

Entomological Challenges and Their Management in Guava Fruit Crop

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Introduction:

Guava, scientifically known as *Psidium guajava*, belongs to the *Psidium* genus in the Myrtaceae family and originates from tropical America. It's also referred to as amarood or jamfal in India. Known for its nutritional richness, the fruit is a valuable source of vitamins, minerals, fiber, and dietary antioxidants.

In Northern India, guava holds significant agricultural importance and is extensively cultivated. Despite being the fourth most crucial fruit in terms of cultivation area and production, following mango, banana, and citrus, guava stands out for its versatility. In Punjab alone, guava cultivation spans an area of 4357 hectares, yielding an annual production of 76248 metric tonnes. Its hardiness, prolific fruit-bearing capacity, and profitability make it an attractive crop, requiring minimal care for substantial yield.

While approximately 80 insect species have been noted to interact with guava plants, only a handful have been identified as recurrent pests causing significant damage. These include the bark-eating caterpillar (*Indarbela spp.*), fruit fly (*Bactrocera spp.*), Tea mosquito bug (*Helopeltis antonii*), and scale insect (*Chloropulvinaria psidii*). These pests pose notable challenges in guava cultivation, demanding attention for effective pest management strategies.

Oriental fruit fly/Guava Fruit fly/Mango fruit fly: *Bactrocera dorsalis* (Handel)

Family: Tephritidae

Order: Diptera

Host plants: Mango, Guava, Citrus, Pear and peach.



- ✚ **Adult fly:** The mature adult fly exhibits a brownish hue and possesses transparent wings, akin in size to that of a common housefly. With a lengthy lifespan and adept flying abilities, this pest remains active year-round, except for the frigid months between November and March, during which it survives in either pupal or adult form. Multiple generations of these flies overlap within a single year.
- ✚ **Egg:** Females deposit clusters of 2 to 10 creamy white eggs beneath the fruit surface, nestled within the fruit pulp. The incubation window for these eggs spans from 2 to 5 days.
- ✚ **Larva:** The larval stage presents as a creamy or dirty white maggot, resembling boiled rice, featuring a pointed mouth and a blunt rear. These larvae exhibit a preference for darkness, often leaping to seek shelter in shadowy areas. Their developmental period lasts approximately 9 to 12 days.
- ✚ **Pupa:** During the pupal stage, the organism takes on a barrel-shaped form with a brown hue. Pupation occurs in the soil, where it remains for 7 to 14 days before emerging as an adult fly.
- ✚ **Nature of damage:** Maggots bore into fruits and feed on soft pulp. The infested fruits show small cavities with dark greenish punctures and when cut open, the wriggling maggots are seen inside. The infestation causes rotting and dropping of fruits. Maggots are the only damaging stage.

Management:

- Collect and destroy the damaged plant parts or bury them into soil at least 60 cm deep.
- Summer plough to expose and kill pupae.
- Harvest the fruits when slightly hard and green.

- Bait Sprays: During the adult fruit fly emergence, applying bait (feeding stimulant + insecticide) on the host tree is found effective in controlling the fruit fly population.
- Male annihilation technique (MAT) is found very effective for effective fruit fly management. This technique consists of different types of traps with para-pheromone methyl eugenol (male fly attractant) along with different insecticides and is in use throughout the country
- Spray malathion 50 EC 2 L in 1500 – 2000 L of water per ha and do not harvest fruit up to 5 days after spray.

Shoot & Capsule Borer / Capsule borer: *Dichocrosis punctiferalis* Guence or (*Conogethes punctiferalis*)

Family: Pyralidae

Order: Lepidoptera



- ✚ **Host plants:** avocado, cardamom, castor, cocoa, ginger, guava, jackfruit, mango, peach, pear turmeric etc.
- ✚ **Adults:** Moths of medium size exhibit a brownish-yellow hue adorned with multiple black dots across their wings. Their entire life cycle spans between 25 to 33 days.
- ✚ **Eggs:** typically pinkish and oval in shape, are deposited on fruits either individually or in clusters of 2 or 3. They find their place between the warts or just beneath the style on the ovary, also occasionally on developing capsules or unopened male flowers. The incubation period for these eggs lasts around 6 to 7 days.
- ✚ **Larva:** The mature caterpillars measure 20-30 mm in length, displaying a dark pinkish-brown coloration with numerous spiny warts covering their bodies. Fine hairs emerge from these warts, present across the body, head and the brown prothoracic shield. The

larval phase extends for approximately 12 to 16 days, contingent on prevailing temperature conditions.

✚ **Pupa:** Pupation occurs within damaged stems, peduncles or capsules, encapsulated within a delicate silken cocoon. The pupa transforms into an adult moth within 7 to 10 days post-pupation.

✚ **Nature of damage:** Larva bores into the young fruits and feed on pulp, seeds and soft tissues, which dry up and fall prematurely, bore holes plugged with excreta. damaged capsule/fruit are webbed together, peduncles and capsules show galleries made of silk and frass.

Management:

- Destroy all the infested fruits.
- Use light trap 1/ha to monitor the activity of adults.
- Spray malathion 50 EC at 3 L in 1500 – 2000 L water per ha, two rounds, one at flower formation and next at fruit set.

Anar butterfly/pomegranate butterfly/ Common guava blue butterfly: *Virachola isocrates* = *Deudorix isocrates* (Fabricius)

Family: Lycaenidae

Order: Lepidoptera



✚ **Host:** Aonla, apple, ber, citrus, guava, litchi, loquat, peach, mulberry, pear, sapota, tamarind.

✚ **Adult:** The butterfly is medium-sized and shines with metallic colors, flying swiftly and gracefully.

✚ **Egg:** The female butterfly lays eggs alone on the calyx of flowers or small fruits.

- ✚ **Larva:** The larva, or caterpillar, is around 10 mm long, pinkish in color, with a light brown head.
- ✚ **Pupa:** The pupa, where the caterpillar transforms into a butterfly, appears brown and can be found inside the fruit or on the ground's surface.
- ✚ **Nature of damage:** Larvae bore inside the developing fruits and feed on pulp and seeds just before the rind exhibiting round bore holes on fruit. Infested fruits are also attacked by bacteria and fungi, which ultimately fall off and give offensive smell and excreta of the caterpillars coming out of entry holes. The excreta are found stuck around the holes. It is a major pest of pomegranate and damages the guava fruits also. After as many as eight caterpillars may be found in a single fruit.

Management:

- Collect and destroy damaged fruits
- Clean cultivation as weed plants serve as alternate hosts
- Endemic areas - grow less susceptible varieties
- Adopt ETL (5 eggs/plant)
- Cover the fruit with polythene bags when the fruits are up to 5 cm
- Use light trap @ 1/ ha to monitor the activity of adults
- Release *Trichogramma chilonis* at one lakh/acre.
- Flowering stage - spray NSKE 5% or neem formulations 2 ml/l
- Insecticides: malathion 50 EC 0.1% two rounds, one at flower formation and next at fruit set.

Bark eating caterpillars: *Indarbela tetraonis* (Moore); *Indarbela quadrinotata* (Walker)

Family: Pyralidae

Order: Lepidoptera



- ✚ **Host Plants:** Mango, aonla, ber, citrus, drumstick, jamun, litchi, loquat, mulberry, pomegranate, rose and a number of forest and ornamental trees.
- ✚ **Adult:** The moth appears robust, having a pale brown hue marked with brown spots and streaks on its forewings. This particular type, known as *Procantarinia (Procytiphora) mangifera*, has only one generation, typically seen between May and July.
- ✚ **Egg:** During May and June, a single female moth lays around 2000 eggs, arranging them in clusters of 15 to 20 within cuts and crevices in the tree bark. These eggs hatch within a span of 8 to 10 days.
- ✚ **Larva:** The caterpillar stage measures about 50-60 mm in length, displaying a dark brown head and a somewhat dirty brown body. These caterpillars undergo a developmental period from July to February, spanning around 9 to 10 months.
- ✚ **Pupa:** Pupation lasts between 15 to 25 days. Moths continue to emerge until June, but their adult lifespan is a mere three days.
- ✚ **Nature of damage:** Young trees succumb to the attack. Caterpillars bore into the trunk or junction of branches make zig zag galleries Presence of gallery made out of silk and frass is the key symptom. They remain hidden in the tunnel during day time, come out at night and feed on the bark. Under severe infestation, flow of sap is hindered, plant growth arrested and fruit formation is drastically reduced. The larva also makes holes and as many as 16 holes may be seen on a tree, one caterpillar or pupa occupying each hole. A thick ribbon like silken webs is seen running on the bark of the main stem especially near the forks.

Management:

- Kill the caterpillars by inserting an iron spike into the tunnels.
- Remove and burn infested branches and keep orchard clean and avoid overcrowding
- Injecting ethylene glycol and kerosene oil in the ratio of 1:3 into the tunnel by means of a syringe and then seal the opening of the tunnel with mud.
- In September-October paint the bark around hole with solution of 10 ml monocrotophos in 10 litre waters.
- From February-March inject 5 ml emulsion of 10% kerosene emulsion (1litre Kerosene +100 gm soap + 9 litre water) into borer hole.

- Dip a small piece of cotton in any of the fumigants, like chloroform or petrol or kerosene, introduce into the tunnel and seal the opening with clay or mud.
- Treated holes should be plastered with mud. Treat all the alternate host plants in the vicinity.

Guava scale: *Chloropulvinaria psidii* (Maskell)

Family: Coccidae

Order: Hemiptera



- ✚ **Host plants:** Apart from guava, the scale feeds on coffee, tea, citrus, mango, gular, jack fruit, jamun, litchi, loquat, sapota and many other shrubs and trees.
- ✚ **Nature of damage:** The scale insects are found in large numbers sticking to leaves on ventral side, tender twigs and shoots. They suck sap from ventral side of leaves, petioles and tender shoots and occasionally from fruits. They cause leaf distortion and growth disturbance. The female feeds voraciously and also exude copious quantity of honeydew. The honeydew excreted by the scales encourages the development of sooty mould on foliage which interferes with photosynthetic activity of plants and spoils the market value of fruits. Severe infestation can kill the branches.

Management

- Pruning and destruction of infested parts during off-season is very effective in reducing the scale infestation.
- Proper care should be taken after pruning; the pruned plant parts should be sprayed with systemic insecticide.
- Release of predator *Cryptolaemus montrouzieri* in January/February (10 grubs/tree) has been found effective against this pest.

- Dusting of 1.5% chlorpyrifos (50 g/tree) around the base of the plant check the ascent of ants interfering in the activity of predators.

Tea mosquito bug: *Helopeltis antonii*

Family: Miridae

Order: Hemiptera



- ✚ **Host Plants:** Cocoa, guava, drumstick, cotton, Singapore cherry, black pepper, allspice, henna, mahogany, eucalyptus, apple, avocado, camphor, cinchona, cinnamon, grapes, red gram, tamarind, tea.
- ✚ **Adult:** Bugs are small, active and having elongated body (7–9 mm) with long legs and antennae. Adult is reddish-brown with a black head, red thorax, black and white abdomen.
- ✚ **Nymph:** Young nymphs are hairy amber coloured and identical to ants. It completes its life cycle within 26–35 days. The newly hatched nymphs resemble spider in general appearance with elongated appendages. They undergo five moults and complete one generation in 2 weeks in June and 8 weeks or more in cold weather.
- ✚ **Eggs:** The adult lays elongated and sausage-shaped eggs that possess two filamentous long processes, which remain cutting out from the tender plant tissue in which the eggs are bedded by the female. Incubation period varies between 5 and 27 days.
- ✚ **Nature of damage:** Nymphs and adults make punctures on petiole, tender shoots and fruits. Brownish – black necrotic patches develop on foliage. Elongate streaks and patches develop on shoots. Corky scab formation on fruits. The tea mosquito bug, when affecting guava plants, can cause considerable damage. These bugs feed on the tender parts of the plant, including the buds, shoots and flowers. This damage often leads to malformation or deformation of the affected parts, which can impact the growth and

development of the plant. In severe infestations, there could be a reduction in fruit yield or quality due to the damage caused to the reproductive structures of the plant. Overall, the presence of tea mosquito bugs can significantly affect the health and productivity of guava plants.

Management

- Collect and destroy the damaged plant parts
- Insecticides: malathion 50 EC 0.2% at bimonthly interval at the time of flowering

