

Lepidopteran and Dipteran Pests of Mulberry and their Management (*Morus* sp.)

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Abstract

Mulberry (*Morus* sp.) is subject to a variety of insect and non-insect pests, with over 200 species identified. These pests are classified into leaf-eating, sap-feeding, stem-boring, and root-feeding varieties. The Bihar hairy caterpillar (*Spilosoma obliqua*) and the tussock caterpillar (*Euproctis fraterna*) are lepidopteran pests that defoliate foliage, causing substantial damage. The wasp moth (*Ammata passalis*) and cutworm (*Spodoptera litura*) also cause leaf damage and defoliation. The mulberry leaf roller (*Diaphania pulverulentalis*) compromises leaf integrity via webbing and rolling. Dipteran pests include the shoot gall midge (*Diplosis mori*), numerous scale insects, mealy bugs (*Meconellicoccus hirsutus*), spiralling white flies (*Aleurodecus dispersus*), leaf hoppers (*Empoasca flavescens*), and thrips (*Pseudodendrothrips mori*), all of which have an impact on plant health and production. To mitigate these, management options include physical, biological, and chemical measures are used.

INTRODUCTION

A. LEPIDOPTERAN PESTS

1. Bihar hairy caterpillar: *Spilosoma obliqua* (Arctiidae; Lepidoptera)

Nature of damage: It's a polyphagous pest & mulberry is also one of its hosts. Young caterpillars feed gregariously on the under surface of leaves & skeletonize them. From 5th instar onwards, the larvae disperse & defoliate the plants leaving only the main veins and cause serious damage to the rearers.

BIOLOGY

EGGS: Each adult moth lay about 1000-1200 eggs in small clusters on the lower surface of the leaves. Green in colour with a metallic shine. Egg period is 5-7 days.

LARVAE: Anterior & posterior regions are black and middle region is yellowish brown. Larval duration is 30 days.

PUPA: Pupation occurs in the soil.



ADULT: Moths are light brown in colour with black dots scattered on the body. The abdomen is brick red with rows of dots on lateral and mid dorsal sides

- **CONTROL MEASURES:** Collection and destruction of eggs & gregarious larvae.
- Flood irrigation to kill pupae in the soil.
- Deep ploughing.
- Set up light traps to attract and kill the adults.
- Larval parasitoid *Apanteles obliqua*. And Egg parasitoid *Trichogramma chilonis*.
- Spray DDVP 0.2% (Nuvan) & leaves are harvested after a safe period of 3 days.

2. TUSSOCK CATERPILLAR: *Euproctis fraterna* (Lymantriidae: Lepidoptera)

Nature of damage: 1st and 2nd instar larvae scrape the leaves and feed on chlorophyll content later instar larvae feed on the whole leaf and cause defoliation

BIOLOGY: Egg: Batches of 20-25 Small, oval, yellow Eggs are laid on the underside of the leaves. **Larva:** Early instar is yellow and last instar dark brown in colour. Long hairy tufts are present on the first thoracic and last abdominal segment.

Pupa: Brown cocoons are formed on the underside of the leaves.

Adult: Yellow with brown and black thorax and abdomen. Fore wings are light brown covered with dark scales towards the margin.

Control measures: Collection and destruction of egg masses and larvae to reduces the pest population. Spray 0.2% Nuvan & follow a safe period of 7 days.

3. WASP MOTH: (*Ammata passalis*, Amatidae -Lepidoptera)

Nature of damage: Larvae scrape the chlorophyll and later instar defoliate the leaves.

BIOLOGY: Occasional pest on mulberry Females are stout bodied with brownish black wing having transparent spot.

EGGS: Females can deposit up to 500 yellow eggs on under surface of leaves.

LARVAE: Full grown larvae 2-2.5cm, dust coloured with green tinge.

PUPA: It will pupate in a silken cocoon among leaf folds. (PP:10-12 days).

4. CUTWORM: *Spodoptera litura*, (Noctuidae, Lepidoptera)

BIOLOGY

ADULT: Moths are stout bodied, forewings are dark with white wavy lines Hind wings are white.

EGGS: The gravid female lay egg in clusters of 200-300 on lower surface of the leaves covered with brown hairs.

LARVAE: Cylindrical, pale greenish brown with dorsoventral bands. (LP 15-22 days)

PUPA: Pupates in soil.

Nature and symptoms of damage: Larvae are nocturnal. They cut and feed on young leaves as defoliator.



Management:

- Setup light trap to kill the adults Collect and destroy the egg masses.
- Deep ploughing to expose the pupae.
- Spray the crop with Nuvan @0.05% in evening hours and follow safety period of 7 days.
- Use poison bait during dusk hours to attract & kill the larvae.
- Collect and destroy the egg mass and larvae.

5. MULBERRY LEAF ROLLER: *Diaphania pulverulentalis*, (Pyralidae, Lepidoptera)

Nature and symptoms of damage: It is a very serious pest of KA, AP and TN It will attack the crop throughout the year. Early-stage larvae make a silken web among the apical leaves and feed by scraping the tissue. As the worms grows, its rollup the tender leaves feed on the leaf leaving the midrib and the vein.

BIOLOGY

ADULT: Medium sized straw-coloured moth having stripes on the lateral side of the abdomen. Both forewings and hind wings have black band on the ventral side of the anal margin.

EGGS: Gravid female lays egg singly on leaf buds. Fresh eggs are greenish yellow turn to pinkish red over time (IP 2-5days)

LARVA: Fully grown larvae are light pink with dark black markings on the dorsal and lateral side of abdomen. Pupate in a silken cocoon among the rolled dried leaves and are deep brown in colour.

- **MANAGEMENT:** Collect and burn the affected parts with pest stages
- Providing perches to encourage predatory birds.
- Setting light trap to attract and kill the adult.
- Growing resistant varieties like M5, Mysore local, TR10, TR8 in tropical region helps in regulating the pest.
- Spray Nuvan 0.2% mixed with 0.5% soap solution and follow safe period of 10 days.

B. DIPTERAN PEST

1. Mealy bug: *Meconellicoccus hirsutus* (pseudococcidae)

Nature of damage: Mealy bugs are found congregating in the nodal region of the tender shoot, on the lower surface of the leaves along the midrib, veinlets & suck the sap.

- ✓ **SYMPTOMS:** Affected plant show curling, arrest the growth.
- ✓ The leaf area decreases due to crinkling, distortion and become dark green in colour and reaches early maturity.
- ✓ Apical growth of the plant is arrested resulting in malformation of the apical shoot, producing multiple shoot. This symptom is popularly known as 'Tukra diseases'
- ✓ Females lays about 300 eggs and lives for 13-15 days.



- ✓ Eggs are elongate, crimson coloured laid in a white waxy filamentous, ovisac attached to the abdominal tip.
- ✓ The eggs hatch in 5 days.
- **Management:** Removal of alternate host in and around the vicinity of mulberry garden.
- Pruning the pest affected parts and burning.
- In case of annual pruning, the cutting should not be dumped in the vicinity of mulberry garden.
- Release the predatory beetle *Cryptolaemus montrouzieri* @ 300 beetles /ac once in year during Oct-Nov.
- Ants play an important role in the spread of nymphal stage of pest from plant to plant.
- To regulate the spread dust 5% malathion around the mulberry plants after leaf harvest.
- In severe infestation, spray Nuvan 0.2% mixed with 0.5% soap solution on pruned plants twice at an interval of 10 days during April-May.
- A safe period of 15 days should be followed.

2. Spiraling white fly: *Aleurodeucus dispersus* (Aleyrodidae, Hemiptera)

- ❖ **Nature and symptoms of damage:** Both nymph and adults suck the sap from lower surface of the leaves causes speckling and yellowing of leaves.
- ❖ Excrete honey dew resulting in development of sooty mould which affect photosynthesis.

3. Leaf hoppers: *Empoasca flavescens* (Cicadellidae, Hemiptera)

Nature and symptoms of damage: Both nymph and adult suck sap from the surface of tender leaves causing a characteristic symptom known as 'hopper burn'.

- ❖ **Biology:** Adults are small green winged insect measuring 2.5 to 4 mm in length.
- ❖ They are elongated and tapering towards the posterior end.
- ❖ Female will insert pale yellow coloured elongate egg within the epidermis along the veins under the leaf blade.
- ❖ Female can deposit 15-35 eggs which hatch in 7-8 days
- ✓ **Management:** Sprinkler irrigation is effective in controlling the pest.
- ✓ Spray 0.05% DDVP & follow safety period of 3 days.
- ✓ Spray 0.1% Rogar (Dimethoate) & strictly follow a safety period of 10 days.

4. THRIPS: *Pseudodendrothrips mori*

- **Nature and symptoms of damage:** Both nymphs and adults lacerate the leaf and suck the sap.
- Resulted in development of white specks and curling of leaf.
- Affected leaves become yellowish brown on maturity.



BIOLOGY

- ❖ **ADULT:** Adult males are brownish yellow.
- ❖ Females are dark brown.
- ❖ Females lay bean shaped eggs below the epidermis on ventral side of the tender leaves.
- **MANAGEMENT:** Removal of alternate hosts or weeds Pruning and follow whole shoot harvest method.
- Sprinkler irrigation
- Growing resistant varieties.
- Predatory thrips - *Scolothrips indicus*, *S. sexmaculatus* and Chrysopid predators - *Chrysopa sexmaculata*, *C.cincta*.
- Spray with Nuvon 0.02 % or Rogar and follow a safe period of 8-10 days.

CONCLUSION

Mulberry pest management needs a diverse approach that includes physical, biological, and chemical control measures. Addressing lepidopteran pests like the Bihar hairy caterpillar and tussock caterpillar, as well as dipteran threats like scale insects and mealy bugs, is critical to plant health and productivity. Implementing procedures like as pest stage collection and killing, parasitoids utilisation, and targeted chemical applications can help to drastically reduce pest impact. Continuous monitoring and adaptive management measures will ensure long-term control of these pests, improving the health and productivity of mulberry crops.

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