Central Institute for Cotton Research, Nagpur

Eighth Weekly Advisory for Cotton Cultivation 14th to 20th July 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 Pyrithiobac 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.

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., *Aphilinus* 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 *S*lNPV (*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% Metaldehide (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

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 Pyrithiobac 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

Table: 1. Early Season Drought (Delayed Onset)

Condition			Suggested Contingency Measures	
Early Season Drought (Delayed Onset)	Major Farming Situation	Normal Crop / Cropping System	Change in Crop/ Cropping System including Variety	Agronomic measures
Delay by 2 weeks (July 1st wk)	Red soil High rainfall Medium elevation	Cotton	*Select short duration var. like Savita and Bunny	*Plough across slope *Apply FYM in mound *Sow in mounds just before or after monsoon onset in dry weather *Raise seedlings in polythene for gap filling.
	Black soil High rainfall Medium elevation	Cotton+ Arhar	*Select short duration cotton var. like Savita and Bunny *Select short duration arhar var. like UPAS 120,Durga,Pragati, Jagruti (120 – 130 days)	*Perform summer ploughing *Sow across slope *Apply FYM in seed furrows *Sow cotton: arhar in 8:2 row ratio

Table-2. Early Season Drought (Delayed Onset)

Condition			Suggested Contingency Measures	
Early Season Drought (Delayed Onset)	Major Farming Situation	Normal Crop / Cropping System	Change in Crop/ Cropping System including Variety	Agronomic measures
Delay by 4 weeks (July 3rd wk)	Red soil High rainfall Medium elevation	Cotton	Select short duration var. like Savita and Bunny	*Plough across slope *Apply FYM in mound *Sow in mounds just before or after monsoon onset in dry weather *Raise seedlings in polythene for gap fill
	Red and Yellow soil High rainfall Medium elevation	Cotton	Select short duration var. like Savita and Bunny	Plough across slope *Apply FYM in mound *Sow in mounds just before or after monsoon onset in dry weather *Raise seedlings in polythene for gap filling
	Black soil High rainfall Medium elevation	Cotton + Arhar	Select short duration cotton var. like Savita and Bunny *Select short duration arhar var. like UPAS 120,Durga,Pragati, Jagruti (120 – 130 days)	*Sow across slope *Apply FYM in seed furrows *Sow cotton: Arhar in 8:2 row ratio

Table :-3. Early Season Drought (Delayed Onset)

Condition			Suggested Contingency Measures	
Early Season Drought (Delayed Onset)	Major Farming Situation	Normal Crop / Cropping System	Change in Crop/ Cropping System including Variety	Agronomic measures
Delay by 6 weeks	Red soil	Cotton	Substitute crop with black gram and	*Plough across slope

(Aug 1st Week)	High rainfall Medium elevation		green gram, cowpea, Niger (Deomali), Horse gram (urmi). Grow maize, cowpea to meet fodder crisis	*Apply FYM in mound *Raise seedlings in polythene for gapfill
	Red and Yellow soil High rainfall Medium elevation	Cotton	Substitute crop with black gram and green gram, cowpea, Niger (Deomali), Horse gram (urmi) *grow maize, cowpea to meet fodder crisis	*Plough across slope *Apply FYM in mound *Raise seedlings in polythene for gapfill
	Black soil High rainfall Medium elevation	Cotton+Arhar	Substitute crop with black gram and green gram, cowpea, Niger (Deomali), Horse gram (urmi) *grow maize, cowpea to meet fodder crisis	Plough across slope *Apply FYM in mound

Table: - 4. Early Season Drought (Delayed Onset)

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

Table 5:- Early season drought (Normal onset)

Condition			Suggested Contingency Measures	
Early season drought (Normal onset)	Major Farming Situation	Normal Crop / Cropping System	Crop management	Soil nutrient & moisture conservation measues
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Red soil High rainfall Medium elevation	Cotton	Spray Quizalofop ethyl for weed control *gap fill with polythene raised seedlings	Go for mulching
	Red and Yellow soil High rainfall Medium elevation	Cotton	Spray Quizalofop ethyl for weed control *gap fill with polythene raised seedlings	Go for mulching
	Black soil High rainfall Medium elevation	Cotton+ Arhar	*Spray Quizalofop ethyl for weed control *gap fill with polythene raised seedlings	*Go for mulching *Apply fertilizer (top dressing) immediately after

				Rainfall.

Table 6:- Early season drought (Normal onset)

Condition			Suggested Contingency Measures	
Early season drought (Normal onset)	Major Farming Situation	Normal Crop / Cropping System	Crop management	Soil nutrient & moisture conservation measues
Mid season Drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)				
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

Table:-7. 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	Applying of Planofix hormone * spraying the crop with Imidacloprid for controlling of sucking pests	Apply 1250ml micronutrient/ha
	Black soil High rainfall Medium elevation	Cotton + Arhar	Applying of Planofix hormone * spraying the crop with Imidacloprid for controlling of sucking pests	Apply 1250ml micronutrient/ha

Table 8. Terminal drought (Early withdrawal of monsoon)

Condition			Suggested Contingency Measures	
Terminal drought (Early ithdrawal 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

	Red and Yellow Soil, High rainfall Medium elevation	Cotton	Provide protective irrigation	Mulch with stovers Dibble rabi crop
	Black soil High rainfall Medium elevation	Cotton + Arhar	Provide protective irrigation Harvest at physiological maturity stage	Mulch with stovers Dibble rabi crop

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 KNO_3 to partially alleviate moisture stress during drought.
- Application of anti-transpirants or hormones.

Andhra Pradesh

Sowing time for unified State of Andhra Pradesh

1. Coastal A.P - July to 15th August
2. Rayalaseems - June to July
3. Telangana - June 15th to20th July

- Repeated inter-cultivation operation to form soil mulch to reduce evaporation losses.
- Foliar nutrition with 2% urea or 2% KNO_3 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 at square formation stage. The incidences of sucking pest viz., jassid and white fly and mealybug have been observed in the fields. If whitefly reaches to its ETL level, it may be controlled by spraying the recommended doses of insecticides. It is advised to avoid the spraying of pyrethroids or combinations containing them. The incidences of cotton leaf curl virus disease have also been noticed in areas of Abohar and Fazilka for which suitable remedial measures could be taken.

Haryana: Crop is normal with vegetative/square formation stage. Survey for cotton diseases and insect pests incidence at Hisar, Fatehabad and Sirsa Districts was conducted. Average population of leafhopper nymphs and adults was much below economic threshold (ET) in all the observed fields. The average population of leafhopper nymphs and adults was <0.5 per leaf. Mean population of whitefly adults ranged from 0.8 to 5.7 per leaf. Solenopsis mealybug (*Phenacoccus solenopsis*) infestation was observed in few plants near road side and in one field in village Dhikatana (Hisa district). Mealybug infestation was also observed on congress grass. Attack of big-sized mealybugs (*Drosicha sp.*) was observed in few cotton plants in Fransi village (Hisar district). No incidence of bollworms and leaf curl virus was observed in any of the fields surveyed. Farmers are advised to monitor disease and insect-pest populations on weekly basis and to apply control measures only when it crosses ET level. In the next fortnight, the leafhopper population on cotton may increase if rains occur frequently and mean relative humidity remains above 70 per cent. However, the whitefly population is likely to remain at low to moderate level in case of long dry spell of 15 days or more and then it may increase at faster rate. For checking whitefly, Nimbecidine 300 ppm @ 1 litre/acre may be sprayed twice at five days interval followed by one spray of 300 ml Dimethoate 30 EC in 200 litres of water per acre. 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. Hoeing in cotton crop for conserving the moisture and removing the weeds, Balanced use of fertilizers and regular monitoring of crop is advised.

Rajasthan: At Banswara, crop is at pre square formation stage. Continuous rains with cloudy weather were prevalent during the reporting period. First top dressing of urea was given. At present, crop is weed free. Thrips infestation has declined and almost crop was free from insect pests.

CENTRAL INDIA

Maharashtra: Though scanty rainfall was received, cotton can sown be up to 22nd July. Sowing of short duration hybrids must be encouraged to avoid extending the cotton season as the cotton crop becomes vulnerable to pink bollworm incidence and damage. Intercropping with green gram, black gram, soybean and pigeon pea is preferable to avoid risk of natural calamities. Pre monsoon cotton should be irrigated to avoid stress where there are no rains. In Marathwada, the irrigated cotton is facing shortage of moisture. Irrigation should be given considering duration of the crop. Nutrient application should be done by fertigation to cotton sown on drip irrigation system. Cotton grown on surface irrigation should be irrigated and fertilizer application should be done. Sowing of rainfed cotton has been started in some areas after receipt of 50 to 75 mm rainfall. Sowing should be done at 120 x 45 cm spacing under rainfed condition. Basal dose of fertilizers (48:60:60 kg NPK / ha) should be applied along with sowing the crop. Seed treatment of Azatobactor and PSB @ 25 gm / kg of seed each should be done at the time of sowing for nitrogen fixation and phosphorus availability. Seed treatment of Thiram @ 3 g / kg seed should be done for fungal diseases. Spraying of Pendimethalin 30 EC @ 2.5 lit / ha as pre emergence may be done for effective management of weeds up to initial 30 to 40 days.

Odisha: Out of the target of 1.35 lakh ha under cotton in the state, 85 % area has been sown till date. Field preparation, ploughing and sowing is going on. All three types of weeds i,e grasses, sedges and broad leaved weeds have infested the crop. Incidence of jassids observed below ETL. Sowing is going on and will be completed during the next week. Farmers are advised to drain out excess water from the field during heavy rainfall. Well decomposed FYM/compost should be applied@ 2.5-5.0 ton/ha before the final ploughing. For normal planting, a spacing of 90 cm x 60 cm and for HDP 60 cm x 10 cm should be followed. For late planting a closure spacing of 90 cm x 45 cm and 45 cm x 10 cm should be adopted for hybrids and HDP respectively. For reducing the jassids population, neem based pesticides can be sprayed @ 2.5 ml/litre of water.

SOUTH INDIA

Andhra Pradesh: The rainfall received helped for the preparatory cultivation. Sowings will be taken up soon after the receipt of sufficient rain fall. 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. Irrigation is recommended.

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