

Central Institute for Cotton Research, Nagpur

Twelfth Weekly Advisory for Cotton Cultivation 11th to 17th August 2014

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

Weed management: Wherever weeds have emerged, weedicides would provide effective and timely control. 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 and Pyriithiobac sodium is effective on broad leaf weeds. Farmers may consult the technical experts of the Agricultural Universities for further details.

Water logging: 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 spray with 0.5 to 1.0% DAP at weekly intervals will help the plants to recover from the effect of water logging.

Weather forecast for 17th Aug to 22nd Aug '2014

Zones/ Weather parameter	Temperature (Min, Max)						Rainfall					
	17/08	18/08	19/08	20/08	21/08	22/08	17/08	18/08	19/08	20/08	21/08	22/08
Punjab	25,35	26,35	26,35	27,36	27,36	27,36	Partly cloudy sky with thundery development					
Haryana	27,37	27,37	27,37	27,37	27,37	27,37	Partly cloudy sky with thundery development					
Rajasthan	27,35	26,35	26,36	27,36	27,36	27,36	Generally cloudy sky with possibility of rain or thunderstorm			Mainly clear sky		
Gujarat	25,31	25,31	25,31	25,31	25,31	25,31	Light rain			Mainly or Generally cloudy sky with possibility of rain or thunderstorm		
Maharashtra	23,33	24,32	25,33	25,34	25,32	24,32	Partly cloudy sky			Thunderstorm		
M.P.	21,28	21,28	20,30	20,30	21,30	21,30	Partly cloudy sky with thundery development		Partly cloudy sky	Light rain	Partly cloudy sky	
Odisha	20,29	20,29	20,29	20,29	20,29	20,29	Generally cloudy sky with possibility of rain or thunderstorm					
A.P.	23,33	23,33	24,33	24,32	24,32	25,32	Partly cloudy sky with thundery development				Light rain	
Karnataka	23,34	23,34	22,34	22,33	22,33	22,33	Light rain			Moderate rain		
Tamil Nadu	23,33	23,33	24,33	24,33	24,34	24,34	Light rain			Partly cloudy sky	Light rain	Partly cloudy sky

Source: www.imd.gov.in

STRATEGIES FOR MANAGEMENT OF PESTS, DISEASES & WEEDS

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. Seed treatment with Imidacloprid @7gms/Kg of seed.
4. Use nitrogenous fertilizers to the minimum especially for sucking pest susceptible varieties.
5. Maintain field sanitation (weed free) and remove and destroy mealy bug infested plants &.
6. **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

7. **If 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.
8. **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.
9. **Do not spray Bt-formulations on Bt cotton** to avoid further selection pressure.
10. **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.
11. **Do not use WHO Class-I (Extremely Harzardous category) insecticides** such as Phosphamidon, Methyl parathion, Phorate, Monocrotophos, Dichlorvos, Carbofuran, Methomyl, Triazophos and Metasystox.

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 Fipronil or 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 Fipronil 5 SC @ 1.0 ml/lit of water

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 on Bt-cotton** followed by the application of **5% NSKE** a week later. **Or, use Phosalone** at 50% bollworm infested plants (plants having flared squares with entry hole) or for the management of *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 (Coragen),
 - b. Flubendiamide (Fame),
 - 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.
5. *Spodoptera litura*: Collection of egg masses or application of *SNPV* (*Spodoptera litura* Nuclear Polyhedrosis Virus) @ 500 LE/ha or Spray 200 ml Rimon 10 EC or 250g Larvin 75WP in 250 litres of water per acre
6. To minimize **shoot weevil** damage, spray Profenofos @ 2 ml/lit
7. In case of 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

1. **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.
2. **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.

3. **Alternaria blight:** spray Mancozeb@2.5 g per one litre of water.
4. **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

Herbicides are most effective on younger weeds.

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

1. **Grasses:** Spray Quizalofop-ethyl or Fenoxaprop ethyl or Fluazifop butyl,
2. **Sedges and grasses:** Spray Propaquizafop ethyl
3. **Broadleaf weeds:** Spray Pyriithiobac sodium

GENERAL CROP HEALTH MANAGEMENT

1. **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.
2. **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.
3. **Retention of squares and flowers:** Spray Planofix 4.5 SL (NAA) hormone @ 21 ppm (7 ml per 15 litres of water).

DROUGHT MANAGEMENT

Odisha

Early Season Drought (Delayed Onset)

Condition	Major Farming Situation	Normal Crop / Cropping System	Suggested Contingency Measures	
			Change in Crop/ Cropping System including Variety	Agronomic measures
Early Season Drought (Delayed Onset)				
Delay by 8 weeks (Aug 3rd week)	Red soil High rainfall Medium elevation	Cotton	Substitute crop with blackgram(Prasad,PU 30) and greengram (PDM54,K851), cowpea, Niger (Utkal Niger)), Horsegram (urmi) *grow maize, cowpea to meet fodder crisis	Plough across slope *Apply FYM @ 5 t/ha Control weed chemically
	Red and Yellow soil High rainfall Medium elevation	Cotton		
	Black soil High rainfall Medium elevation	Cotton+Arhar		

Early season drought (Normal onset)

Condition	Major Farming Situation	Normal Crop / Cropping System	Suggested Contingency Measures	
			Crop management	Soil nutrient & moisture conservation measures
Early season drought (Normal onset)				
At vegetative Stage	Red soil High rainfall Medium elevation	Cotton	Spray Quizalofop ethyl for weed control	Spray planofix Top dress after rain

	Red and Yellow soil High rainfall Medium elevation	Cotton	Spray Quizalofop ethyl for weed control	Spray planofix *Top dress after rain
	Black soil High rainfall Medium elevation	Cotton+ Arhar	Spray Quizalofop ethyl for weed control Provide irrigation at critical	Spray planofix Top dress after rain Spray 2% urea

Mid season drought (long dry spell)

Condition			Suggested Contingency Measures	
Mid season drought (long dry spell)	Major Farming Situation	Normal Crop / Cropping System	Crop management	Soil nutrient & moisture conservation measures
At flowering/ fruiting stage	Red soil High rainfall Medium elevation	Cotton	Applying of Planofix hormone * spraying the crop with Imidacloprid for controlling of sucking pests	Apply 1250ml micronutrient/ha
	Red and Yellow soil High rainfall Medium elevation	Cotton		
	Black soil High rainfall Medium elevation	Cotton + Arhar		

Terminal drought (Early withdrawal of monsoon)

Condition			Suggested Contingency Measures	
Terminal drought (Early withdrawal of monsoon)	Major Farming Situation	Normal Crop / Cropping System	Crop management	Rabi Crop planning
	Red soil, High rainfall, Medium elevation	Cotton	Provide protective irrigation	Mulch with stovers Dibble rabi crop
		Cotton	Provide protective irrigation	
		Cotton + Arhar	Provide protective irrigation Harvest at physiological maturity stage	

In case of severe drought situation following measures may be taken apart from the above contingent plans.

- Opting for castor, sesamum and safflower (mid *Rabi* crop) (as per recommendations specific to the agro eco region) instead of cotton to manage severe drought situation in *Kharif season*.
- In the event of late planting of cotton due to delayed onset of monsoon, maintenance of higher plant population and optimum input management to the extent possible is suggested.
- Bacterial blight, fungal foliar spots and parawilt are the major diseases in this region. Long dry spells with intermittent rains may aggravate the incidence of the diseases. These should be managed with fungicidal sprays as and when required.
- Foliar spray of KCl or KNO₃ to partially alleviate moisture stress during drought.
- Application of anti-transpirants or hormones.

Gujarat

15 th -31 st July	1 st -15 th August	16 th -31 st August	1 st -15 th September
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Early season drought	Mid season drought at vegetative stage	Mid season drought at reproductive stage	Terminal drought
<ul style="list-style-type: none"> ➤ Gap filling and re-sowing ➤ Thinning , if required ➤ Soil mulch by shallow interculture ➤ Weeding ➤ Avoid fertilizer application if insufficient moisture ➤ Insecticide spray for control of jassids. ➤ Compartmental bunding to conserve runoff water ➤ Mulching with paddy straw / other grasses 	<ul style="list-style-type: none"> ➤ Thinning for reducing soil moisture demand ➤ Repeated interculture in black soils to close cracks in soil and create soil mulch to conserve soil moisture. ➤ Conservation of soil moisture by hoeing and weeding ➤ Foliar spray of Urea (2 %) ➤ Insecticide spray for control of sucking pest ➤ Delay top dressing of Urea till sufficient occurrence of rain 	<ul style="list-style-type: none"> ➤ Repeated interculture in black soils to close cracks in soil and create soil mulch to conserve soil moisture. ➤ Conservation of soil moisture by hoeing and weeding. ➤ Top dressing of Urea if sufficient occurrence of rain. ➤ Foliar spray of 3 % KNO₃ ➤ Alternate furrow irrigation, if irrigation water is available ➤ Insecticide spray for control of sucking pest ➤ Adopt topping to reduce evapotranspiration losses in early sown crop ➤ Spraying of PMA 	<ul style="list-style-type: none"> ➤ Weeding ➤ Top dressing of Urea if sufficient occurrence of rain ➤ Insecticide spray for control of sucking and bollworms ➤ Alternate furrow irrigation, if irrigation water is available ➤ Adopt topping to reduce evapotranspiration losses

Andhra Pradesh

Sowing time for unified State of Andhra Pradesh

1. Coastal A.P - July to 15th August
2. Rayalaseema - June to July
3. Telangana - June 15th to 20th July

- Repeated inter-cultivation operation to form soil mulch to reduce evaporation losses.
- Foliar nutrition with 2% urea or 2% KNO₃ 2 to 3 times at 10-15 days interval.

IMPORTANT NOTE: (PEST MANAGEMENT)

Farmers are advised not to spray pyrethroids early in the season singly or in combination against sucking pests such as the whiteflies not only for cotton but also on other *H. armigera* host plants such as soybean, as it may exacerbate bollworm problems in non Bt cotton, wherever cultivated.

COTTON CROP SITUATION

(Based on inputs received from the State Agricultural Universities of the respective States)

NORTH INDIA

Punjab: The crop is in reproductive phase. As the weather is hot and humid, there are chances of increase in the attack of sucking pests. So farmers are advised to monitor their crop accordingly. The incidence of whitefly and jassids are above economic threshold level in some pockets of Fazilika, Abohar, Mansa and Bathinda for which recommended plant protection measures should be followed for their control. The attack of whitefly has resulted

in the incidences of cotton leaf curl virus disease in many cotton areas of Punjab. Around 3 to 4 sprays of Potassium nitrate @ 2% per acre at weekly intervals can be given as the crop is at peak flowering stage.

Haryana: The crop is normal under vegetative and reproductive stage. Interculture if required and weeds must be removed around the fields, water channel and road side to check the whitefly population on alternate host of CLCuD. Survey for cotton diseases and insect pests incidence in Hisar, Jind, Rohtak and Bhiwani Districts was conducted. Average population of leafhopper nymphs and adults was above economic threshold (ET) in few fields. Mean population of whitefly adults was also above ET in few fields. Solenopsis mealybug (*Phenacoccus solenopsis*) infestation was observed on few plants near road side. Mealybug infestation was also observed on congress grass. Thrips damage was observed in all the fields. Low incidence of leaf-curl virus disease was observed in traces. No incidence of Bacterial leaf blight and fungal foliar diseases in surveyed field of cotton. Farmers are advised to monitor disease and insect-pest populations on weekly basis and to apply control measures only at ET. Population of whitefly may increase fast in case the dry spell prolongs. Since *Aenasius* parasitoid is quite active, the mealybug is likely to remain in low profile and there is no need of spraying any insecticide against this pest. The present weather conditions are also favourable for build-up of red hairy caterpillar. Therefore, wherever this pest is a problem, particularly in the sandy areas, recommended insecticides may be sprayed for its control. For control of root rot disease in cotton, soil drenching with 0.2% Carbendazim solution may be done in root rot affected areas.

Rajasthan: The crop is 61 to 70 days old with boll formation stage. Continuous rains in this week with cloudy weather, At present, the crop is full of weeds for which the recommended weedicides may be sprayed, Jassids continued to remain above ETL. while whiteflies incidence was recorded below ETL. Among bollworms, spotted bollworm infestation was recorded below ETL..No incidence of disease in any of the cotton fields.

CENTRAL INDIA

Maharashtra: The growth rate of cotton is reduced due to dry spell for about 2 weeks in Vidarbha region. The irrigation should be given wherever it is possible with drip, sprinkler and furrow irrigation in alternate row to cover maximum area with limited water and time. The sucking pest in Bt cotton should be controlled with recommended insecticides. Light hoeing and weeding should be taken up to check evaporation. The crop of irrigated cotton in Marathwada is found to be infested by sucking pests viz. jassids and thrips. Spray of Acetamiorid @ 2 g / 10 lit or Imidacloprid @ 4 ml / 10 lit is recommended. It should be given final top dressing @ 60 Kg N per ha at two months after sowing stage. In case of rainfed cotton, first top dressing should be applied after one month after sowing @ 36 kg N / ha). Infestation of sucking pests viz. jassids is noticed in some areas. Spray of Dimethoate @ 10 ml / ha or Acetamiorid @ 2 g / 10 lit is recommended. Interculturing and weed management practices should be followed to protest moisture losses. Water management practices may be followed by opening trenches across the slope. At Rahuri, the crop is 60 to 90 days old with Square formation to boll development stages. Irrigations, Fertilizer application, weeding, Insecticide sprays (Irrigated) have been given. Weeds up to 30 to 40 per cent were noticed. TSV was observed in research farm and farmers field up to 10 to 12 per cent irrespective of Bt hybrids. The plant stand is good but the crop growth is not satisfactory due to insufficient rains

Odisha: Out of the target of 1.35 lakh ha under cotton, sowing has been fully completed. The crop is in vegetative and square initiation stage .Weather is hot and humid. First top dressing, weeding and earthing up is going on. All three types of weeds i.e grasses, sedges and broad leaved weeds have infested the crop. Incidence of aphids and jassids observed (below ETL). Farmers are advised to drain out excess water from the field during heavy rainfall. For control of weeds, recommended post emergent weedicide should be sprayed 50 days after sowing. At 60 DAS, second top dressing should be done with 25 % N. For reducing the aphids and jassids population, spray neem based pesticides @ 2.5 ml/litre of water. To monitor the incidence of Spodoptera insects, install four pheromone traps per ha with Spodolure.

SOUTH INDIA

Andhra Pradesh: Dry weather prevailed during the period under report with normal wind velocity. The fields are ready and sowings will be done after receipt of rainfall. Summer cotton sown in approximately in an acreage of 25 thousand hectares which is in squaring to flowering stage to boll development stages. Suitable Plant Protection against sucking pests (Jassids & Thrips) were recommended. In Telangana, the cotton sowings were completed and the crop is in 20 days (seedling stage) to 65 days (squaring and initiation of flowering). Repeated inter-cultivation operation should be done to form soil mulch to reduce evaporation losses. Foliar nutrition with 2% urea or 2% KNO₃ 2 to 3 times at 10-15 days interval can be given.

Karnataka: The crop is 40 to 70 days old under vegetative and square initiation stage. No rains during this week. Top dressing and weeding operations were undertaken. Monocot and dicot weeds were observed for which Quizalofop ethyl @ 1 ml/lit + Pyriithiobac sodium @ 0.7 ml/lit was sprayed as post emergent herbicides to control monocot and dicot weeds. Directed spray of Glyphosate @ 5 ml/lit of water was undertaken wherever severe infestation of weeds was seen. Sucking pests and shoot weevil incidence were seen in the early sown crop. Shoot weevils were handpicked in the morning hours and spraying of Pipronil @ 1 ml/lit + DDVP @ 2 ml/lit of water was undertaken. No incidence of any disease. Cessation of rains helped in undertaking hoeing, weeding and spraying operations in the crop of different stages.

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