Pink Bollworm-A Serious Insect Pest of Cotton Crop

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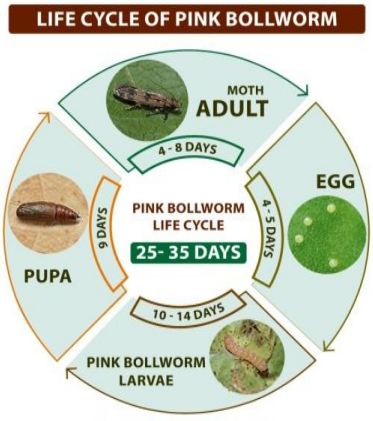
Cotton (*Gossypium hirsutum L.*) is most important commercial crop known as "King of natural fiber" and world over commonly referred as "White Gold". Cotton belongs to family Malvaceae and genus Gossypium. India has the sole distinction of growing all the four cultivated species of cotton and their intra- and inter-specific hybrids. In India, cotton is grown in three distinct agro-ecological zones, viz., Northern (Punjab, Haryana and Rajasthan), Central (Gujarat, Maharashtra and Madhya Pradesh) and Southern zone (Andhra Pradesh, Tamil Nadu and Karnataka).

Among cotton pests, the pink bollworm *(Pectinophora gossypiella* saunders*)* is the most important worldwide. The name "pink bollworm" refers to the pinkish hue of its larvae, which are caterpillars responsible for the most significant damage to cotton plants. It primarily infests the buds, flowers and bolls, causing substantial economic losses for cotton farmers. In India, the incidence of pink bollworm on cotton in Maharashtra has been reported to exceed the Economic Threshold Level (ETL) and caused a 33 percent crop loss during 2017-18.

Major states affected: Maharashtra, Gujarat, Andrapradesh, Telangana and Karnataka

Life Cycle of Pink Bollworm

The pink bollworm undergoes a life cycle consisting of the following stages:



- **Egg:** The pearly iridescent white eggs are flattened and oval, measuring approximately 0.5 mm long and 0.25 mm wide. They have longitudinal lines and are laid singly or in groups of four to five.
- **Larva:** The larvae of the pink bollworm undergo color changes as they mature. The first two instars are white, while the third instar and beyond develop a pink color. The larvae have a dark brown head due to the sclerotized prothoracic shield.
- **Pupa:** The pink bollworm pupates within a thin silken cocoon in the cotton lint, soil, or kapas. The pupae start as light brown and gradually become dark brown as pupation progresses. They measure up to 7 mm in length.
- **Adult:** The adult pink bollworm moth is grayish brown with blackish bands on the forewings, while the hind wings are silvery gray. Moths emerge from pupae in the morning or evening and are nocturnal, hiding among soil debris or cracks during the day.

Nature of Damage by Pink Bollworm

The pink bollworm larvae cause significant damage to cotton plants and bolls. Here are some characteristics of their damage:

- **Square, Flower, and Boll Infestation**: The larvae enter squares, flowers, or bolls shortly after hatching. They penetrate the developing bolls through the tip, and the entrance hole closes as the boll matures.
- **Feeding on Seeds and Fiber**: The larvae feed on the seeds and fiber-forming tissues inside the boll, resulting in the retardation of lint development.
- **Movement and Seed Destruction:** The larvae feed on seeds and move to adjacent seeds and locules by creating holes through the septum.

Damage Symptoms of Pink Bollworm in cotton

The presence of pink bollworm infestation in cotton crops leads to the following symptoms:

- **Bud Shedding:** Infestation of flower buds causes them to shed prematurely.
- **Rosette Flower Formation:** Flower infestation can lead to the formation of rosette flowers.
- **Reduction in Lint Development:** The feeding activities of larvae result in reduced lint development and weakened lint quality.

- **Premature Boll Opening:** Infested bolls may open prematurely, exposing them to saprophytic fungi growth.
- **Reduced Germination:** If infested seeds are used for sowing, germination rates are reduced.

ETL (Economic Thresholds Level)

Larva enter buds | Rosette flower | Damaged flower | Exit hole | Larvae inside boll

10 % damaged flowers (Rosette flowers) or 10 % damaged green bolls (at least 2 bolls out of 20 having white or pink larvae or exit holes) or 8 moth catch per pheromone trap per night for consecutive 3 days.

(*ETL – It is the pest population density or crop damage level at which the control measures need to be determined to prevent the increasing pest population)

IPM Approach for Pink Bollworm

To effectively tackle the pink bollworm menace, an integrated pest management (IPM) approach is highly recommended. IPM involves combining various strategies and practices to minimize pest populations while reducing reliance on chemical insecticides. Here are some key components of an IPM approach for managing pink bollworm.

Pre-sowing stage

- Deep summer ploughing to expose the pupa in the soil to birds and sunlight.
- Removal and destruction of alternate host of pink bollworm.
- Maintain field sanitation at the vicinity of the main field and keep nearby areas free from weeds.
- Crop rotation should be followed to break the life cycle of pink bollworm.

Sowing stage

- Do not sow cotton crop in the month of April-May as it will attract pink bollworm infestation at early crop stage.
- Take up sowing in the month of June with early maturing short duration Bt-cotton hybrid/ varieties recommended for particular region.
- Select tolerant/resistant cultivars.
- Use certified seeds.
- Refuge (20% non Bt seeds) should be planted along with Bt cotton, if provided in separate packet

Vegetative growth stage

- Undertake roving survey at every 10 km distance initially at weekly intervals and thereafter at 10 days intervals (depending upon pest population). Record incidence of pink bollworm on all host crops of the locality. Observe at each spot diagonally criss cross 20 plants/acre at random. Record the population potential of different biocontrol fauna.
- Undertake Field scouting for pink bollworm and biocontrol fauna once in 3 – 5 days to workout ETL. For pink bollworm eggs terminal leaves should be observed. Observe larvae on fruiting bodies and leaves per plant. For percent bollworm incidence count total and affected fruiting bodies on the plant and also in the shed material and work out the percent infestation.
- Install pheromone traps @ 5/ha, after 45 days of sowing or flowering stage to till harvest for monitoring the moth activity of pink bollworm.

Flowering, boll formation and picking stage

- Inspect the crop at squaring and flowering stage for the presence of pink bollworm larvae within flowers.
- Collect and destroy fallen squares, flowers and bolls in the field.
- If rosette flowers found in the field, pluck it mechanically and destroy to stop the further multiplication.

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