

ICAR-Central Institute for Cotton Research, Nagpur

Strategies and Advisory for Cotton Pest and Disease Management for the year 2024-25

A. PINK BOLLWORM

- Crop rotation to be followed to break the life cycle of pink bollworm.
- Procure seeds of authentic Bt-cotton hybrids or variety and retain bills of seeds that have been purchased.
- Timely sowing of short to medium duration Bt-cotton hybrids/ varieties recommended for the region.
- Follow recommended spacing of zone and maintain the number of plants as per spacing.
- Do not use the higher doses of nitrogenous (urea) fertilizer as top dressing or basal dose to avoid over growth of plants.
- Install pheromone traps near ginneries and Cotton stack of stalk in field to trap suicidal emergence, if any.
- Avoid pre-season sowing of cotton crop as it would be susceptible to pink bollworm.
- Fields that have suffered heavy damage due to pink bollworm last year may be closely monitored during the current season.
- Monitoring of pink bollworm using pheromone traps may be initiated at 45 days after sowing. Install pheromone traps @ 5 per hectare for monitoring moth activity of pink bollworm.
- Inspect the crop at squaring and flowering stage of the crop for the presence of pink bollworm larvae within flowers. Remove and destroy rosette flowers whenever seen.
- At boll formation stage, farmers are advised to inspect cotton crop for presence and damage of pink bollworm by plucking and dissecting 20 green bolls per acre from different plants randomly.
- Economic threshold level (ETL) at flowering stage is 10% damaged flowers (Rosette flowers) or at boll development stage is 10% damaged green bolls (at least two bolls out of 20 bolls having white or pink larvae/ exit holes), ETL for adults male moths trapped in pheromone trap (Average of 2 traps/acre) is 8 moths catch per pheromone trap for consecutive 3 days. On crossing ETL spraying of recommended insecticides is advocated.
- Strictly avoid spraying pyrethroids before 120 days of sowing or any insecticide mixtures at any time to prevent whitefly/aphid outbreaks.
- Picking of clean and infested cotton may be carried out separately. Clean cotton may be stored or marketed. Do not store infested or stained seed cotton or cotton seed in Godowns.
- Advised to use only label claim insecticides for pest control.

- Never use tank mixtures of any agrochemicals along with insecticides.
- Use protective aids while handling chemical pesticides.
- Do not extend cotton crop beyond 180 days.
- Clean up residual stalks and partially opened bolls from fields. Do not stack cotton stalks in fields to reduce the carryover population.
- Stack cotton stalks away from the field preferably in village and use before March. In North zone, stacked cotton stalks retained after 30th March may be covered properly with help of mosquito net or plastic sheets after beating and dislodging the unopened bolls. Destroy the residues /trash.

B. WHITEFLY IN NORTH INDIA

- Monitoring of whitefly should be done on alternate hosts such as vegetables, ornamentals, weeds and plantation crops starting from pre-sowing.
- Grow recommended high yielding cotton genotype approved by the SAU/ICAR/ department of Agriculture having tolerance to whitefly and cotton leaf curl virus disease (CLCuD).
- Ensure timely sowing (up to 15 May for the hirsutum cotton hybrid/varieties and up to 30 April for Desi cotton varieties) of the crop as timely sown crop tolerates whitefly and CLCuD. Maintain optimum population of 8,000 –10,000 plants per acre of the hirsutum cotton hybrids in the field.
- Grow two dense rows of sorghum or pearl-millet or maize as a border crop around cotton fields. Create ecological diversity by growing Desi cotton and other non-host crops between the cotton fields.
- Desi cotton varieties/hybrids are tolerant to the whitefly and immune to the CLCuD.
- Avoid excessive urea application during early vegetative phase of the crop.
- Maintain field sanitation by keeping fields, bunds and the vicinity free of weeds before and after sowing of cotton.
- Destroy volunteer/ ratoon cotton plants as well as weed hosts growing near the irrigation channel/canal and fallow lands.
- Install yellow sticky traps @20/ha during July to August for monitoring.
- Vacuum suction pumps can be used during August coinciding with the high whitefly population.
- Apply two sprays of neem oil at initial stage of crop or up to 60 DAS.
- Avoid using synthetic pyrethroids or organophosphate before 120 DAS or any insecticide mixtures. These insecticides are known to cause and aggravate the resurgence of whitefly when used indiscriminately.
- Chemical insecticide spray suggested – Afidpyropen 50G/L, Diafenthiuron 50%WP, Dinotefuran 20SG, Flonicamid 50%WG, Clothianidin 50%WDG, Buprofezin 25%SC, Spiromesifen 22.9%SC, Pyriproxyfen 10%EC, August onwards.

C. NECROSIS DISEASE (TOBACCO STREAK VIRUS) IN SOUTH ZONE

- Field and field bunds should be weed free especially Parthenium weed should timely be managed.
- Monitor crop during early stage (40-75 DAS) to avoid the transmission of TSV.
- Installation of Blue sticky traps @ 20/ha for monitoring
- Need based foliar spray of Spinetoram 11.7%SC, Flonicamid 50%WG, Dinotefuran 20%SG, Diafenthiuron 50%WP, Profenofos 50%EC is recommended for the management of thrips infestation to avoid the transmission of TSV.

D. ADVISORY FOR CROP WINDOW BASED INSECT PEST MANAGEMENT

Pests	Pests management advisory
Crop growth stage: 0-60 Days After Sowing (DAS)	
Pink bollworm	At 45 DAS, install pheromone traps @5 per hectare.
Pink bollworm & sucking pests	Spray NSKE 5% + Neem oil 5 ml /litre or neem oil-based formulation 5 ml /litre (300 or 1500 ppm) + 1.0gm laundry detergent emulsion (Initial 1-2 sprays). (NSKE 25L + Neem oil 2.5L +0.5kg laundry detergent emulsion per hectare). Use 150-200 litres of water /acre or 375-500 litre/ ha for dilution of the insecticides.
Crop Growth Stage: 60-90 DAS	
Pink bollworm	Observe for rosette flowers, pluck and destroy them At boll formation stage, farmers are advised to inspect the presence and damage of pink bollworm by plucking and dissecting 20 green bolls from different plants randomly (one boll per plant). If ETL crossed i.e. >10% damaged flowers (Rosette flowers) or 10% damaged green bolls (at least two out of 20 bolls having white or pink larvae or exit holes) and or 8 moths catch per pheromone trap for consecutive 3 days, spray Profenofos 50%EC @ 30ml/10L (1500 ml/ha) Or Emamectin benzoate 5%SG @ 5g/10L (250 g/ha) Or Indoxacarb 14.5%SC @10ml/10L (500ml/ha) Or Chlorpyriphos 20 % EC @ 25ml/10L (1250 ml/ha). (10L= Ten liter of water)
Bollworms (Cotton and Spotted)	Spray Chlorantraniliprole 18.5%SC @ 3ml/10L (150ml/ha) for Cotton bollworm Or Flubendiamide 39.35%SC @ 2.5 ml/10L (125ml/ha) Or Indoxacarb 14.5%SC @ 10 ml/10L (500ml/ha).
Jassid	Spray Flonicamid 50%WG @ 4g/10L (200g/ha) Or Dinotefuran 20%SG @ 3g/10L (150g/ha) Or Imidacloprid 17.8%SL @ 3ml/10L (150ml/ha) Or Tolfenpyrod 15%EC 20ml/10L (1000ml/ha) Or Fenpyroximate 5%EC 15ml/10L (750ml/ha).

Whitefly	<p>Install yellow sticky traps @ 20/ha during July to August for monitoring and @ 100/ha for management.</p> <p>Insecticides effective against whitefly adult population: Diafenthiuron 50%WP @ 12g/10L (600 g/ha) Or Afidopyropen 50g/L @ 20ml/10L (1000 ml/ha) Or Dinotefuran 20%SG @ 3g/10L (150g/ha) Or Fonicamid 50%WG @4g/10L (200 g/ha) or Clothianidin 50%WDG 1ml/10L (50ml/ha).</p> <p>Insecticides effective against the Whitefly nymphs: Pyriproxyfen 10%EC @ 20ml/10L (1000 ml) /ha Or Buprofezin 25%SC @ 20ml/10L (1000 ml/ha) or Spiromesifen 22.9%SC @ 12ml/10L (600 ml/ha).</p>
Thrips	<p>Spray Thiamethoxam 25%WG @ 2 gm/10L (100g/ha) Or Spinetoram 11.7%SC @ 8.4ml/10L (420 ml/ha) Or Profenofos 50%EC 30ml/10L (1500ml/ha).</p>
Sucking pests (Mixed population)	<p>If mixed infestations of whitefly and thrips either or both are observed above ETL after 70 days old crop, spray Diafenthiuron 50%WP @12g/10L (600g/ha) Or Spinetoram 11.7%SC @ 8.4ml/10L (420 ml/ha) Or Profenophos 50%EC @ 20 ml/10L (1000 ml/ha).</p> <p>If the mixed infestation of whitefly and leafhopper/jassid either or both are observed above ETL, apply Fonicamid 50%WG @4g/10L (200 g/ha) Or Dinotefuran 20%SG @ 3g/10L (150g/ha).</p> <p>In case Sooty mould develop: Three prophylactic/therapeutic sprays of Propiconazole 25%EC @10ml/10L (500ml/ha) Or Copper oxychloride (COC) 50%WP @ 25g/10L (1250g/ha) at 15 days interval may be applied.</p>
Crop Growth Stage: 90-120 DAS	
Pink bollworm	<p>If ETL crossed i.e. >10% damaged flowers (Rosette flowers) or 10% damaged green bolls (at least two out of 20 bolls having white or pink larvae or exit holes) and or 8 moths catch per pheromone trap for consecutive 3 days, release parasitoid <i>Trichogramma bactrae</i>@ 60000 per acre or spray cotton crop with Profenofos 50%EC @ 30 ml/10L (1500 ml/ha) Or Emamectin benzoate 5SG @ 5g/10L (250 g/ha) Or Indoxacarb 14.5%SC @10ml/10L (500ml/ha) Or Chlorpyriphos 20 % EC @ 25ml/10L (1250 ml/ha).</p>
American and Spotted bollworms	<p>For Non-Bt/ in Desi (arboreum) cotton, spray Flubendiamide 39.35 SC @ 3ml/10L (150ml/ha) Or Indoxacarb 14.5%SC @ 10ml/10L (500 ml/ha) Or Spinosad 45%SC 4 ml/10L (200ml/ha)</p>
Jassid, thrips	<p>Spray Thiamethoxam 25%WG @ 2g/10L (100g/ha) Or Tolfenpyrod 15%EC 20ml/10L (1000ml/ha)</p>
Thrips	<p>Spray Thiomethoxam 25%WG @ 2 gm (100g/ha) Or Spinetoram 1.7%SC @ @ 8.4 ml/10L (420 ml/ha).</p>
Whitefly	<p>In central and south Zone, spray Dinotefuran 20SG @ 3g/10L (150g/ha) Or Spiromesifen 22.9%EC @12ml/10L (600 ml/ha) Or Pyriproxyfen 10EC @ 20ml/L (1000ml) Or</p>

	<p>Diafenthiuron 50%WP @ 12g/10L (600 g/ha) or Profenofos 50 EC 30ml/10L (1500ml/ha).</p> <p>In North zone : For whitefly adults: Diafenthiuron 50% WP @ 12g/10L (600 g/ha) Or Afidopyropen 50g/L @ 20ml/10L (1000 ml/ha) Or Dinotefuran 20%SG @ 3g/10L (150g/ha) Or Flonicamid 50%WG @ 4g/10L (200 g/ha) or Clothianidin 50%WDG 1ml/10L (50ml/ha) whereas for Whitefly nymphs: Pyriproxyfen 10%EC @ 20ml/10L (1000 ml /ha) Or Buprofezin 25%SC @ 20ml/10L (1000 ml/ha) Rr Spiromesifen 22.9% SC @ 12ml/10L (600 ml/ha).</p>
Crop Growth Stage: >120 DAS	
Pink bollworm	<p>Spray Cypermethrin 10%EC @ 10-15ml/10L (550-760 ml/ha) Or cypermethrin 25%EC @ 4-6ml (160-280 ml/ha) Or Lambda cyhalothrin 5%EC @ 10ml/10L (500 ml/ha) Or deltamethrin 2.8 EC @ 10ml (500 ml/ha) Or Fenpropathrin 10% EC @ 15-20ml/10L (750-1000 ml/ha) or Fenvalerate 20%EC @ 10ml/10L (500 ml/ha) Or alphacypermethrin 10% EC @ 6ml/10L (300 ml/ha).</p>
Crop Growth Stage: 180 DAS	
	<ul style="list-style-type: none"> ▪ Terminate the crop as early as economically feasible. For this purpose, give last irrigation by end of September in case of north Zone. It would reduce bollworms damage and their carryover to the next cropping season. ▪ Allow sheep and goat grazing in field after picking to reduce the carryover of bollworms. ▪ Stack cotton stalks away from the field vertically. If possible, shredding of cotton stalks in soil is advisable.

Recommendations of the insecticides are subjected to the guidelines of CIB&RC. Do not repeat same insecticide more than twice.

Economic Threshold Levels (ETLs)

Based upon the result of survey/field scouting etc for different pests, farmers are advised to initiate pest management practices accordingly as soon as the pest crosses ETL. The ETLs for major pests are as under.

Insect	ETL: Pest count in a sample of 20 plants per acre	Based on average number
Jassid	25% plants showing infestation grade II/ III/ IV	2 nymphs per leaf
Thrips	25% plants showing silvery patches on underside of leaves above mid canopy	10 thrips per leaf
Whitefly	50% out of 20 observed plants/acre showing Honey dew appearance	6 whitefly/ leaf
Aphids	10% plants showing symptoms cupping / crumpling of few leaves on the upper portion of plant	

Mealybugs	≥20 plants/acre showing damage grade II/ III/ IV	
Mirid bugs	≥5 mirid nymphs or adults per plant (from top canopy squares)	
Spodoptera	≥2Egg mass / cluster of gregarious larvae or ≥10infested plants (50%) having ≥5 solitary full grown larvae/plant	
Bollworms		
(American & Spotted) bollworms	20% plants having one or more 'flared up' squares or 5-10% infested squares or bolls	
Pink bollworm	More than 8 moths / trap per night for 3 consecutive nights and or more than 10 % infested flowers or 10% green bolls with live larvae.	

E. ADVISORY FOR CROP WINDOW BASED DISEASE MANAGEMENT

Disease Name	Crop Growth Stage	Duration of Crop Growth stage (DAS*)	Advisory for management
Root rot, wilt, bacterial leaf blight (All the three zones)	Seedling	0-60	<ul style="list-style-type: none"> ▪ Seed treatment with Carboxin 37.5% + Thiram 37.5% DS @3.5 g per kg of seeds for root rot and bacterial leaf blight (BLB) disease Or <i>Pseudomonas fluorescens</i> WP @10 g/kg seeds for bacterial leaf blight (BLB) disease Or Fluxapyroxad (333 g/L FS) @1.5 ml/kg seed for seedling disease Or Tetraconazole 11.6% W/W (12.5% w/v) SL @1.5 ml/ kg of seeds for seed-borne fungal disease management. ▪ Drenching early symptomatic plants and surrounding plants with <i>Trichoderma</i> spp. (<i>T. harzianum</i> or <i>T. viride</i>) 1% WP @50g Or Carbendazim 50%WP @ 20 g/ 10 L of water
Necrosis disease (<i>Tobacco streak virus</i>) (Central and South Zone)	Vegetative and flowering stage	45-120	<ul style="list-style-type: none"> ▪ Alternate weed hosts like parthenium and others to be eradicated. Keep weed-free bunds and fields. ▪ Continuous monitoring of the crop during early stage (40-75 DAS) to avoid the transmission of TSV. ▪ In the early crop stage (40 -60 DAS) spraying of insecticides such as Spinetoram 11.7% SC @ 8.4 ml/10L (420ml/ha) Flonicamid 50% WG @

			4 g/10L (200g/ha) or Dinotefuran 20% SG @ 3g/10L (150 g/ha) or Diafenthiuron 50 WP @ 12 g/10L (600 g/ha) or Profenofos 50%EC @ 20ml/10L (1000 ml/ha) is recommended for the management of thrips infestation to avoid the transmission of TSV.
Cotton leaf curl viral disease (CLCuD) (North zone)	Vegetative and flowering stage	45 -120	<ul style="list-style-type: none"> ▪ Grow recommended Bt hybrids/varieties which are resistant/tolerant to CLCuD ▪ To minimize CLCuD incidence, weed sanitation, cultivation of Desi cotton/sorghum/Perl millet/maize as border rows, and optimal use of nitrogenous fertilizers are advocated as per crop conditions and soil test report. ▪ 3-5 foliar spray of salicylic acid (200 ppm) or butter milk 5% or Cow urine + Calcium nitrate (6.6%+0.5%) or mustard oil (3.0%) at 15 days interval starting from 30 days after sowing. ▪ Measures suggested for whitefly vector control should be followed.
Parawilt (All the three zones)	Vegetative and flowering stage	45 -120	<ul style="list-style-type: none"> ▪ Proper soil health management strategies for better root development and soil aeration should be followed. ▪ Follow crop rotation, deep ploughing, timely irrigation, avoid water stagnation in the field. ▪ 2-3 drenching with solution of Copper oxychloride 50 % WP @ 250 g or Carbendazim 50%WP @ 120 g plus Urea 2 kg per 100 liter of water at one week interval starting immediately after symptom development.
Bacterial leaf blight (All the three zones)	Vegetative to boll development	45 -120	<ul style="list-style-type: none"> ▪ 1-2 foliar spray of Copper oxychloride 50 % WP @ 25 g Or Carbendazim 12+ Mancozeb 63% WP@25 g Or Copper sulphate 47.15% + Mancozeb 30% WDG @ 50 g per 10 litre of water at weekly interval.
Target leaf spot,	Vegetative to boll	60-120	<ul style="list-style-type: none"> ▪ Prophylactic spray of Propineb 70 WP@25-30 g Or Azoxystrobin

Alternaria leaf spot, Myrothecium leaf spot, (All the three zones)	development		18.2%w/w + Difenoconazole 11.4% w/w SC@ 10 ml Or Fluxapyroxad 167 g/l + Pyraclostrobin 333 g/l SC@ 6g Or Carbendazim 50% WP@20 g Or Propiconazole 25% EC @10 ml Or Pyraclostrobin 5% + Metiram 55% WG @20 g per 10 litres water.
Boll rot (External fungal boll rot (All the three zones)	Boll development to boll maturity stage	90-140	<ul style="list-style-type: none"> ▪ Foliar spray with Fluxapyroxad 167 g/Litre + Pyraclostrobin 333 g/Litre SC @ 6 g Or Metiram 55% + Pyraclostrobin 5% WG @ 20 g Or Propineb 70% WP @ 25 g per 10 litre of water
Internal Boll rot disease (All the three zones)	Vegetative to boll development state	60-120	<ul style="list-style-type: none"> ▪ The dried petals sticking to the developing bolls should be removed. ▪ Avoid indiscriminate use of nitrogenous fertilizers. Restrict excess vegetative growth of the cotton crop. Facilitate proper drainage in the field to avoid water logging in the field. ▪ Prophylactic sprays of Copper oxychloride 50%WP @25 g/10L Or Carbendazim 12+ Mancozeb 63% WP@ 25 g/10L is suggested during early boll developmental stages at 15 days interval if cloudy weather, high relative humidity, flash and drizzle rain occurred during squaring, flowering and boll development stage. ▪ Manage sucking pests with recommended insecticides.
Grey Mildew (Central and South zones)	Boll development to boll maturity stage	90-140	<ul style="list-style-type: none"> ▪ Spray with Kresoxim-methyl 44.3% SC @1 ml Or Azoxystrobin 18.2% w/w + Difenoconazole 11.4% w/w SC @ 10 ml /10 litres of water.
Rust (South zone)	Boll development to boll maturity stage	90-140	<ul style="list-style-type: none"> ▪ Foliar spray of Fluxapyroxad 167 g/Litre + Pyraclostrobin 333 g/Litre SC @ 6 g Or Metiram 55% + Pyraclostrobin 5% WG @ 20 g Or Propiconazole 25%EC @ 10 ml Or Azoxystrobin 18.2% w/w + Difenoconazole 11.4% w/w SC @ 10 ml per 10 litre of water.

*DAS: days after sowing