



Infestation of Invasive Tomato Pin Worm Under Polyhouse Condition in Tomato Crop

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Introduction:

Tomato (*Solanum lycopersicum* L.) is one of the most important edible and nutritious vegetable crop and also good source of farm income for farmers. The crop may be invading by an introduced notorious pest, tomato pin worm, *Tuta absoluta* (Meyrick). This belongs to the Gelechiidae family of the Lepidoptera order. This pest is originated from South America and known for various other names in the different parts of world viz., tomato leaf miner, South American tomato moth, South American tomato pinworm, tomato borer, American leaf miner etc. It has been accidentally introduced into India in the year 2014 in Pune, Maharashtra first and thereby other states of the country. It was earlier known to a pest of tomato crop in open field conditions only, but recently, it has been observed under polyhouse conditions. However, now a day, it is found to invade the polyhouses tomato crop in a devastating way and becoming notorious pest for the farmers. It causes 50 to 100% reduction in yield and fruit quality in greenhouses and fields. Host Plants Tomato prefers primarily but known to feed on other solanaceous plants like brinjal and potato.

Identification of the Pest:

Egg: Eggs are Small cylindrical, creamy white to yellow 0.35 mm long. *Tuta absoluta* deposits eggs on the underside of leaves or stems. Hatching takes place after 4-6 days. The egg colour varies from oyster-white to bright yellow, darkening in the embryonic phase and becoming almost black near eclosion.

Larva: The first-instar larvae are whitish soon after eclosion, becoming greenish or light pink in the second to fourth instars according to food (leaflet or ripe fruit, respectively). There are usually four instars. Larval period lasts 10–15 days. *Tuta absoluta* has a high reproductive potential. Larvae do not go to diapause stage while food is available.

Pre-pupa: The pre-pupae are lighter than the feeding larvae (first to fourth instars) and develop a distinguishing pink colouration on the dorsal surface. They leave the mines and build silk cocoons on the leaflets or in the soil, according to habitat. When pupation occurs inside mines or fruit the pre-pupae do not build cocoons.

Pupa: Pupae are oblong with greenish coloration at first, turning chestnut brown and dark brown near adult emergence. Pupation takes place within 10 days on the leaf surface, in mines or in soil.

Adult: Adult moths are 5-7 mm long and with a wingspan of 8-10 mm, with silverish-grey scales, filiform antennae, alternating light or dark segments and recurved labial palps which

are well developed. Adults are nocturnal and usually hide during the day between leaves. The pest may overwinter as eggs, pupae or adults. Adult female lays about a total of about 250 eggs during her lifetime. The total life cycle is completed in 30–40 days. There up to 12 generations per year.

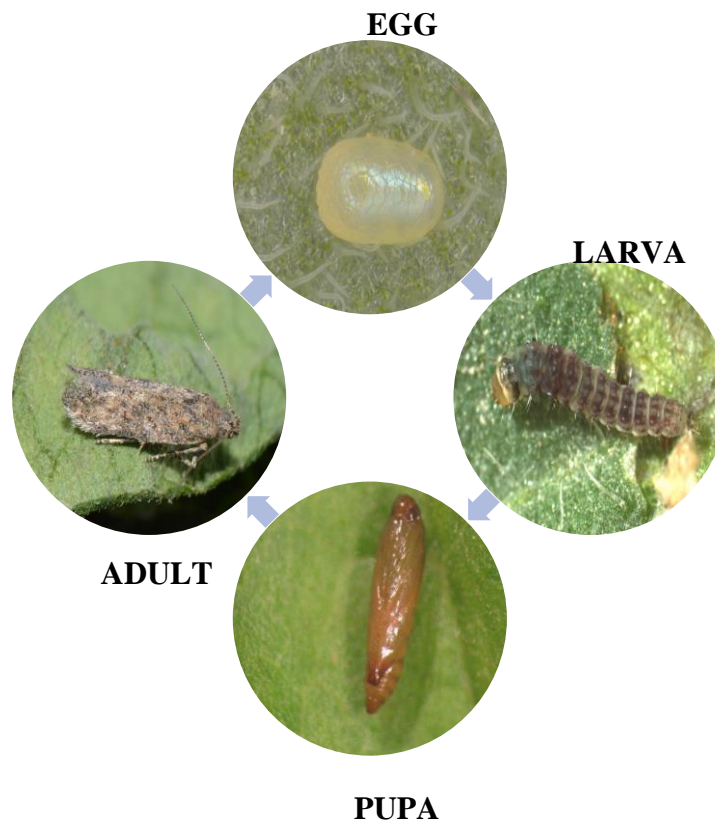


Fig. 1: Life cycle of Tomato Pin Worm, *Tuta absoluta* (Meyrick)

Symptoms of Damage

The larvae of *T. absoluta* mine the leaves producing large galleries and burrow into the fruit, causing a substantial loss of tomato production in protected and open field cultivations. The larvae feed on mesophyll tissues and make irregular mine on leaf surface. In cases of heavy infestation, both green and red fruits are attacked and infested fruits show small pin holes on the surface of the fruits and the larvae tunnel below the surface. Damage can reach up to 100%. This pest damage occurs throughout the entire growing cycle of tomatoes. *Tuta absoluta* has a very high reproduction capability. There are up to 10-12 generations in year in favourable conditions. The larvae are very unlikely to enter diapause as long as food source is available. *Tuta absoluta* can overwinter as eggs, pupae and adults. Adult female could lay hundreds of eggs during her life time. Tomato plants can be attacked from seedlings to mature plants. In tomato infestation found on apical buds, leaves, and stems, flowers and fruits, on which the black frass is visible. On potato, mainly aerial parts are attacked. However damage on tuber also recently reported.



Fig. 2: *Tuta absoluta* (Meyrick) larvae attack on leaves of tomato plant under polyhouse condition



Fig. 3: Infestation of *Tuta absoluta* (Meyrick) larvae on tomato fruit under polyhouse condition

Management Includes

- Collect and destroy the affected plants and fruits.
- Avoid cultivation solanaceous crops after tomato like brinjal, potato etc.
- Use healthy seedlings for transplanting.
- Install pheromone traps @ 16 nos./acre to attract and kill the adult moths.



- Install yellow sticky traps above the crop canopy to attract the moths.
- Install light trap @ 1/ha to kill adult moths.
- Conserve the natural enemies of *T. absoluta* such as *Trichogramma exiguum*, *Trichogramma pretiosum* (Trichogrammatidae: Hymenoptera) and *Nesidiocoris tenuis* (Hemiptera: Miridae) etc.
- Spray biopesticide like Neem formulation (Azadirachtin 1% or 5%) @ 400-600 ml/acre or *Bacillus thuringiensis* 0.5 kg/ha during initial infestation.
- If case of high incidence, spray chemical insecticides such as Spinosad 45% SC 0.25 ml/lit or Flubendiamide 20% WG @ 0.20 ml/lit or or Indoxacarb 14.5% SC @ 100 ml/ha. During the peak emergence of the adult moths, spray Decamethrin 2.5 EC @ 1 ml/lit for killing adults.

Future Impacts

Following its introduction into Europe, North Africa and the Middle East, *T. absoluta* has already caused extensive economic damage. The impact of the pest includes severe yield loss reaching up to 100%, increasing tomato prices, bans on the trade of tomato, increase in synthetic insecticide applications, disruption of integrated management programs of other tomato pests, and an increase in the cost of crop protection would be observed.

References

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