



## Pests of Silkworms and their Management

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In the intricate world of sericulture, maintaining silkworm health and productivity is crucial for successful silk production. However, several pests pose significant challenges throughout the rearing and grainage stages. Among these, the Indian Uzi fly *Exorista bombycis*, a parasitic insect, is a major threat. Commonly found in regions including China, South Korea, Japan, India, and Thailand, this fly targets silkworms, including Tasar, Oak Tasar, Eri, and Muga varieties. First identified in Karnataka in 1982, its incidence peaks during the rainy season and winter. The Uzi fly's life cycle involves four stages: egg, maggot, pupa, and adult, with maggots feeding on silkworm tissues and leading to the production of unfit cocoons. Additionally, dermestid beetles and ants also present serious issues. Dermestid beetle grubs feed on stored or stifled cocoons, rendering them unreleable. Effective management includes fumigating storage areas with chemicals like methyl bromide or chloropicrin to eliminate these pests. Ants, on the other hand, invade rearing houses and grainage areas, feeding on silkworms and causing damage. Control measures involve using grease barriers, ant baits, and thorough sanitation. The earwig *Labia arachidis*, another pest, infests grainage areas, causing damage by pinching silk moths and leading to mortality through black scars on the moths. Management of earwigs includes spreading protective barriers and using insecticides. Lastly, rodents such as house rats *Rattus rattus* and house mice *Mus musculus* are attracted to the protein-rich silkworm pupae and can cause substantial damage. Strategies to combat these pests include securing rearing facilities and using traps.

### Indian uzi fly: *Exorista bombycis* (Diptera: Tachinidae)

- Commonly known as the Indian Uzi fly.
- It is an endoparasite.
- Parasitizes silkworms in China, South Korea, Japan, India, and Thailand.
- In India, it also infests other commercial silkworms such as Tasar, Oak Tasar, Eri, and Muga.
- Infestation is highest during the rainy season, followed by winter, and least during summer.

#### Life Cycle:

There are four distinct stages in the life cycle of the fly.

#### Egg:

- Eggs are creamy white, 0.45-0.56mm in length and 0.26-0.32mm in width, oblong in shape and adhered on to the body.
- Incubation period is 24 to 36 hours.

#### Maggot:

- Maggot passes three instars.

- It is fusiform in shape, somewhat acute anterior and rounded posteriorly.
- I Instar 0.7 to 1.5 mm
- II Instar 2.7 to 2.9 mm
- III Instar 3.3 to 3.6 mm
  - Yellowish white in I and II instar and creamy white in III instar.
  - Maggot period is about 6 days.

**Pupa:**

- Puparium is oblong, barrel shaped, somewhat oval anteriorly and rounded posteriorly, reddish brown to dark reddish-brown.
- Body 11 segmented and measures 0.9- 1.2 cm in length and 0.4 - 0.6 cm in width. Pupal period is about 14 -16 days.

**Adult:**

- The fly is blackish-grey in color.
- Males are larger than females.
- Four longitudinal black lines are present on the dorsal side of the thorax.
- Lateral regions of the abdomen are covered with bristles.
- Males can be distinguished from females by the presence of external genitalia covered with brown hairs on the ventral side of the abdominal tip.
- The female flies lay approximately 300 eggs.

**Nature of damage:**

- Two to three eggs are laid on the body of the silkworm, preferably during the 4th and 5th instars.
- The young maggot hatches from the egg and bores its way into the silkworm's body through the integument, causing a black scar at the entry site.
- The maggot feeds on the silkworm's tissues, particularly the fat bodies.
- The fully-grown maggot punctures the silkworm's body to exit and then pupates in cracks and crevices.
- Cocoons pierced by Uzi flies are unfit for reeling.

**Management**

- Uzi net is spread all around the rearing stand
- Spraying uzoicide on larva which kills the uzi eggs without affecting the silkworm growth
- Collecting and killing the uzi infested larva, maggots and pupa of uzi fly by putting in hot water
- Transport of larva and cocoons from infested to non-infested area should be avoided

**IPM****Exclusion method**

- Provide wire mesh/ nylon mesh on all windows
- Provide doors with automatic closing mechanism
- Provide anteroom at the entrance of the rearing house
- Keep the leaf in the verandah of the rearing house and observe for the uzi fly before shifting leaf in to the rearing house
- Rear silkworm under nylon net enclosure

**Uzi trap:**

- The Uzi trap attracts and kills adult Uzi flies.
- Each packet contains 12 tablets.
- Dissolve 1 tablet in 1 liter of water to obtain a yellow-colored solution.
- Place the Uzi trap solution in white trays, both inside and outside the rearing house, near doors and windows at the window base.
- Use the Uzi trap solution from the 3rd instar stage up to spinning.
- The solution is safe for silkworms and eco-friendly.

**Chemical method:**

- Uzicide- A liquid formulation which kills the eggs of uzi fly before hatching
- Sprayed every alternate day from 2nd day after 2nd moult till spinning @ 5-6 ml/sq. ft
- Should not be sprayed when worms are preparing/ under moult
- For preparation of uzicide dissolve 10 g of benzoic acid crystals in 125 ml acetone and add 875 ml of water and store in air tight container
- For 100 DFL's 5 lit uzicide is required

**Biological method**

- Release *Nesolynx thymus* (a pupal parasitoid of uzi fly) on 2nd day of V instar
- Two pouches are required for 100 DFL's
- After mounting of all spinning worms transfer the same pouches near mountages
- After harvesting of cocoons keep the same pouches near the manure pit

**Dermestid beetles (Coleoptera: Dermestidae)**

- Grubs of these beetles feed on stifled cocoons that have been stored for a long time.
- They bore holes into the cocoons and consume both pupae and silk.
- Adults are small beetles with brown elytra and club-shaped antennae.
- Eggs are laid on stored or stifled cocoons.
- Larvae are small and fusiform in shape.
- Pupae are naked.
- Both larvae and adults feed on freshly spun, stored, or stifled cocoons, cutting them and making them unreleable.

**Management**

- Fumigation of cocoon storage rooms with methyl bromide @ 0.5kg/283 m<sup>3</sup> for a day or with Chloropicrin 0.5kg/283 m<sup>3</sup> for 3 days

**ANTS: *Camponotus compressus*, *Tapinoma* sp. (Hymenoptera: Formicidae)**

- Ants pose serious problem to silkworm in poorly maintained rearing houses.
- They attack the silkworms in rearing trays, spinning worms on mountage and kill them by way of feeding.
- They pose problem in grainage

**Management**

- Smear the Chandrika's foot with grease
- Raksha rekha can be applied as chalk
- Use ant well below the rearing stand and mountage

**Earwig: *Labia arachidis* (Dermaptera: Labiidae)**

- It is a grainage pest that resides in crevices and the rims of trays.
- The adult earwig is dark brown, smooth, and measures 1.3 cm in length and 0.3 cm in width.
- The adult earwig uses its mandibles to hold the abdomen of silk moths and pinches with forceps-like cerci.
- This action causes a black scar to develop on the moth.
- Affected moths eventually die.

**RATS: House rat, *Rattus rattus*; House mouse, *Mus musculus***

- They are considered as potential pests in grainage, rearing room and filature.
- Rats have special attraction for silkworm, pupae which form highly palatable and proteinaceous food.
- Rats feed on grown up worms and spinning worms on mountages (leaving aside silk glands).
- In addition to these, squirrels, birds and lizards also cause considerable loss to silkworms.

## Conclusion

Safeguarding silkworms from pests is essential for maintaining the health and productivity necessary for successful silk production. The Indian Uzi fly, with its damaging maggots, presents a significant threat, particularly during the rainy season and winter. Dermestid beetles and ants also jeopardize silkworms, affecting both stored and actively reared cocoons. Effective management of these pests includes using fumigants, protective barriers, and insecticides, alongside robust sanitation practices. Additionally, controlling earwigs and rodents requires targeted strategies such as physical barriers and traps. Adopting an integrated pest management approach-incorporating physical, chemical, and biological methods-is crucial for mitigating these challenges. By employing these comprehensive strategies, Seri culturists can enhance silkworm health and ensure a successful silk production process, ultimately contributing to the sustainability and efficiency of sericulture practices.

## References

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