopodia				Sympodia				SCY (kg/ha)			
	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled
T1	30.1	26.7	42.1	33.0	3.4	4.1	4.7	4.1	1.2	1.2	1.2	1.2	14.0	12.7	16.9	14.5	1883	1778	2160	1940
T2	28.6	26.0	42.1	32.2	3.4	3.9	4.7	4.0	1.0	1.2	1.3	1.2	13.9	12.6	18.4	15.0	1698	1725	2419	1947
T3	29.0	25.9	42.9	32.6	3.5	3.7	4.5	3.9	1.2	1.2	1.2	1.2	13.7	12.4	17.7	14.6	2227	1748	2330	2102
T4	28.1	24.4	46.1	32.9	3.3	4.2	4.5	4.0	1.2	1.2	1.3	1.2	14.3	13.0	18.9	15.4	1787	1645	2263	1898
T5	28.3	22.9	45.7	32.3	3.2	3.9	4.3	3.8	1.0	1.0	1.3	1.1	13.3	12.0	18.2	14.5	1752	1628	2557	1979
T6	30.3	23.3	45.5	33.1	3.3	4.2	4.3	3.9	1.3	1.0	1.3	1.2	14.5	13.2	17.6	15.1	1679	1670	2328	1892
T7	31.4	23.7	45.1	33.4	3.5	3.8	4.6	4.0	1.0	1.0	1.4	1.1	15.0	13.7	18.3	15.7	1638	1658	2187	1828
T8	27.3	30.6	46.1	34.7	3.5	4.6	4.4	4.2	1.0	1.0	1.5	1.2	12.8	13.5	18.8	15.0	1853	1984	2306	2047
T9	29.9	29.0	47.3	35.4	3.4	4.3	4.2	4.0	1.0	1.0	1.5	1.2	14.7	13.4	18.3	15.5	1897	1944	2472	2105
T10	31.1	26.3	45.4	34.3	3.2	4.1	4.2	3.8	1.2	1.0	1.4	1.2	14.5	13.2	17.1	14.9	1763	1796	2424	1994
T11	31.9	24.9	47.0	34.6	3.4	3.5	4.5	3.8	1.0	1.0	1.3	1.1	13.3	12.0	17.9	14.4	1503	1715	2132	1783
T12	30.1	27.1	46.2	34.5	3.1	4.3	4.4	4.0	1.3	1.3	1.5	1.4	14.3	13.0	16.8	14.7	1578	1689	2231	1833
T13	31.0	24.1	45.7	33.6	3.1	4.1	4.1	3.6	1.0	1.2	1.4	1.1	13.9	12.7	18.2	14.9	1612	1685	2008	1768

Table 108a. Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Nanded) -Pooled

Treatment	Germination (%)				Plant Mortality 30 DAS (%)				Plant Mortality 60 DAS (%)				Plant Mortality 90 DAS (%)			
	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled
T1	94.6	94.4	96.5	95.2	-	5.56	4.6	5.1	-	6.06	6.1	6.1	-	6.06	7.1	6.6
T2	96.5	96.9	96	96.5	-	3.03	6.6	4.8	-	3.54	8.1	5.8	-	3.54	9.6	6.6
T3	96.8	96.7	93.9	95.8	-	3.28	6.6	4.9	-	4.29	7.6	5.9	-	4.29	8.6	6.4
T4	97	96.9	92.4	95.4	-	3.03	5.1	4.1	-	3.79	6.1	4.9	-	3.79	7.6	5.7
T5	94.4	96.2	93.4	94.7	-	3.79	6.1	4.9	-	4.29	7.6	5.9	-	4.29	8.1	6.2
T6	-	92.9	93.4	93.2	-	7.07	5.6	6.3	-	7.58	6.6	7.1	-	7.58	7.1	7.3
T7	96.5	97.2	97	96.9	-	2.78	3.5	3.1	-	3.79	5.1	4.4	-	3.79	6.1	4.9
T8	93.7	92.4	94.4	93.5	-	7.58	5.1	6.3	-	8.84	6.1	7.5	-	8.84	6.6	7.7
T9	97.2	91.7	94.4	94.4	-	8.33	6.1	7.2	-	8.33	8.6	8.5	-	8.33	9.1	8.7
T10	-	94.4	96	95.2	-	5.56	4.6	5.1	-	6.57	7.6	7.1	-	6.57	8.1	7.3
T11	94.6	95.9	92.4	94.3	-	4.04	10.6	7.3	-	4.55	13.6	9.1	-	4.55	14.1	9.3
T12	-	95.9	90.9	93.4	-	4.04	10.1	7.1	-	5.3	13.1	9.2	-	5.3	13.6	9.5
T13	87.9	88.6	89.4	88.6	-	11.36	15.2	13.3	-	11.87	18.7	15.3	-	11.87	19.7	15.8

Table 108b: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Nanded) -Pooled

Treatment	Plant Mortality 120 DAS (%)				% disease reduction over control				Seed cotton yield (Q/ha)			
	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled
T1	5.4	6.06	7.1	6.2	55.4	48.9	64.0	57.5	11.6	16.7	17.4	15.2
T2	3.5	3.54	9.6	**5.5**	71.1	70.2	51.3	**62.3**	12.0	16.6	16.2	14.9
T3	3.3	4.29	8.6	**5.4**	72.7	63.9	56.3	**63.0**	12.1	17.1	17.4	15.5
T4	**3**	**3.79**	**7.6**	**4.8**	75.2	68.1	61.4	**67.1**	11.3	16.7	17.0	15.0
T5	5.6	4.29	8.1	6.0	53.7	63.9	58.9	58.9	11.7	16.0	16.8	14.8
T6	*	7.58	7.1	7.3	*	36.1	64.0	50.0	*	16.5	16.5	16.5
T7	**3.5**	**3.79**	**6.1**	**4.5**	71.1	68.1	69.0	**69.2**	11.4	18.0	18.0	15.8
T8	6.3	8.84	6.6	7.2	47.9	25.5	66.5	50.7	12.3	14.1	15.4	13.9
T9	2.8	8.33	9.1	6.7	76.9	29.8	53.8	54.1	12.3	17.4	18.1	15.9
T10	*	6.57	8.1	7.3	*	44.7	58.9	50.0	*	18.6	17.9	18.2
T11	5.4	4.55	14.1	8.0	55.4	61.7	28.4	45.2	11.9	15.4	15.7	14.3
T12	*	5.3	13.6	9.5	*	55.3	31.0	34.9	*	14.2	15.2	14.7
T13	12.1	11.87	19.7	14.6	0.0	0.0	0.0	0.0	8.6	13.7	13.9	12.1

(*) – Data not received

Table 108c: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Nanded) -Pooled

	Treatments	ALS		GM	
		PDI	Red. over control (%)	PDI	Red. over control (%)
T1	*Trichoderma* spp. isolate (CICR-Rf-B/Th-11) as seed treatment @ 5 g/kg seed	5.4	33.7	14.9	30.1
T2	*Trichoderma* spp. isolate (Rf-B/Th-11) as soil treatment @ 1 kg/acre with 100 kg well-decomposed FYM/Compost at sowing time	4.8	40.9	14.4	36.2
T3	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time	4.5	44.0	13.7	41.8
T4	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L	3.6	54.5	14.2	53.5
T5	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L)	3.4	58.1	12.1	62.7
T6	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L)	3.0	63.5	6.9	65.8
T7	Seed treatment with carboxin 37.5% + thiram 37.5% @ 3.5g/kg	4.5	44.0	11.4	55.0
T8	Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L at 60 and 90 DAS	2.9	64.8	9.4	77.0
T9	Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L) at 60 and 90 DAS	**2.5**	**68.7**	**9.7**	**78.8**
T10	Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L) at 60 and 90 DAS	**2.1**	**74.4**	**3.6**	**82.3**
T11	Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L)) only	3.0	62.9	9.4	75.3
T12	Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L)) only	3.0	64.0	3.7	81.5
T13	Control	8.1	0.0	16.1	0.0

Table 109. Statement showing economics of various treatments in management of diseases of cotton (2024-25-Junagarh)

S/N	Treatment / Module	Seed cotton yield (kg/ha) Pooled	Yield increase over control (kg/ha)	Additional income(Rs) (From column No.4)	Cost of treatment (Pesticides, labor charge etc. (Rs/ha)	Net realization	ICBR
1	2	3	4	5	6	7 (5-6)	8 (5/6)
T_1	*Trichoderma* spp. isolate (CICR-Rf-B/Th-11) as seed treatment @ 5 g/kg seed	1940	172	13760	2260	11500	**1:6.09**
T_2	*Trichoderma* spp. isolate (Rf-B/Th-11) as soil treatment @ 1 kg/acre with 100 kg well-decomposed FYM/Compost at sowing time	1947	179	14320	3190	11130	**1:4.49**
T_3	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time	2102	334	26720	5280	21440	**1:5.06**
T_4	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L	1898	130	10400	4740	5660	1:2.19
T_5	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L)	1979	211	5520	14050	2830	1:1.20
T_6	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L)	1892	124	9920	8930	990	1:1.11
T_7	Seed treatment with carboxin 37.5% + thiram 37.5% @ 3.5g/kg	1828	60	4800	1118	3682	**1:4.29**
T_8	Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L at 60 and 90 DAS	2047	279	22320	9080	13240	**1:2.46**
T_9	Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L) at 60 and 90 DAS	2105	337	26960	17160	9800	1:1.57
T_{10}	Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L) at 60 and 90 DAS	1994	226	18080	12300	5780	1:1.47
T_{11}	Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L)) only	1783	15	1200	8650	-7450	1:0.14
T_{12}	Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L)) only	1833	65	5200	5400	-200	1:0.96
T_{13}	Control	1768	0	0	0	0	0

(**1)** Labor charge for one spray/ha: Rs. 500 (**2)** Price of seed cotton: Rs. 80/kg

(3) Labor charge for soil application of treat./ha: Rs. 500 **(4)** Picking charge: Rs 15/kg seed cotton.

(5) Carboxin 37.5% + thiram 37.5% 2.46 Rs./g **(6)** Mineral paraffin oil 500 Rs./liter

(7) (*Trichoderma* spp.) 250 Rs./kg & FYM 1.5 Rs./kg **(8)** Azoxystrobin 18.2% + difenoconazole 11.4% 5.29 Rs./ml

SOUTH ZONE

Table 110a: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Dharwad) -Pooled

Treatment	Plant Mortality 30 DAS (%)				Plant Mortality 60 DAS (%)				Plant Mortality 90 DAS (%)			
	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled
T1	2.5	2.0	2.4	2.3	7.6	6.3	6.3	6.7	7.8	7.6	6.3	7.2
T2	3.0	3.5	2.9	3.1	7.6	7.4	7.4	7.5	7.2	7.6	7.4	7.4
T3	4.3	4.0	3.6	3.9	6.5	6.0	6.0	6.2	5.4	6.5	6.0	6.0
T4	3.5	3.2	3.0	3.2	7.8	7.9	7.9	7.9	7.2	7.8	7.9	7.6
T5	2.9	2.3	2.1	2.4	5.5	5.0	5.0	5.2	4.8	5.5	5.0	5.1
T6	2.6	2.6	2.4	2.5	6.4	6.2	6.2	6.3	5.8	6.4	6.2	6.1
T7	2.0	1.5	1.0	1.5	4.8	4.1	4.1	4.3	3.8	4.8	4.1	4.2
T8	7.4	7.2	6.5	7.0	9.3	9.8	9.8	9.6	11.7	11.6	11.3	11.5
T9	7.3	7.0	7.0	7.1	9.4	9.1	9.1	9.2	10.6	11.4	17.4	13.1
T10	7.8	7.6	7.5	7.6	9.4	9.5	9.5	9.5	11.2	11.8	18.0	13.6
T11	7.9	7.8	7.4	7.7	8.9	8.8	8.8	8.8	10.1	10.7	17.2	12.6
T12	8.2	8.1	7.5	7.9	9.7	9.1	9.1	9.3	10.7	11.3	18.1	13.4
T13	11.5	10.5	9.50	10.5	12.5	12.0	12.0	12.2	16.2	15.7	24.3	18.7

Table 110b: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Dharwad) -Pooled

Treatment	Plant Mortality 120 DAS (%)				Disease reduction over control (%)				Seed cotton yield (Q/ha)			
	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled
T1	7.8	7.6	6.3	7.2	59.4	61.0	77.3	67.6	12.4	13.0	12.8	12.7
T2	7.2	7.6	7.4	7.4	62.5	61.0	73.4	66.7	12.8	13.8	13.5	13.3
T3	5.4	6.5	6.0	5.9	71.9	66.7	78.4	**73.4**	13.7	14.8	13.5	14.0
T4	7.2	7.8	7.9	7.6	62.5	60.0	71.6	65.8	14.5	13.2	13.1	13.6
T5	4.8	5.5	5.0	5.1	75.0	71.8	82.0	**77.0**	16.5	15.4	14.1	15.4
T6	5.8	6.4	6.2	6.1	69.8	67.2	77.7	72.5	15.2	15.0	15.0	15.1
T7	3.8	4.8	4.1	**4.2**	80.2	75.4	85.3	**81.1**	15.9	17.8	15.7	16.4
T8	14.7	15.2	13.3	14.4	23.4	22.1	52.2	35.1	16.3	18.0	17.3	17.2
T9	12.6	13.5	19.1	15.1	34.4	30.8	31.3	32.0	17.1	18.5	17.1	17.6
T10	13.6	14.5	20.0	16.0	29.2	25.6	28.1	27.9	18.8	20.0	18.9	**19.2**
T11	11.9	12.6	18.7	14.4	38.0	35.4	32.7	35.1	13.3	12.7	11.5	12.5
T12	12.7	13.2	19.6	15.2	33.9	32.3	29.5	31.5	12.8	12.5	12.4	12.5
T13	19.2	19.5	27.8	22.2	0.0	0.0	0.0	0.0	10.8	11.5	10.5	10.9

Table 110c: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Dharwad) -Pooled

	Treatment	ALB		BLB	
		PDI	Control (%)	PDI	Control (%)
T1	*Trichoderma* spp. isolate (CICR-Rf-B/Th-11) as seed treatment @ 5 g/kg seed	25.1	18.1	9.6	16.6
T2	*Trichoderma* spp. isolate (Rf-B/Th-11) as soil treatment @ 1 kg/acre with 100 kg well-decomposed FYM/Compost at sowing time	22.5	26.4	9.3	18.8
T3	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time	22.1	27.9	9.0	20.8
T4	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L	23.9	22.1	9.1	19.9
T5	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L)	18.8	38.7	7.0	38.2
T6	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L)	20.7	32.4	7.4	29.4
T7	Seed treatment with carboxin 37.5% + thiram 37.5% @ 3.5g/kg	18.7	39.0	6.0	45.4
T8	Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L at 60 and 90 DAS	**15.6**	**49.1**	4.8	57.7
T9	Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L) at 60 and 90 DAS	15.9	48.2	**4.8**	**58.6**
T10	Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L) at 60 and 90 DAS	**12.8**	**58.6**	**3.3**	**69.2**
T11	Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L)) only	25.8	15.8	8.6	25.9
T12	Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L)) only	28.1	8.2	8.8	18.5
T13	Control	30.7	-	11.7	-

Table 111a: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Lam, Guntur) -Pooled

Treatment	Germination (%)				Plant Mortality 30 DAS (%)				Plant Mortality 60 DAS (%)				Plant Mortality 90 DAS (%)			
	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled
T1	80.0	66.7	81.3	**76.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.4
T2	81.3	69.3	79.7	**76.8**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.7
T3	84.3	**71.0**	84.3	**79.9**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.4
T4	84.3	**69.3**	87.0	**80.2**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	0.0	1.5
T5	80.0	68.7	89.7	**79.5**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	0.0	1.5

T6	87.3	**70.3**	84.0	**80.5**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	1.1	0.0	0.9
T7	81.3	67.3	80.0	**76.2**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	1.1	1.5
T8	69.3	62.3	69.7	**67.1**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.4
T9	68.7	63.7	70.3	**67.6**	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.0	0.0	0.0	1.7	0.6
T10	70. .33	63.3	67.7	**65.5**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.7
T11	67.7	64.0	67.7	**66.4**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	2.2	0.9
T12	66.7	62.7	62.3	**63.9**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	3.9	2.0
T13	64.0	62.7	64.7	**63.8**	0.0	0.0	0.0	0.0	1.5	2.5	2.0	2.0	0.6	3.9	3.4	2.6

Table 111b: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Lam, Guntur) -Pooled

Treatment	Plant Mortality 120 DAS (%)				Disease reduction over control (%)				Plant height (cm)				Seed cotton yield (Q/ha)			
	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled	2022-23	2023-24	2024-25	Pooled
T1	1.7	1.1	1.1	1.3	77.9	77.6	80.7	78.69	169.9	159.3	163.3	164.2	16.8	18.5	14.2	16.5
T2	1.7	2.2	0.6	1.5	77.9	55.1	89.5	75.41	166.3	157.8	166.3	163.5	18.4	18.6	14.3	17.1
T3	1.7	1.1	0.6	1.1	77.9	77.6	89.5	**81.42**	170.0	172.7	163.5	168.7	17.3	22.4	14.7	18.1
T4	1.1	4.4	0.0	1.8	85.7	10.2	100.0	69.95	164.5	171.0	166.2	167.2	19.7	23.9	14.8	19.5
T5	0.6	4.4	0.0	1.7	92.2	10.2	100.0	72.68	166.2	173.8	167.6	169.2	22.4	21.9	14.6	19.6
T6	3.9	1.1	0.0	1.7	49.4	77.6	100.0	72.68	172.7	169.9	170.8	171.1	21.9	23.3	16.8	20.7
T7	7.3	0.0	1.1	2.8	5.2	100.0	80.7	54.10	168.1	166.3	167.9	167.4	22.5	20.4	13.9	18.9
T8	0.0	0.0	1.1	**0.4**	**100.0**	**100.0**	**80.7**	**93.99**	171.0	164.6	168.1	167.9	22.7	24.2	19.9	22.3
T9	0.0	0.0	1.7	0.6	100.0	100.0	70.2	**90.71**	159.3	172.4	163.5	165.1	22.3	22.7	19.1	21.4
T10	0.0	2.2	0.0	0.7	100.0	55.1	100.0	87.98	167.9	167.9	164.5	166.8	16.8	22.5	18.4	19.2
T11	0.0	0.6	2.2	0.9	100.0	87.8	61.4	84.70	158.9	158.9	166.7	161.5	16.3	16.3	12.1	14.9
T12	0.0	2.2	3.9	2.0	100.0	55.1	31.6	66.67	157.8	149.9	161.8	156.5	16.7	15.1	10.5	14.1
T13	7.7	4.9	5.7	6.1	-	-	-	-	144.5	144.5	158.5	149.2	14.7	13.7	9.1	12.5

Table 111c: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne diseases management (Lam, Guntur) -Pooled

Treatment	CoLS (PDI)				GM		Rust		Boll rot	
	60 DAS	90 DAS	120 DAS	% Control	120 DAS	% Control	120 DAS	% Control	% Incidence	% Control
T1	4.7	11.0	11.8	36.9	9.9	31.7	11.5	34.7	4.1	16.3
T2	5.1	10.2	12.5	33.2	10.4	28.3	12.5	29.0	4.0	18.4
T3	5.0	9.6	11.8	36.9	9.3	35.9	11.5	34.7	4.1	16.3
T4	4.6	7.4	8.3	55.6	7.5	48.3	9.2	47.7	3.5	**28.6**
T5	4.7	7.4	8.0	**57.2**	6.9	**52.4**	8.6	**51.1**	3.5	**28.6**
T6	4.7	7.7	8.0	**57.2**	7.2	50.3	8.7	**50.6**	3.4	**30.6**
T7	5.4	11.0	11.2	40.1	10.4	28.3	12.2	30.7	4.8	2.0
T8	8.3	10.3	9.6	48.7	7.5	48.3	11.1	36.9	4.4	10.2
T9	8.1	10.2	8.9	52.4	6.5	**55.2**	10.0	43.2	4.8	2.0
T10	7.6	11.0	10.0	46.5	7.9	45.5	10.8	38.6	4.6	6.1
T11	9.4	11.1	11.4	39.0	9.4	35.2	12.8	27.3	4.9	0.0
T12	9.0	12.7	12.8	31.6	11.9	17.9	13.9	21.0	4.5	8.2
T13	9.7	16.5	18.7	0.0	14.5	0.0	17.6	0.0	4.9	0.0

Table 112a: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne disease management-Coimbatore (Pooled analysis for 2022-2023, 2023-2024, 2024- 2025)

Treatment	Germination (%)	Root rot incidence				% disease reduction over control	Plant height	No.of sympodial Branches	Seed cotton yield Q/ha
		30 DAS	60DAS	90DAS	120 DAS				
T_1	79	7.2 (15.5)	16.5 (23.9)	20.3 (26.7)	21.0 (27.1)	44.0	145.5	18.7	16.0
T_2	81	6.3 (14.4)	15.7 (23.4)	19.2 (25.9)	19.8 (26.5)	47.2	147.6	19.6	16.2
T_3	83	5.7 (12.9)	14.7 (22.5)	18.9 (25.8)	19.3 (25.7)	48.5	152.6	21.6	16.6
T_4	87	5.0 (12.5)	9.5 (18.1)	13.3 (21.9)	13.7 (21.7)	**63.5**	165.0	24.6	17.6
T_5	88	3.7 (10.8)	6.3 (14.3)	10.1 (18.7)	**10.6 (18.9)**	**71.7**	168.6	26.7	18.3
T_6	87	4.4 (12.7)	7.4 (15.8)	11.0 (20.5)	11.5 (19.5)	**69.3**	167.2	25.7	17.7
T_7	85	6.5 (14.7)	16.0 (24.3)	20.2 (26.6)	20.6 (27.0)	45.1	135.7	19.7	15.2
T_8	78	8.5 (16.9)	15.3 (22.5)	19.8 (26.4)	20.1 (26.4)	46.4	133.4	21.7	15.4
T_9	81	8.7 (17.0)	14.9 (22.0)	19.0 (27.0)	19.7 (25.8)	47.5	136.2	22.5	16.0
T_{10}	80	9.3 (17.7)	17.7 (24.8)	21.0 (27.3)	21.3 (26.8)	43.2	134.4	21.5	15.7
T_{11}	76	10.7 (18.4)	22.4 (28.2)	26.1 (31.3)	26.8 (31.7)	28.5	130.7	15.0	13.7
T_{12}	75	10.5 (18.6)	22.7 (28.8)	25.9 (30.6)	26.4 (31.3)	29.6	131.0	15.3	13.9
T_{13}	71	15.7 (23.4)	33..5 (35.3)	36.9(38.0)	37.5 (37.6)	0.0	120.6	12.7	12.3
CD at 5%	**2.40**	**1.20**	**1.17**	**1.21**	**1.24**	**-**	**2.74**	**1.38**	**1.66**
S. E(m)	**2.02**	**0.41**	**0.48**	**0.51**	**0.54**	**-**	**2.37**	**0.68**	**0.96**
Cv %	**2.07**	**4.01**	**2.98**	**2.69**	**2.76**	**-**	**2.24**	**3.91**	**5.98**

Table 112b: Field evaluation (Rhizospheric fungi & chemicals etc.) for seed and soil borne disease management- (Pooled analysis for 2022-2023, 2023- 2024, 2024-2025) Coimbatore

S.No.	Treatments	*Alternaria*leaf blight		Grey mildew	
		PDI	% reduction over Control	PDI	% reduction over Control
T_1	*Trichoderma* spp. isolate (CICR-Rf-B/Th-11) as seed treatment @ 5 g/kg seed	13.9 (21.8)	24.4	14.3 (22.2)	27.4
T_2	*Trichoderma* spp. isolate (Rf-B/Th-11) as soil treatment @ 1 kg/acre with 100 kg well-decomposed FYM/Compost at sowing time	13.6 (21.5)	26.0	13.7 (21.7)	30.4
T_3	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time	12.8 (21.0)	30.4	13.2 (21.2)	32.9
T_4	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L	10.2 (18.6)	44.5	10.8 (18.8)	45.1
T_5	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol mineral paraffin oil) @1.5% (15 ml/L)	9.9 (18.3)	46.1	10.6 (18.9)	46.1
T_6	*Trichoderma* spp. isolate (Rf-B/Th-11) as seed + soil treatment at sowing time and FS at 60 and 90 DAS @ 2/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L)	10.4 (18.7)	43.4	11.2 (19.5)	43.1
T_7	Seed treatment with carboxin 37.5% + thiram 37.5% @ 3.5g/kg	13.8 (21.7)	25	13.5 (21.5)	31.4
T_8	Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L at 60 and 90 DAS	8.1 (16.4)	**55.9**	7.2 (15.5)	**63.4**
T_9	Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L) at 60 and 90 DAS	7.2 (15.5)	**60.8**	7.4 (15.6)	**62.4**
T_{10}	Azoxystrobin 18.2% + difenoconazole 11.4 @ 1ml/L + Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L) at 60 and 90 DAS	7.6 (15.9)	**58.6**	7.6 (16.0)	**61.4**
T_{11}	Mak Adjuvol (mineral paraffin oil) @1.5% (15 ml/L)) only	15.2 (22.8)	17.3	15.6 (23.2)	20.8
T_{12}	Mak Adjuvol (mineral paraffin oil) @0.75% (7.5 ml/L)) only	15.5 (23.2)	15.7	16.1 (23.5)	18.2
T_{13}	Control	18.4 (25.3)		19.7 (26.3)	
CD at 5%		**1.26**		**1.51**	
S. E(m)		**0.47**		**0.75**	
Cv %		**3.39**		**4.13**	