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# Insect Pest of Mulberry and their Management

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## Abstract

Mulberry is a fast growing plant which is the only food for mulberry silkworm (*Bombyx mori)* due to the presence of morin, β sitosterol and swallowing factors. In India, there are four main species - *M. indica*, *M. alba*, *M. serrata* and *M. laevigata*, which grows naturally in the northern part of the country. There are several factors that reduce the productivity and quality of mulberry leaves of which the incidence of insect pests and diseases are one amongst them. The important insect pests of mulberry are mealy bugs, jassid, thrips, hairy caterpillars and cutworms. Among which sap suckers are mealy bug, thrips and jassid and leaf eaters are cutworm and hairy caterpillar.

Mulberry (*Morus* sp.) is a fast growing plant which mostly grows in the Northern part of India. Mulberry cultivation was introduced to India from China via Tibet around 140 BC. Today, it is grown in over 32 countries across tropical, temperate, and subtropical regions worldwide. In Four primary species—*M. indica*, *M. alba*, *M. serrata*, and *M. laevigata* are naturally thrive in the northern region of India (Ravindran *et al*., 1997). Mulberry leaf is a major economic component in sericulture since the quality and quantity of leaf produced per unit area have a direct bearing on cocoon harvest. Mulberry leaf is the only food for mulberry silkworm (*Bombyx mori)* due to the presence of morin, β sitosterol and swallowing factors (Babu *et al*., 2009). Mulberry has numerous other uses as well. Fruits of this plant are utilized to prepare jam, jelly, and juices, or they can be enjoyed fresh. The fruits are also used in medicine to enhance appetite and alleviate abdominal distention and constipation. Several factors reduce the productivity and quality of mulberry leaves, with the incidence of pests and diseases being a major one. Approximately 300 species of insect and non-insect pests are known to attack mulberry plants. (Narayanaswami,1996). The perennial nature of mulberry plants in combination with monocultural practices increases the chances of infestation of several pests throughout the year.

## Some important insect pests of mulberry

1. **Pink mealy bug**- *Maconellicoccus hirsutus*, Pseudococcidae, Hemiptera

Identification: Female bugs are pinkish in color with white waxy filaments covering the body while males are winged in nature. Adult insects are 2-3 mm long.

Period of occurrence: This insect can be seen throughout the year but severe infestation is seen during summer months. Population is negligible during rainy season.

Damage symptom:

- Nymphs and adults suck sap from tender leaves and stem as a result the leaves become thick dark green and wrinkled in nature giving the plant a bushy or bunchy appearance. This symptom is collectively called as 'tukra' symptom.
- Due to honeydew secretion by the mealybug, a black sooty mould can be seen in attacked plant parts.

- Leaf yield is greatly reduced by the pest with reduction in leaf quality.

2. **Papaya mealy bug**- *Paracoccus marginatus*, Pseudococcidae, Hemiptera

- Identification: Female mealy bug is yellowish in appearance with waxy coating over the body. It can be easily distinguished from pink mealy bug by the presence of eight antennal segments, in contrast to nine in pink hibiscus mealybug.

Damage symptom:

- Initial infestation takes place in the apical region later on covers the whole plant.
- Nymph and adult suck sap from leafs and twigs causing curling and crinkling of the leaves with stunted growth of the plant.
- Sooty mould appearance can be easily seen.

3. **Thrips**: *Pseudodentrothrips mori*, Thripidae, Thysanoptera.

Identification: Adults of both the sexes are winged in nature, body yellowish white in color. Pale brown antennae can be dseen with 4-6 segments.

Period of occurrence: Though the pest is occurred throughout the year but highest population can be seen during Feb-April.

Damage symptom:

- Nymph and adult of this pest pierce the epidermal layer of leaves with their rasping and sucking type of mouth part. As a result silvery patches with small black spots can be seen on the upper surface of leaves. In case of severe infestation leaves become curled, shrinked and ultimately fall off. Loss of leaf yield upto 1300kg/acre /season can be estimated for thrips infestation.

4. **Jassid**: *Empoasca flaviscens*, Cicadellidae, Hemiptera

Identification: Nymphs are yellowish green in color while adults are small, wedge shaped and pale green in color. Adults are 3-4 mm long.

Period of occurrence: Generally hot summer months are more suitable for this pest attack.

Damage symptom: Both nymph and adult suck sap from young leaves and tender shoots. As a result the affected leaves become dry, uneven, curl downward like an inverted boat, and have brown edges. This distinctive symptom is known as 'Rim Blight' or 'Hopperburn'.

5. **Bihar hairy catterpillar**- *Spilosoma obliqua*, Noctuidae, Lepidoptera.

Identification: Caterpillars are reddish brown in color with long and thick bristles over their body. Adult moths are crimson colored with black dots over the body with a red abdomen.

Period of occurrence: Mostly seen throughout the year but heavy population can be seen during August-February.

Damage symptom:

- Young larva feeds gregariously on the leaf exposing the veins which gives a typical mesh like appearance of leaves. .
- Grown up larva feeds on the whole leaves.

6. **Cutworm**: *Spodoptura litura*, Noctuidae, Lepidoptera.

Identification: larva is small, cylindrical and pale green in color. Forewings of the adult moth are reddish brown in color with cream colored streaks along the veins.

Damage symptom:

- Larva with their biting and chewing type of mouth part scrap the leaf tissue creating holes in the leaf. In severe cases this pest can cause complete defoliation of plants leaving the field in such a way as it is grazed by animals.

## Integrated Pest Management for Mulberry

As tender mulberry leaves are directly feed to the silkworm larva, pest control with chemical insecticides should be avoided. Instead a combination of several pest management practice should be combined together to combat any pest problem in mulberry plantation.

Cultural control

- Clipping of infested plant parts, egg masses of insects and burning them.
- Planting of alternate hosts like okra, hibiscus, guava etc at the vicinity of mulberry plantation should be avoided to manage mealy bugs.
- Digging of trenches around the field to trap marching larva of hairy caterpillar.

Mechanical control

- Deep summer ploughing of fields exposes the larvae of hairy caterpillars and thrips, which are then killed by the scorching sun.
- Water jetting and sprinkler irrigation are effective in reducing the thrips population by washing away various stages of the thrips.
- Flooding of field is effective against pupae of hairy caterpillar.
- Light traps can be installed in field to attract hairy caterpillar moths.
- Yellow sticky traps can be used to monitor jassids.
- To control cutworm light trap and pheromone traps (Spodlure) can be installed in the field.

Biological control

- Predators like *Scymnus coccivora* @1000 adults/ha and *Cryptolaemus montrouzieri* @ 750 adults/ ha can be effective to control pink mealy bug.
- For papaya mealy bug exotic parasitoid *Acerophagus papaya* @ 100 no/acre can be released to get better control of the pest.
- Foliar spray of *Verticillium lecanii* or *Beauveria bassiana* ($2 \times 10^8$ cfu/ml) @ 5 g/ml per litre of water is effective in reducing the population of mealybugs.
- *Trichogramma chilonis* @ one Trichocard /acre/week can be released to control hairy caterpillar and cut worm. Each Trichocard should be cut into 12-16 pieces and staple them below mulberry leaf.

Chemical control:

- Neem oil @ 1 ml/lt of water can be used.
- Spray dichlorvos 76 EC 2 ml/l, monocrotophos 36 WSC 1.5 ml/l, methyl demeton 25 EC 2 ml/l, chlorpyriphos 20 EC 2 ml/l, imidacloprid 200 SL 1ml/l or malathion 2.5ml/l of water at 15 days intervals.

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