

ICAR-Central Institute for Cotton Research
Weekly Advisory for Cotton Cultivation from 31st August to 7th September 2015
(42st Standard Week)

"The advisory is based on inputs received from the State Agricultural Universities of the respective state

WEATHER ADVISORY

Date	Rainfall (mm) Aug/ Sep 2015								ADVISORY
	31	1	2	3	4	5	6	7	
PUNJAB									The weather will remain partly cloudy without any expectations of rain . The crop is in reproductive and boll formation stage. WHITEFLY: Incidence of leafhopper (0-3), whitefly (6-22) and thrips (2-13) per 3 leaves were observed. Cotton leaf curl virus disease (CLCuD) was observed in Bathinda on all the cotton hybrids. Mean population of whitefly adults was above ET except in Rewari, Mohindergarh and Palwal districts. Average population of leafhopper nymphs and adults was above economic threshold (ET)in fields of Rewari, Palwal and Mohindergarh districts. Average population of leafhopper nymphs and adults was above economic threshold (ET)in fields of rice grown belt. Farmers are advised to spray with 1.0% Nirma laundry detergent and 5.0% castor oil emulsion or neem oil 1.0 liter/acre to reduce the whitefly inoculum, 7-8 days later followed by spray of Diafenthiuron 50 WP @ 320 g/acre Buprofezin 25 SC @ 80ml per acre based on crop growth wherever the ETL of whitefly has crossed (6-8 adults/3 leaves). Keep the fields free from weeds. PARAWILT: Parawilt symptoms have also been noticed after application of irrigation at few places. Apply irrigation to cotton crop wherever temporary wilting in the morning hours is observed. Spray Cobalt chloride @10 ppm (1g/100 litres of water). PEST/DISEASE: Incidence of bollworms was observed in desi cotton. Solenopsis mealy bug incidence was observed only in traces in few fields. Bacterial leaf blight disease did not appear in surveyed fields of cotton. Fungal foliar diseases were observed in traces in some fields. GENERAL RECOMMENDATIONS: Apply remaining applications of N: P: K (13:0:45). Spray 2 kg Potassium nitrate or 5 kg Urea in 200 litres of water per acre at flowering and boll development stage. Farmers are advised to monitor their crop for insect pests & diseases regularly and to apply control measure only at ET. Recommended insect pest control measures must be taken only at economic threshold levels on rain free days. Do not spray pyrethroids, fipronil or mixtures or any insecticide mixtures. This will aggravate whitefly infestation.
Batinda	0	0	0	0	0	0	0	0	
Ferozepur	0	0	0	0	0	0	0	0	
Muksar	0	0	0	0	0	0	0	0	
Mansa	0	0	0	0	0	0	0	0	
HARYANA									
Sirsa	0	0	0	0	0	0	0	0	
Hissar	0	0	0	0	0	0	0	0	
Fatehabad	0	0	0	0	0	0	0	0	
RAJASTHAN									
Hanumangarh	0	0	0	0	0	0	0	0	
Sri Ganganagar	0	0	0	0	0	0	0	0	
Banswara	0	4	0	0	0	0	0	1	
ORISSA									
Koraput	48	48	29	13	12	15	12	11	
Kalahandi	47	22	26	13	11	13	10		
Balagir	36	11	17	7	4	0	4	5	

GUJARAT								
Amreli	0	0	0	0	5	8	0	1
Bhavnagar	0	0	0	0	4	4	0	0
Jamnagar	0	0	0	0	0	4	0	1
Rajkot	0	0	0	0	0	8	0	1
Baruch	0	0	0	0	0	0	0	1
Sabarkantha	0	0	0	0	0	0	0	0
Surendranagar	0	0	0	0	7	4	0	0
Ahmedabad	0	0	0	0	7	8	0	1
Vadodara	6	0	1	2	1	0	0	1
Patan	0	0	0	0	0	0	0	0
Mehsana	0	0	0	0	3	0	0	0
MADHYA PRADESH								
Khargaon	8	3	0	0	0	0	0	1
Dhar	0	6	0	3	0	0	0	1
Khandwa	12	0	0	0	0	0	0	1
MAHARASHTRA								
Nagpur	30	9	0	0	0	0	0	3
Wardha	24	7	0	0	0	0	0	3
Chandrapur	27	6	0	4	0	0	0	6
Yavatmal	15	4	0	0	0	0	0	4
Amravati	34	9	0	0	0	0	0	2
Akola	6	0	0	0	0	0	0	1
Buldhana	15	0	0	0	0	0	5	0
Parbhani	0	0	0	0	0	3	9	5
Nanded	0	0	0	0	0	5	9	5
Beed	0	0	0	0	0	4	10	3
Washim	3	0	0	0	0	0	3	2
Dhule	7	3	0	3	3	6	6	0
Jalgaon	15	0	0	0	3	6	6	0
Jalna	0	0	0	0	0	0	7	2
Aurangabad	6	0	0	0	0	3	6	1

The crop growth is at flowering stage. Crop condition is good. Rains are not expected until mid-September. Interculture and weeding must be completed now. Apply 25% dose of recommended dose of fertilizers. Avoid excessive urea application. Incidence of jassids, whitefly, thrips and mealy bugs, was observed to be low. Farmers are advised strictly not to spray pyrethroids and Fipronil. These insecticides aggravate whitefly and Helicoverpa resurgence. The crop is free of any disease. Repeated sprays of Spinosad and thiodicarb cause problems of mealybugs and leaf reddening, respectively. **PINK BOLLWORM:** Incidence of Pink bollworm was observed to have declined and at low levels in Bt Cotton. Farmers are advised to install pheromone traps @ 5-6 /ha to monitor pink boll worm. At economic threshold levels of 8 moths per trap per night for three consecutive nights and/or 10% damaged bolls with grown-up larvae, spray quinalphos. Farmers are advised to terminate cotton crop in December without extending it further into 2016. This is necessary to reduce pink bollworm incidence and bollworm resistance to Bt-cotton. Cotton stalks of last year have been observed lying on the bunds. They must be destroyed immediately. Old cotton seed stored in go-downs or homes serve as a carryover for pink bollworm moths. If the seeds are infested, these may be destroyed immediately. If unattended, pink bollworm can cause heavy damage in October. Do not use mixtures especially those containing pyrethroids. This can result in whitefly infestation.

The crop condition is good. Summer sown crop is in fruiting stage while other crop is in vegetative stage. The weather is dry with high temperature. Jassid incidence crossed economic thresholds in some hybrids in some parts of the State. Recommended control measures may be initiated in these fields. There is no disease incidence.

In Vidharba region, crop sown during May is in boll formation stage; crop sown in mid-June monsoon is in flowering stage and July sown crop is in early squaring stage. Hoeing and weeding may be completed now. Furrows to be opened for moisture conservation. At Nanded, the crop is in boll formation stage in the irrigated field and flowering to boll formation in the rainfed areas. Intercultural operations should be carried out for weed management. Moisture conservation practices should be carried out for rainfed crop. Opening of furrows should be done to irrigated crop for moisture conservation and land configuration for surface irrigation. Foliar application of MgSO₄ and KNO₃ should be done at 75 to 85 DAS. Sprays of 1% urea or 1% DAP spray may be taken up in June sown crop at peak flowering stage. Drying of cotton was reported from Chandrapur and Yeotmal districts in 200 to 400 acres in Korpana village and surrounding areas. The cause was traced to the spraying of fertilizers especially urea at more than 2% concentration and post-expiry-date fertilizers on 30-40 day old moisture stressed plants. Chemicals after expiry date get chelated and cause problems. Yavatmal too reported drying of early sown cotton in boll bursting stage. Use of unapproved herbicides appears to be the reason. Leaf hopper (jassid) infestation was found to be above ETL in more than 70% of the villages surveyed in Dhule (98%) Chandrapur (72%) and Hingoli (74%). Leaf hopper infestation was observed to cross ETL in 36 to 54% of the villages in Akola, Amravati, Yeotmal, Aurangabad, Jalna, Nanded, Parbhani and Nagpur. Thrips and mealybug infestation was seen in some patches. American bollworm was noticed in non-Bt G. hirsutum varieties for which recommended measures should be taken up. In general the crop is healthy. Alternaria was noticed in some patches. Control measures may be initiated for sucking pests as per recommendations in fields where ETL has crossed for any of the insect pests.

TELANGANA								
Adilabad	3	0	0	6	3	8	12	28
Warangal	3	4	4	4	17	18	18	10
Khammam	4	5	5	5	24	29	19	8
Karimnagar	5	8	4	6	17	18	18	7
Nalgonda	3	5	5	6	24	29	20	6
ANDHRA PRADESH								
Guntur	0	0	0	6	28	34	25	6
Prakasam	0	0	0	7	28	34	28	6
KARNATAKA								
Dharwad	6	6	10	8	0	3	0	2
Haveri	8	6	4	3	3	3	3	2
Mysore	6	0	4	4	4	11	6	4
TAMILNADU								
Perambalur	0	0	0	0	6	12	15	3
Salem	0	0	0	4	13	17	17	7
Trichy	0	0	0	10	22	26	13	6
Virdhunagar	3	0	0	10	22	26	13	0

Rains are expected to continue until mid-September in Telanagana and parts of AP. Root system of Bt cotton is poorly developed with a very short tap root. This has been seen in all plants that dried. Farmers are advised to sow desi cotton in soils having hardpan or to go in for high density planting with straight varieties and to refrain from cultivating hybrid cotton. Farmers are also advised to desist from growing Bt cotton hybrids under drip as availability of water in the early stages at the top layer discourages root penetration. Insect pest or disease infestation have not been reported from any part of the region.

Insect pest or disease infestations have not been reported from any part of the region. Sowing of desi cotton varieties (*G. herbaceum*) like Jayadhar, DDHC-11 and RAHS-14 as sole crop and as intercrop in onion or chilli crop have to be completed by this week end. Final top dressing application should be taken up with 25 kg urea + 25 kg Muriate of potash per acre to 80-90 days old crop. In areas where it is not possible for manual weeding in cotton crop, it is suggested for spraying of selective post emergent weedicides as recommended in the annexure of this advisory for effective control of both monocot and dicot weeds. Repeated hoeing is suggested in scanty rainfall areas to conserve the available soil moisture. The crop at boll formation stage has to be sprayed with 1 % of 19:19:19 fertilizer (10 g/lit of water) along with 1% MgSO4 and Planofix (0.25 ml/lit of water) can be taken up to manage leaf reddening and square dropping effectively. Light irrigation is suggested in black soil for the crop which is at peak square formation and boll initiation stage.

Cloudy sky with possibility of rainfall is predicted for the last days of ensuing week. Gap filling is to be taken up. Pre-emergence application of herbicide – Pendimethalin @ 3.3 liters / ha. and seed treatment with *Pseudomonas fluorescens* @ 10 / kg of seed or *Trichoderma viride* @ 4 g /kg of seed is to be done. Ignore aphid and leafminer incidence on seedlings.

Legend					
Rainfall in mm	< 5	5-20	20-50	50-80	> 80

MANAGEMENT STRATEGIES RECOMMENDED BY CICR

(Authored by K. R. Kranthi; No part of this advisory may be used in any form in any publication electronic or print or any other means without the permission of the author)

The strategies recommended in this brief note are based on results of experiments conducted by CICR and developed in consonance with various ecologically compatible guidelines issued by various National and Global agencies.

GENERAL CROP HEALTH MANAGEMENT PRACTICES

1. **Early maturing varieties or Bt-cotton hybrids** may be preferred in rain-fed regions.
2. **Early sowing** is preferred in rain-fed regions immediately after receiving the first showers of 80 mm rainfall.
3. **Sowing on ridges in rain-fed regions** especially in high density planting systems is most preferred.
4. **Bt-cotton hybrids** may be sown at 90 x 30 cm in rain-fed regions and at wider spacing under irrigation
5. **Non-Bt varieties** Suraj such as (CICR) NH 615 (VN-MAU, Parbhani), AKH 081 (Dr PDKV Akola), Phule Dhanwantari (MPKV Rahuri) and Anjali (LRK 516) are early maturing. If these varieties are sown before 15th June in high density planting at 60x10 cm (40x10cm for Phule Dhanwantari), the crop will escape drought stress and bollworms.
6. **Intercropping in high density non-Bt cotton varieties** can be taken up with soybean (seed treated with *Bradyrhizobium japonicum*), cowpea or blackgram in alternate rows at 45 cm row to row and 10 cm plant to plant.
7. **Intercropping in Bt hybrids** can be taken up with soybean (seed treated with *Bradyrhizobium japonicum*), cowpea or blackgram as one row between two Bt-hybrid rows
8. **Border rows (2-3 rows) of pigeonpea** around cotton fields will prevent infestation of mealy bugs and serve as refugia.
9. **Farm Yard Manure** @ 5 to 10 t/ha or compost should be applied just after the first rain.
10. **Azotobacter and PSB** @ 25 g each / kg seed should be used for nutrients fixation.
11. **Optimize nutrient management** for macro and micronutrients. Foliar spray of MgSO₄, 2% Urea followed by 2% DAP, to ensure proper Cry1Ac expression and also to reduce problems of leaf reddening. Sprays of 1% cobalt chloride and soil drenching with Bavistin 1 % in the initial stage of wilt was found to help in the recovery of plants.
12. **Prevention of Leaf Reddening:** Spray 2 % urea, 0.5% Zinc Sulphate and 0.2 % Boron, twice at 15 days interval on 90 days old crop.
13. **Retention of squares and flowers:** Spray Planofix 4.5 SL (NAA) hormone @ 21 ppm (7 ml per 15 litres of water).

INSECT PEST MANAGEMENT

General recommendations

DOs

1. **Select sucking pest resistant varieties/hybrids.** Sucking pest resistant Bt hybrids may require very few insecticide interventions.
2. **Inter-crop with cowpea or sorghum or soybean or blackgram** to encourage predators of sucking pests.
3. **Imidacloprid (8 g), Vitavax or Thiram (3 g)** per kg seed will protect varieties against sucking pests and diseases.

4. **Use nitrogenous fertilizers to the minimum** especially for sucking pest susceptible varieties.
5. **Maintain field sanitation** (weed free)
6. **Remove and destroy mealy bug infested plants.**
7. **Use Neem preparations and biological control options** for least disruptive pest management.
8. **Pheromone traps** are efficient for pest monitoring of Pink bollworm.
9. **Stem application or soil application** (near the root zone) of Imidacloprid, Dimethoate or Acephate at 30-40 DAS and 50-60 DAS for effective eco-friendly control of thrips, mirid bugs, mealy bugs and other sucking pests.

DON'Ts

10. **Avoid late sowing beyond 15th May in North India** to prevent aggravation of cotton leaf curl virus.
11. **As far as possible avoid chemical insecticides during the first two months of the crop** to conserve naturally occurring biological control. Ladybird grubs and beetles, *Chrysoperla* grubs and adults, Syrphid flies, *Geocoris* grubs and bugs, *Aenasius* spp., *Aphelinus* grubs and wasps, mirid bugs and Spiders are the most important naturally occurring predators and parasitoids that effectively control aphids, jassids, thrips, mirids, whiteflies and mealybugs.
12. **Do not spray against minor lepidopteran insects** such as the cotton leaf folder, *Sylepta derogata* and cotton semilooper, *Anomis flava*. The larvae cause negligible damage to cotton but serve as hosts for parasitoids such as *Trichogramma* spp., *Apanteles* spp and *Sysiropa formosa*, that attack *H. armigera* and other bollworms.
13. **Do not spray Bt-formulations on Bt cotton** to avoid further selection pressure.
14. **Avoid foliar application of neonicotinoid insecticides** such as Acetamiprid, Imidacloprid, Clothianidin and Thiomethoxam which are likely to aggravate insect resistance, since hybrid cotton seeds are treated with imidacloprid.
15. **Do not use WHO Class-I (Extremely Harzardous category) insecticides** such as Phosphamidon, Methyl parathion, Phorate, Monocrotophos, Dichlorvos, Carbofuran, Methomyl, Triazophos and Metasystox.
16. **Avoid Fipronil and Pyrethroids** to prevent whitefly outbreaks.
17. **Avoid insecticide mixtures.** Mixtures severely disrupt eco-systems thereby leading to pest outbreaks.

SUCKING PEST MANAGEMENT

Economic Threshold Level (ETL): If whitefly and/or leafhopper damage reaches economic threshold levels of grade-II damage of curling and crinkling of lower leaves and yellowing of margins in 25% plants or more, any one of the following pest control measures as suggested below can be used.

- a. Neem oil 1.0% + Neem Seed Kernel Extract 5.0% + 0.05-0.1% detergent
- b. *Verticillium lecanii* 10gms/lit of water, wherever good formulations are available from reliable manufacturers
- c. Diafenthiuron 50WP 800g /ha,
- d. Flonicamid 50 WG 200g a.i/ha or
- e. Buprofezin 25% SC 200 g a.i/ha.

Insecticides such as Dimethoate or Acephate or Ethion can also be used but may be considered as alternatives only, in view of factors that relate to ecological and environmental safety, efficacy and resistance.

If mirid bugs are observed to cause economic damage to squares, it is advised to spray Acephate 75 SP @ 1 g/lit or Dimethoate.

BOLLWORM MANAGEMENT

Bt cotton is effective in controlling bollworms.

The following strategies are being recommended for non-Bt cotton

At Economic Threshold Levels (ETLs) of 50% infested plants (plants having flared squares with entry hole) for *Helicoverpa armigera*.

1. **Use HaNPV** (*Helicoverpa armigera* Nuclear Polyhedrosis Virus) on Bt-cotton followed by the application of **5% Neem Seed Kernel Extract (NSKE)** a week later. **OR, use Phosalone** at ETL for the management of bollworms, *Spodoptera* or whitefly.
2. **Trichogramma**, if available, can be used on non-Bt genotypes at 70-80 DAS. Avoid *Trichogramma* egg parasitoid releases on Bt-cotton since maximum neonates get killed on Bt-cotton and with *Trichogramma* application becoming superfluous.
3. **Insecticides effective on Bollworms**, especially *Helicoverpa armigera*.
 - a. Chlorantraniliprole,
 - b. Flubendiamide,
 - c. Spinosad,
 - d. Emamectin benzoate and
 - e. Indoxacarb

These insecticides have a high selective toxicity towards the target pests while being less toxic to many beneficial insects in the cotton ecosystem. These insecticides are ideally suited in eco-sustainable insecticide resistance management programmes.
4. **Pink bollworm and Spotted bollworms:** ETL level of one live larva in 10 green bolls or 8 moths per night for three consecutive nights. Spray Quinalphos 25 EC Profenophos 50 EC @ 2 ml/lit of water / Spray of Thiodicarb 75 WP @ 20 g or any pyrethroid.

OTHER PESTS

1. **Spodoptera litura:** Collection of egg masses or application of *SINPV* (*Spodoptera litura* Nuclear Polyhedrosis Virus) @ 500 LE/ha or Spray 200 ml Novaluron 10 EC or 250g Thiodicarb 75WP in 250 litres of water per acre
2. To minimize **shoot weevil** damage, spray Profenofos @ 2 ml/lit
3. **Snail incidence in heavy rainfall areas:** baiting with 2% Metaldehyde (Snail kill) @ 12.5 kg/ha has to be taken up and it is to be applied at the hideouts of the snails, on the bunds and to the soil around the crop where the damage is seen

DISEASE MANAGEMENT

Parawilt or Sudden drying (New wilt) or Wilt / Root rot: Symptoms are noticed in some fields after drought followed by rains or irrigation. Spray cobalt chloride @10mg/litre (10ppm) on affected plants within few hours of onset of symptoms and/or Drench plants

with a mixture of Copper-Oxy-Chloride 25g and 200g Urea in 10 ltr of water or Carbendazim 1g/L.

Boll Rot: Generally early formed lower bolls rot due to cloudy and drizzling conditions. Spray Mancozeb 75 WP + Chlorothalonil 70 WP each @ 2 g/lit of water. For better results, mix 10g Selvet 99 or 50 ml Triton in 100 litres of fungicide solution.

Alternaria blight: spray Mancozeb@2.5 g per one litre of water.

Myrothecium leaf spot disease and/or Bacterial blight: Spray Streptomycin sulphate (15-20 g/ha) plus Copper oxychloride (1500-2000 g/ha) in 200-250 L of water.

WEED MANAGEMENT

Application of Pre-emergence weedicide Stomp 30EC or Basalin @45EC 2.5 lt/ha and harrow immediately to prevent degradation.

Herbicides are most effective on younger weeds.

Post emergence herbicides (application rate 50 to 75 g ai/ha)

Grasses: Spray Quizalofop-ethyl or Fenoxaprop ethyl or Fluazifop butyl,

Sedges and grasses: Spray Propaquizafop ethyl

Broadleaf weeds: Spray Pyriithiobac sodium

Post-emergence weedicides would provide effective and timely control especially when interculture operations or manual weeding becomes difficult in wet soils. Weedicides are effective against younger (less than 10-15 days old) weeds, especially grasses. For grassy weeds, Quizalofop ethyl, Fenoxaprop ethyl, fluazifop butyl, can be used. For sedges and grasses, Propaquizafop ethyl is effective. Pyriithiobac sodium is effective on broad leaf weeds. Farmers may consult the technical experts of the Agricultural Universities for further details.

WATER LOGGING MANAGEMENT

Cotton is very sensitive to excess water. In many parts of Central and South India, water logging can be problematic due to excess rains. Cotton grown on deep black soils and ill drained conditions is worst affected due to water logging. Provide adequate drainage channels or water ways (particularly in heavy soils) along the slope of the land for draining excess water under heavy rainfall situations. For better soil moisture conservation, preferably in areas where rainfall is 700-900mm, the land can be reshaped into ridges and furrows with the help of a ridge plough or a bund former. This technique and sowing cotton on ridges would conserve rainwater and the furrows acts drainage channels whenever heavy rains are received particularly in heavy clays.

Drainage channels must be opened up along the field borders so that excess water is removed from the fields. If sowing hasn't yet been completed, it is strongly recommended that to take up sowing immediately on ridges and furrows by planting on top of ridges. Heavy rains will not affect the crop because the furrows will drain away excess water. Apply fertilizers if the crop becomes pale due to water logging. If heavy rains are forecast, fertilizer application may be postponed so as to prevent losses due to surface run-off.

Foliar sprays with 0.5 to 1.0% DAP or 19:19:19 (soluble complex of Nitrogen) at weekly intervals will help the plants to recover from the effect of water logging.

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