IPM PACKAGE OF PRACTICES FOR THE MANAGEMENT OF PINK BOLL WORM OF COTTON

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).

The pink bollworm *Pectinophora gossypiella* is the most important cotton pest in the world. In India, the report on incidence of PBW on cotton at Maharashtra reported above ETL and recorded 33 percent crop loss during 2017-18.

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

Life cycle:

Egg: Eggs are pearly iridescent white, flattened, oval measuring approximately 0.5 mm long, 0.25 mm wide and sculptured with longitudinal lines. Eggs are laid singly or in groups of four to five

Larva: First two instars are white, while from third instar pink colour develops. The larvae have the characteristic dark brown head due to the sclerotised prothoracic shield.

Pupa: Pupates in a thin silken cocoon in the lint or within soil or in kapas. Pupae are light brown when fresh, gradually become dark brown as the pupation proceeds. Pupa measures up to 7 mm in length.

Adult: The adult moth is greyish brown with blackish bands on the forewings and the hind wings are silvery grey. Moths emerge from pupae in the morning or in the evening, but are nocturnal, hiding amongst soil debris or cracks during the day.

Nature of damage:

- Larva soon after hatching enters the square, flowers or the boll.
- Larvae enter the developing bolls through tip portion and entrance hole is closed as the boll matures.
- Larvae inside the boll feed on seeds and fibre forming tissues which leads to the retardation of lint development.
- Larvae feed on the seeds and move to adjacent seeds and locules by making a hole through the septum.

Damage symptoms:

- Infestation of flower buds causes shedding of buds.
- Flower infestation lead to the formation of rosette flower.
- Reduction of lint development, destruction of seed and weakened lint.
- Infested bolls open prematurely exposing the saprophytic fungi to grow on them.
- If seeds are used for sowing, the germination is reduced.

Rosette flower

Damaged flower

Exit hole

Larvae inside boll

ETL (Economic Thresholds Level):

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

Integrated Management practices of 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 glossy lure pheromone baited traps @ 5/ha, after 45 days of sowing 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
- At boll formation stage, farmers are advised to inspect the presence and damage of pink bollworm by plucking and splitting 20 green bolls from different plants randomly
- Installation of large numbers of pheromone traps for mass trapping and destruction of pink boll worm
- One spray of neem seed kernel extract (NSKE) 5% may be taken up at 60 days after sowing which provides anti feedant and ovicidal effect.
- Conserve and augment natural enemies of pink bollworm includes

  Parasitoids- *Trichogramma brasiliensis* (egg), *Chelonus sp.* (egg-larval), *Campoletis chlorideae (*larval*), Bracon lefroyi (*larval*)*

  Predators- *Chrysoperla carnea, Coccinellids*, wasp, Reduviid bug, Pentatomid bug
- Release parasitoid *Trichogramma bactrae* eggs @ 3 cc (60,000)/acre.
- Chemical control measures should be initiated when pest crossed ETL.
- Spray Quinolphos 20% AF @20 ml per 10 lit. of water or Thiodicarb 75%WP @ 20 gram per 10 liter of water or Chlorpyriphos 20%EC @ 20 ml per 10 litre of water Fenevelerate 20% EC @ 10 ml per 10 litre of water or Cypermethrin 10% EC @ 10 ml per 10 lit. of water
- Avoid repeating chemical pesticide spray and use in cyclic rotation as per need.

After last picking stage

- Terminate cotton crop by December to mid-January
- Destroy residual stalks and partially opened bolls