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Identification of Different Insect Pests of Cotton and Their Management

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Introduction:

Cotton, *Gossypium hirsutum* L., an important industrial crop of the world. India ranks first in acreage of cotton crop. India is the second largest producer of cotton in the world after China.Among the major constraints in cotton cultivation, pest damage is the most important one. Cotton crop is infested by several pests right from germination to harvest and the pest spectrum of cotton is quite complex. These insect pests have the potential to cause catastrophic impacts on the crop, resulting in major output losses and financial distress for farmers. Sustainable production depends on identifying the major insect pests that impacts on cotton crop and comprehending their nature of damage and treatment options. Through this article, we seek to give an overview of the major insect pests of cotton and insights into practical insect pest management strategies. Cotton is the most important commercial crop in our country. However, these insect Pest reduce the yield of the cotton, making it difficult to grow. That's why there's a shift towards sustainable cotton production which depends majorly on identifying the main insect pests and comprehending their nature of damage and treatment options so as to know a technique to treat them. However, the crop might become affected and the insect pest caused not only lowers the yield but also has a grave impact on the fibre quality and seed quality. For maintaining the production quality of cotton fibre, it is essential to further comprehend the major insect pests and its management.

1. Aphids: ***Aphis gossypii*** Aphididae: Hemiptera

Economic Importance:

- It is a cosmopolitan and polyphagous which breaks out in epidemic form, almost annually in all the cotton growing areas of the country.

Marks of Identification:

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- The adult is an oblong insect; about 2 mm long and is yellowish to dark green in colour.
- They are usually wingless but winged forms are often noticed mostly in the beginning towards the end of the season.
- Wings are thin, transparent and are held like a roof over the body at rest.

Nature of Damage:

- Nymphs as well as adults suck the cell sap by remaining on the lower surface of the leaves and also on tender shoots and impair the vitality of the plants.
- In cases of severe infestation, the leaves curl badly and growth of the plants remain stunted.
- Besides sucking the sap from the leaves these insects excrete a honeydew like substance on which the black sooty mould develops and adversely affected the photosynthesis.

Life History:

- Winged and apterous forms produce young on viviparously and parthenogenetically. The life cycle is completed in 7 to 9 days.
- As the female adults give birth to the female young ones, the nymphs when become adults all of them reproduce and give birth to young one and therefore very fast multiplication into enormous population's takes place in short time.

Host Plants:

- Besides cotton, the pest also infests crops like brinjal, bhendi, chilles, potato etc.

Aphids (*Aphis gossypii* Glover)

2. Cotton Jassid: ***Amrasca biguttula biguttula*** Cicadellidae : Hemiptera

Economic Importance:

- It is a cosmopolitan and polyphagous, distributed widely in all the cotton growing areas of the State.

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Marks of Identification:

- The adult is a wedge shaped insect and pale green in colour. There is a black spot on each of the fore wings and spots on the vertex.
- The insect is characterized by its habit of walking diagonal in relation to body.

Nature Damage:

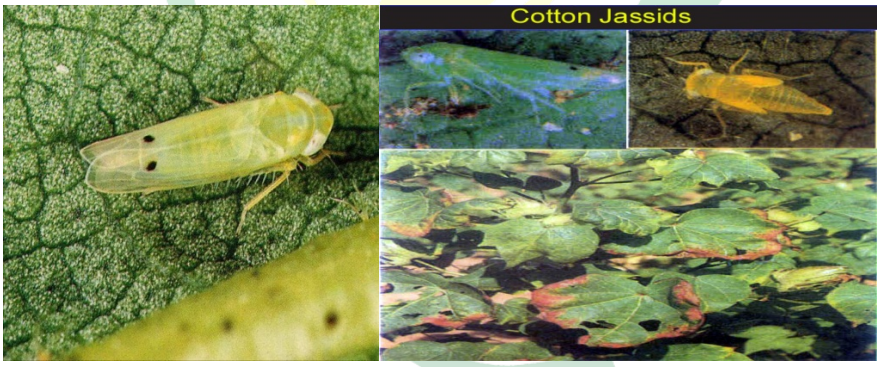
- Both nymphs and adults suck the cell sap mostly from the underside of the leaves.
- As a result, a characteristic hopper burn symptom is noticed wherein the margins turn yellowish initially and subsequently turn reddish and curl.
- In cases of heavy infestation, the leaves show brown necrotic patches and the growth of the plants remain stunted which adversely affect the flowering and ultimately yield.

Life History:

- Female lay eggs singly inside the leaf veins, which hatch in 4 to 11 days.
- Nymphal stage lasts for 7 to 21 days with six nymphal instars.
- The entire life cycle is completed in 2 to 4 weeks.
- There are several overlapping generations in a year.
- The pest is more severe in July to September.

Host Plants:

- It is polyphagous species infesting cotton, bhendi, ambadi, potato, brinjal etc.



Jassids or leaf hopper (*Amrasca biguttula* Ishida)

3. Thrips : *Anaphothrips dorsalis* Thripidae : Thysnoptera

Economic Importance:

- It is a cosmopolitan and polyphagous species found all over the state.

Marks of Identification:

- The adult are minute delicate insects and are light yellow in colour.

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- Their body is narrowed in the middle. Their wings are fringed with hairs, hence called as **fringe winged insects.**
- The nymphs and even adults are seen walking fast, when observed under magnifying lens.

Nature Damage:

- The thrips have rasping and sucking type of mouth parts suited for scraping the epidermal tissues of the leaves and sucking the oozing cell sap.
- As a result of such feeding brown patches are seen of the leaves and also on boils.
- Excessive feeding on leaves lead to their curling and the growth of the plant is stunted.
- The pest is active in post monsoon periods.

Life History:

- The eggs are laid in the tissues on the lower surface of leaves.
- Eggs hatch in about 2 to 5 days.
- Nymphs become full grown in about a week, after moulting thrice.
- The adult lives for 10 to 25 days.

Host Plants:

- Cotton, chillies, cucurbits etc.

Thrips (*Thrips tabaci* Lind)

Management Practices:

- For all sucking pests, *i.e.,* jassids, aphids and thrips are given below:

1. In areas where heavy attack of jassids occurs, resistant varieties should be cultivated.
2. In endemic areas, 1 to 1.5 g phorate 10% granules be applied at each spot before sowing.
3. When economic threshold level of 10 is reached, dimethoate 0.05% or methyl demeton 0.02% be sprayed. Spraying be repeated at fortnightly interval if needed.

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4. Cotton white fly: *Bemisia tabaci* Aleurodidae : Hemiptera

Mark of Identification:

- Nymphs and pupae: Black and round or oval.
- Pupae have marginal bristles.
- Adults: Small, yellow bodied insects with white wings which are densely covered with a waxy powder

Nature Damage:

- Both nymphs and adults suck the cell sap from the leaves and devitalize the plants.
- As a result of their feeding the boll formation as well as the proper openings is affected.
- Besides, they also excrete honey-dew on leaves, on which black sooty mould develops.
- It is also vector of leaf heart virus on tobacco, cotton etc.
- Host Plants: It is polyphagous species feeding on bhendi, brinjal, potato, cruciferous and cucurbits.

White fly (*Bemisia tabaci G.*)

Management Practices:

1. Use white fly tolerant varieties like LK 861, Amravathi, Kanchan, Supriya.
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.
3. Timely sowing with recommended spacing, preferably wider spacing is essential, avoid late sowing.
4. Avoid the alternative cultivated host crops of the whitefly (Brinjal, bhendi, tomato and tobacco) in the vicinity of the cotton crop.
5. Grow cotton only once in a year either in winter or summer season in any cotton tract.

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6. Adopt crop rotation with non-preferred hosts such as sorghum, ragi, maize etc., to check the build-up of the pest.
7. Remove and destroy alternate weed hosts like *Abutilon indicum, Solanum nigrum* from the fields and neighbouring areas.
8. Follow judicious irrigation management and nitrogenous fertilizer application to arrest the excessive vegetative growth and pest the build-up.
9. Monitor the activities of the adult whiteflies by setting up yellow pan traps and sticky traps at 1 ft height. Also monitor through in situ counts.
10. Collect and remove whitefly infested leaves from the plants and those which were shed due to the attack of the pest and destroy them.
11. Spray NSKE 5% and neem oil 5 ml or fish oil rosin soap at 1 kg / 40 L of water / in combination with recommended dose of insecticide (2 ml/L).
12. The use of the synthetic pyrethroids should be discouraged / minimized to 2-3 sprays in cotton to avoid the problem of whitefly.
13. Spray any of the following insecticides with 500 L water/ha.

5. Mealy bug: *Phenacoccus solenopsis* Pseudococcidae : Hemiptera

Economic Importance:

- 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.

Host Plants:

- Polyphagous pest, Ornamental plants, fruit crops, vegetables and field crops.

Mark of 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.
- 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.

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Nature of Damage:

- 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.

Management Practices:

1. Early crop termination and Destruction of cotton stalks.
2. Destroy alternate weed host growing on field bunds, water channels and wastelands.
3. Use acid delinted seeds for sowing.
4. Grow pigeonpea, bajra or maize as border crop wherever possible.
5. 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 neem10ml/L or Karanj oil 10ml /L can be sprayed as spot application on infested stalks.
6. Use *Cryptolaemus montrouzieri adults* /grub@ 10 per infested plants wherever available.
7. Spray biopesticides viz., *Verticillium lecanii* (Potency 2 X 108 C.F.U /gm) 10gm/l and *Beauveria bassiana* (Potency 108 spores/ml) 10ml/l.
8. Spray less hazardous insecticides, such as acephate, 75 SP 2.0 kg, malathion 50 EC 2 L, buprofezin 25 SC 2.0 L/ha.
9. As the last option, spray moderately hazardous insecticides: Quinolphos 25 EC or Chlorpyriphos 20EC 3 L or Profenophos 50EC Thiodicarb 75WP 5.0gm/l 2.5 L in 800- 100 L of water/ha.

Mealy Bug (*Phenacoccus solenopsis C.*)

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6. Red cotton bug: ***Dysdercus cingulatus*** Pyrrhocorecidae : Hemiptera

Economic Importance:

- This pest occurs throughout the cotton growing area of Maharashtra, but is of minor importance. It is commonly known as **cotton stainer.**

Marks of Identification:

- The adult bug is red in colour except eyes. Scutellum and antennae, which are black, coloured.
- Besides, there is a black spot on each of the forewings.
- A series of white transverse bands are present on the ventral side of the abdomen. Nymphs are also red in colour but small and wingless.

Nature Damage:

- Both nymphs and adults suck the cell sap from the leaves and the shoots and impair the vitality of the plant.
- However, the pest is mainly injurious, because of its behaviour of attacking mainly bolls in all stages of its growth.
- They feed by inserting mouth parts into the bolls and extract the juice from developing tissues and young seed and lower the oil content.
- Similarly, infested seeds become unfit for sowing. Small-injured bolls fall down but the large bolls remain on the plant.
- Due to excreta of these insects and the crushing of nymphs during the ginning the lint gets stained, hence the name.

Life History:

- The female lay eggs in the soil near the plant, which hatch in 4 to 7 days. The nymphs undergo 4 moults in 30 to 36 days before becoming adult. The life cycle is completed in 6 to 8 weeks.

Management Practices:

- No sooner the incidence of pest is noticed dusting with methyl parathion 2 % dust be done on plants as well as on the soil around the plants.

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Red Cotton Bug (*Dysdercus cingulatus* fb.)

7. Dusky cotton bug: *Oxycaraenus hyalinipennis* Lygaeidae : Hemiptera

It is also a minor pest of cotton. It attacks open bolls and those damaged by bollworms.

Marks of Identification:

- The adults are small in size and dusky in colour.
- Eggs are cigar shaped and whitish in colour but turn pinkish when about to hatch.
- The nymphs in the initial instars are reddish brown but later become dusky brown.

Nature Damage:

- Nymphs and adults feed the open bolls also on the bolls already infested by the bollworms and suck juice from immature seeds, which do no develop properly.
- Besides due to the crushing in ginning, the lint gets stained.

Host plants:

- Besides cotton, the other alternate hosts are bhendi, ambadi and hollyhock.

Life History:

- Cigar shaped eggs are laid in the lint close to seeds, eggs hatch in 5 to 6 days and the nymphs become adult in about two weeks after moulting six times.
- The pest is active from November to February.

Management Practices:

- Same as against Red cotton bug.

Dusky Cotton Bug (*Oxycaraenus hyalipennis* K.)

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Conclusion :

cotton is one of the important fibre crops in Maharashtra and even in India. The cotton plays a vital role in the Indian economy, sustains the Indian cotton textile industry, provides employment to millions of people and contributes substantially to the country's foreign trade. But its productivity is reduced due to pest problem which causes severe damage to cotton resulting in yield losses. Sucking pests have become quite serious from seedling stage to harvesting and their heavy infestation at times reduces the crop yield to a great extent. The information generated in present study would be helpful in developing efficient pest management strategies against insect pest of cotton crop for increased production efficiency, profit, besides safety to the environment.