

Lecture 11: Insect Pests of Cotton and their Management

Learning Objectives

- **Distribution, biology, nature, symptoms of damage and management strategies of:**
 1. Cotton aphid: *Aphis gossypii* (Aphididae: Hemiptera)
 2. Leafhopper: *Amrasca devastans* (Cicadellidae: Hemiptera)
 3. Thrips: *Thrips tabaci* (Thripidae: Thysanoptera)
 4. Mealy bug: *Phenacoccus solan* (*Pseudococcidae: Hemiptera*)
 5. Whitefly: *Bemisia tabaci* (Aleyrodidae: Hemiptera)

1. Cotton aphid: *Aphis gossypii* (Aphididae: Hemiptera)

Distribution and status: Cosmopolitan, world wide in distribution

Host plants: Cotton, bhendi, brinjal, chillies, guava

Damage symptoms:

- It is a potential pest on cotton infesting tender shoots and under surface of the leaves.
- Aphids occur in large numbers, suck the sap and cause stunted growth, gradual drying resulting in death of the plants.
- Development of black sooty mould due to the excretion of honey dew gives the plant, a dark appearance.



ETL: 5% of infested plants.

Identification:

- The aphids are greenish brown, soft bodied and small insects.
- The alate as well as apterous females multiply parthenogenitically and viviparously.
- A single female may produce 8-22 nymphs in a day which become adults in about 7-9 days.
- They are often attended by ants for the sweet honey dew secretion.
- Winged forms may be seen under crowded conditions.

Management

- ✓ Monitor the nymphs and adults of early season sucking pests from the 14th day after sowing.
- ✓ Conserve natural enemies viz., *Monochilus sexmaculatus*, *Coccinella septempunctata*, *Aphelinus mali*, *A. flavipes*, *Phylloscopus tristis*
- ✓ Spray any of the following insecticides with 500 L water/ha Methyl demeton 500 ml or Dimethoate 500 ml or Monocrotophos 1000 ml or Thiacloprid 21.7 SC 100-125 ml

2. Leafhopper: *Amrasca devastans* (Cicadellidae: Hemiptera)

Distribution and status: Major pest in all cotton-growing region of India

Host range: Cotton, potato, brinjal, castor, bhendi, tomato, hollyhock and sunflower.

Damage symptoms:

- Both nymphs and adults suck the sap from the under surface of leaves, tender leaves turn yellow, leaf margins curl downwards and reddening sets in.
- In the case of severe infestation leaves get a bronze or brick red colour which is typical “hopper burn”.
- Crop growth retarded.



Cotton leaf hopper



Backward curling of leaves



Hopper Burn

ETL:

- 50 nymphs / adults per 50 leaves or yellowing and curling from the middle to upper portion of the plants in 25 % of plants in the field

Bionomics:

- Adult green and wedge shaped, lay eggs singly within leaf veins.
- Incubation period 4-11 days.
- Nymph light green and translucent found between the veins of leaves on the under surface.
- Nymphal period 7-21 days.
- Nymphs moult five times. Life cycle is completed in 15-46 days.
- Eleven generations are known to occur in a year.

Management:

- ☐ Early sowing and close spacing of cotton reduces pest infestation particularly if the rainfall is heavy.
- ☐ Setup light trap to monitor the broods of leaf hopper and to attract and kill.
- ☐ Release predators viz., *Chrysopacarnea*.

- ☐ Spray monocrotophos 36 WSC @ 1000 ml/ha and NSKE 5% @ 25 kg/ha or 750 ml endosulfan 35 EC in 1000 L of water per hectare.
- ☐ Use resistant varieties like MCU 3, MCU 5 and MCU 9.

3. Thrips: *Thrips tabaci* (Thripidae: Thysanoptera)

It is commonly known as the onion thrips, the potato thrips, the tobacco thrips or the cotton seedling thrips.

Host range: onion, leek and garlic, brassicaceous plants such as cabbage, cauliflower and broccoli, asparagus, sugarbeet, melon, pumpkin, marrow and cucumber, strawberry, potato, tobacco, cotton and many fruiting and ornamental plants

Damage symptoms:

- Both nymph and adult lacerate the tissue and suck the sap from the upper and lower surface of leaves and in cases of severe infestation they curl up and become crumpled.
- Silvery sheen on the lower surface can be seen in early stages of attack.



Thrips

Cotton leaf damaged by thrips feeding.

ETL: 1 No. /leaf

Identification:

- Adults small, slender, yellowish to brown with fringed wings and drift away on disturbance.
- Nymph very minute, slender, yellowish and microscopic

Management

- Monitor the nymphs and adults from the 14th day after sowing.
- Seed treatment with imidaclopid 70WS7g/kg protects the crop from aphids, leaf hoppers and thrips upto 8 weeks

- Spray any of the following insecticides with 500 L water/ha Methyl demeton 500 ml or Dimethoate 500 ml or Monocrotophos 1000 ml or Thiachloprid 21.7 SC 100-125 ml

4. Mealy bug: *Phenacoccus solan* (*Pseudococcidae: Hemiptera*)

Distribution and status: During the last few years mealybugs, which were considered to be minor pests in many crops have acquired the status of major pests especially in cotton, vegetables and fruits. Recently in India the cotton crop in Punjab, Rajasthan, Maharashtra and Gujarat is being seriously infested with mealybug

Host range: Polyphagous pest. Ornamental plants, fruit crops, vegetables and field crops. Ninety one host plants spread across 24 families has been recorded in India till date.

Damage symptoms:

- Plants infested during vegetative phase exhibit symptoms of leaf curling, distorted and bushy shoots, crinkled and/or twisted and bunchy leaves.
- Plants dry become stunted and dry.
- Late season infestation during reproductive crop stage results in late opening of bolls, reduced plant vigour, early crop senescence, affecting the yield badly.

Identification:

- The body is covered with very short waxy filaments. Long tails and stripes on the body are absent.
- This species does not produce an egg mass or ovisac.
- Mealybugs are white to pink in colour and measure 3–4 mm in length.
- In case of *M. hirsutus*, eggs as well as crawlers are pink in colour. The crawlers measure 0.3 mm in length.
- Immature females and newly matured females are greyish-pink which are dusted with mealy white wax.
- Adult females are 2.5–4.0 mm long, soft-bodied, elongate oval and slightly flattened. Females are provided with 9-segmented antennae, anal lobe bars, numerous dorsal oral rim ducts on all parts of the body except the limbs and long, flagellate dorsal setae.
- Males have one pair of very simple wings, long antennae and white wax filaments projecting posteriorly with no mouthparts.
- Nymphs and adults are soft bodied insects covered by a mass of mealy white waxy covering over the body.



Colony of mealy bugs

Life cycle:

- Eggs overwinter on stems, soil, cracks and crevices of the stem and inside crumpled leaves.
- Freshly laid eggs (500-600) are orange coloured but turn pinkish just prior to hatching.
- The crawlers disperse from the ovisac by way of walking, wind or ants.
- The nymphs develop into adults in 30 days. Life cycle is completed in 45 days.
- There are 10-15 generations / year

Management

- ✓ Early crop termination
- ✓ Destruction of cotton stalks.
- ✓ Destroy alternate weed host growing on field bunds, water channels and wastelands.
- ✓ Grow pigeonpea, bajra or maize as border crop wherever possible.
- ✓ Regularly monitoring of the pest.
- ✓ Neem Seed Kernel Extract (NSKE 5%) 50ml/L + Neem oil 5ml/ L + detergent powder 1gm/L or Fish oil rosin liquid 10 ml mixed with neem 10ml/L or Karanj oil 10ml /L can be sprayed as spot application on infested stalks.
- ✓ Use *Cryptolaemus montrouzieri* adults /grub@ 10 per infested plants wherever available.
- ✓ Spray biopesticides viz., *Verticillium lecanii* (Potency 2 X 10⁸ C.F.U /gm) 10gm/l and *Beauveria bassiana* (Potency 10⁸ spores/ml) 10ml/l.
- ✓ Spray less hazardous insecticides, such as acephate, 75 SP 2.0 kg, malathion 50 EC 2 L, buprofezin 25 SC 2.0 L/ha. As the last option, spray moderately hazardous insecticides: Quinolphos 25 EC or Chlorpyrifos 20EC 3 L or Profenophos 50EC Thiodicarb 75WP 5.0gm/l 2.5 L in 800- 100 L of water per ha.

5. Whitefly: *Bemisia tabaci* (Aleyrodidae: Hemiptera)

Distribution and status: India, Sri Lanka, Nigeria, Congo, West Africa, Japan and Europe

Host range: Cotton, tomato, tobacco, sweet potato, cassava, cabbage, cauliflower, melon, brinjal and bhendi.

Damage symptoms:

- Nymphs and adults suck the sap from the under surface of leaves.
- Severe infestation results in premature defoliation, development of sooty mould, shedding of buds and bolls and poor boll opening.
- It also transmits the leaf curl virus disease of cotton.
- The insect is highly polyphagous and known to have biotypes.

ETL: 5-10 nymphs / leaf



Identification:

- Adult is a minute insect with yellow body covered with a white waxy bloom.
- Eggs are laid on leaves.
- Egg period is three days.
- Nymph is greenish yellow oval in outline, along with puparia on the under surface of the leaves.
- Nymphal period is 5-33 days in summer, 17-73 days in winter.



Management

1. Use white fly tolerant varieties like LK 861, Amravathi, Kanchan, Supriya, LPS 141
2. Treat 100 kg seeds with Imidacloprid 48 FS 500-900 ml or Imidacloprid 70 WS 500-1000 g Thiamethoxam 30 FS 1.0 L l or Thiamethoxam 70 WS 430 g
1. Timely sowing with recommended spacing, preferably wider spacing is essential, avoid late sowing.
2. Avoid the alternative cultivated host crops of the whitefly (Brinjal, bhendi, tomato and tobacco) in the vicinity of the cotton crop.
3. Grow cotton only once in a year either in winter or summer season in any cotton tract.
4. Adopt crop rotation with non-preferred hosts such as sorghum, ragi, maize etc., to check the build up of the pest.
5. Remove and destroy alternate weed hosts like *Abutilon indicum*, *Solanum nigrum* from the fields and neighbouring areas.
6. Follow judicious irrigation management and nitrogenous fertilizer application to arrest the excessive vegetative growth and pest the buildup.
7. Monitor the activities of the adult whiteflies by setting up yellow pan traps and sticky traps at 1 foot height. Also monitor through *in situ* counts
8. Collect and remove whitefly infested leaves from the plants and those which were shed due to the attack of the pest and destroy them.
9. Spray neem oil 5 ml or fish oil rosin soap at 1 kg / 40 L of water (or) in combination with recommended dose of insecticide (2 ml/L).

10. Spray any of the following insecticides with 500 L water/ha. Diafenthiuron 50 WP 600 g or Ethion 50 EC 1.5-2.0 kg or Methyl demeton 25 EC 500 ml or Quinalphos 25 EC 2.0 L or Phosalone 2.5 l/ha

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Study Questions

1. Write down the distribution, biology, nature and symptoms of damage and management strategies of pests of Cotton?