

ICAR-Central Institute for Cotton Research
Weekly Advisory for Cotton Cultivation from 22nd to 27th September 2015
(45th Standard Week)

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

WEATHER ADVISORY

Date	Rainfall (mm) Sep 2015						ADVISORY
	22	23	24	25	26	27	
PUNJAB							<p>The crop is at reproductive and boll formation stage. Regular monitoring of the cotton crop to be done for attack of sucking pests. Availability of water and nutrients at flowering and peak boll formation phase is critical for good yields. Moisture and nutrient stress can result in shedding of flowers and bolls thereby leading to poor yield. To hasten boll opening, last irrigation may be given at the end of September. Incidence of leafhopper (0-4/3 leaves), whitefly (9-22/3leaves) and thrips (0-4/ 3 leaves) were observed. Severe parawilt has been noticed at many locations after irrigation. Though the population of leafhopper is increasing but is still below ETL. Whitefly incidence is more or less stable. Install yellow sticky traps at 1 trap per 100 sq metre to trap the increasing adult population, spray 5% emulsion of NEEM OIL, CASTOR OIL, FISH OIL ROSIN SOAP OR 1% NIRMA. At ETL levels any one of the Insect growth regulators such as Diafenthiuron, Buprofezin, Pyroproxifen, Spiromesfin and Emamectin benzoate may be sprayed. Spray for whitefly wherever the population of whitefly is high. Spray should be done in the morning or late in the evening and targeted towards mid and lower canopy of plant. Problem of sooty mould has appeared. For parawilt, spray cobalt chloride @10ppm (1g/100 litres of water). Keep the fields free from weeds. It is advised to give four sprays of N: P: K (13:0:45) @2.0 kg/acre at weekly interval starting at flowering stage. Incidence of leaf curl virus disease was observed upto 3 grade severity in Hisar, Sirsa, Fatehabad, Jind and Bhiwani district. For boll rot complex, spray copper oxychloride 800 g. or bavistin 400 g. in 200 L of water per acre. Farmers are advised to monitor their crop for insect pests & diseases regularly. Farmers are advised to monitor Desi Gossypium arboreum and non-Bt Gossypium hirsutum cotton crop for bollworm incidence and take appropriate steps for their management. This climate is also congenial for the attack of the cotton diseases specially leaf blight, so regularly monitor the crop for their symptoms and management thereafter.</p>
Batinda	4	27	0	0	0	0	
Ferozepur	4	27	0	0	0	5	
Muktsar	4	23	0	0	0	5	
Mansa	6	13	0	0	0	0	
HARYANA							
Sirsa	8	12	0	0	0	0	
Hissar	8	15	0	0	0	0	
Fatehabad	7	14	0	0	0	0	
RAJASTHAN							
Hanumangarh	12	18	0	0	0	0	
Sri Ganganagar	7	9	0	0	0	0	
Banswara	7	18	0	0	0	0	
ORISSA							
Koraput	0	5	0	10	7	5	
Kalahandi	0	6	0	8	8	7	
Balagir	3	0	0	0	3	0	
GUJARAT							
Amreli	10	0	0	0	0	0	
Bhavnagar	3	0	0	0	0	0	
Jamnagar	0	0	0	0	0	0	

Rajkot	3	0	0	0	0	0	October and intensify in November-December. 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 or thiodicarb once in October and pyrethroid preferably 'lambda-cyhalothrin' once in November. Thiodicarb is sprayed more than once can cause leaf reddening in rainfed farms. If unattended, pink bollworm can cause heavy damage in October and November. Strictly avoid pyrethroids until the end of October. Never use any insecticide mixtures. This can result in whitefly infestation. Farmers are advised to terminate cotton crop in December without extending it any 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.
Baruch	16	8	0	0	0	0	
Sabarkantha	48	4	0	0	0	0	
Surendranagar	25	0	0	0	0	0	
Ahmedabad	22	0	0	0	0	0	
Vadodara	6	3	0	0	0	0	
Patan	59	0	0	0	0	0	
Mehsana	48	0	0	0	0	0	
MADHYA PRADESH							
Khargaon	7	4	0	0	0	0	The crop condition is good. A final spell of rain is expected until 27th September. Summer sown crop is in fruiting stage while other crop is in vegetative stage. There are no reports of insect pest or disease incidence, If sucking pests are observed to reach economic thresholds in any fields, 2.0% neem oil emulsion in soap may be sprayed. Strictly avoid excessive nitrogen and chemical insecticides.
Dhar	0	8	0	0	0	0	
Khandwa	9	3	0	0	0	0	
MAHARASHTRA							
Nagpur	3	0	0	0	0	0	The crop is in boll development stage. Moisture conservation practices should be carried out in rainfed crop by opening of furrows. Fertilizers may be applied wherever fields have adequate soil moisture, to ensure that nitrogen is applied at optimum levels and never in excess. Foliar application of MgSO ₄ and KNO ₃ may be done. Infestation of white flies is observed on rainfed cotton. Install yellow sticky traps at 1 trap per 100 sq metre to trap the increasing adult population, spray 5% emulsion of NEEM OIL, CASTOR OIL, FISH OIL ROSIN SOAP OR 1% NIRMA. At ETL levels any one of the Insect growth regulators such as Diafenthiuron, Buprofezin, Pyroproxifen, Spiromesfin and Emamectin benzoate may be sprayed. Incidence of Fusarium wilt and alternaria leaf spot is noted in some pockets. Drenching of 500 to 1000 ml solution of Copper oxy chloride @ 25 ml and Streptocyclin @ 2 g per 10 lit water should be done for its management. Foliar spray of Pseudomonas fluorescens 0.2 per cent or Copper oxy chloride @ 25 g / 10 lit may be done for its management. Parawilt was noticed in some pockets where more than 150mm rainfall was received and water stagnated in the fields. Recommended measures may be initiated as per the annexure of this advisory. Spinosad for bollworm in non Bt cotton should be sprayed. Thrips and mites noticed in May - June sown cotton. Mealybug noticed in some patches and White fly in some pockets. American bollworm was above ETL level in <i>Gossypium arboreum</i> and <i>G. hirsutum</i> sown in June and July cotton. 2% urea or 2% DAP spray should be given at at flowering stage and 1% urea and 1% Magnesium sulphate spray at Boll development stage. Out of the villages surveyed, villages crossed ETL by jassid infestation were Akola- 61.57 % and Jalna -53.02%. Jassid infestation was above ETL in 31.57% villages in Chandrapur district, while villages in the range 10-30% were Nanded (29.34%), Yeotmal (20.31%) and Parbhani(11.91%). Low infestation of thrips was observed in villages of Akola (06.98%), Yeotmal (6.16%) and Amravati (3.16%) districts. Increased infestation of whitefly was recorded in Amravati district (41.90%) followed by Yeotmal district (10.95%). Leaf reddening was observed in Ahmednagar (31.34% villages) followed by Osmanabad (15.78%) and Nagpur (9.82%).
Wardha	0	0	0	0	0	0	
Chandrapur	0	0	0	0	0	0	
Yavatmal	0	0	0	0	0	0	
Amravati	4	0	0	0	0	0	
Akola	3	0	0	0	0	0	
Buldhana	11	4	0	0	0	0	
Parbhani	0	0	0	0	0	0	
Nanded	0	0	0	0	0	0	
Beed	0	0	0	0	0	0	
Washim	0	0	0	0	0	0	
Dhule	6	0	0	0	0	0	
Jalgaon	11	4	0	0	0	0	
Jalna	0	0	0	0	0	0	
Aurangabad	4	0	0	0	0	0	

TELANGANA						
Adilabad	0	0	4	3	0	0
Warangal	0	0	4	8	9	5
Khammam	0	0	3	19	14	7
Karimnagar	0	0	4	8	9	5
Nalgonda	0	0	0	19	14	7
ANDHRA PRADESH						
Guntur	0	0	4	22	16	8
Prakasam	0	0	11	22	16	11
KARNATAKA						
Dharwad	4	0	0	0	0	0
Haveri	0	0	0	3	0	4
Mysore	0	0	5	7	5	5
TAMILNADU						
Perambalur	0	0	0	4	10	16
Salem	0	0	6	15	15	15
Trichy	0	0	11	27	9	35
Virdhunagar	0	4	11	27	9	35

The crop is in vegetative, square formation and flowering stage. Saturated conditions may prevail in the field. Draining of water from the fields should be taken up immediately as the fields are affected due to water logging conditions. Foliar application of nutrients with 1-2% Urea or 1-2% KNO₃ along with 1% MgSO₄ to mitigate abiotic stress conditions as well as leaf reddening condition. Stem application with imidacloprid : water (1:20) at 60 DAS should be given. Weed management may be carried out as per recommendations in the annexure. Strictly avoid acephate, fipronil, pyrethroids or any insecticide mixtures for the control of early sucking pests. These insecticides aggravate further pest problems. For the control of Rhizoctonia blight and other fungal leaf spot diseases, spraying with Propiconazole @ 1.0 ml/l or Mancozeb + Carbendazim 2.0 g/l of water is recommended. Due to wide spread rain forecast, water logging may occur in low laying areas, hence farmers are advised to take-up necessary remedial measures for water logging like draining of water from the fields, Working with plough to form ridges and furrows, Foliar spray of 2% Urea or 2% KNO₃ and application of 25 to 35kg of Urea + 15kg MOP per acre as booster dose. There will be no need of any insecticides in view of the continuous rains during the peak vegetative and early-mid reproductive phase.

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 or thiodicarb once in October and pyrethroid preferably 'lambda-cyhalothrin' once in November. Spray the crop with Copperoxychloride @ 3 g /lit and Streptocycline @ 0.5 gm/lit of water to control boll rotting. Grey mildew disease is reported in desi and non Bt cotton for which it is suggested to spray the crop with Carbendizim 50 WP @ 1g/lit of water for effective control. Along with these sprays it is advised to tank mix 1% of 19:19:19 soluble fertiliser along with 1% MgSO₄ to reduce square dropping and leaf reddening. Spraying of Curacron @ 2 ml/lit is advised to manage the midge incidence. Field sanitation is to be maintained by collecting the dropped diseased leaves and squares from the field and to be buried in the soil or to be burnt. Drain out the excess water under heavy rainfall conditions to avoid boll dropping due to water stagnation.

The crop is in vegetative stage. Weed infestation noticed for which appropriate weedicides have been sprayed. Aphid infestation noticed but below ETL. Drenching of Chlorpyrifos @750 ml/ha along with Bavistin @ 750 g/ha may be done as a prophylactic measure against stem weevil and root rot.

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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