Major Insect Pests of Mango: Damage and Management

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ABSTRACT

Mango production is threatened by several insect pests that impact fruit quality and yield. Key pests such as leafhoppers, mealybugs, stem borers, Stone weevil, thrips, and fruit flies infest different plant parts, leading to reduced productivity and economic losses. Identifying these pests and understanding their damage symptoms is essential for effective control. Integrated Pest Management (IPM), including cultural methods, biological control and targeted chemical applications, helps in insect pest suppression. Adoption of region-specific pest control measures and farmer awareness programs can further enhance management efficiency and minimize crop losses in mango orchards.

INTRODUCTION

The mango (*Mangifera indica* L.), often referred as the "King of Fruits," is highly valued for its rich nutrient profile, distinctive flavour, and pleasant aroma. It is originated from Southeast Asian and Indo-Burma regions, particularly in the Himalayas foothills (Mukherjee, 1951). As the national fruit of India, mango plays a crucial role in the agricultural economy especially through processing and export. India is the leading global producer of mangoes, contributing over 40 per cent to the world's total mango production, with a recorded yield of 20,772 thousand metric tons (MT) in the year 2021-2022. Commercial cultivation is predominantly carried out in states such as Maharashtra, Goa, Gujarat, and Karnataka. In the Konkan region, mango cultivation spans

approximately 100,000 hectares, yielding an estimated 50,000 MT, with an average productivity of 3.12 t/ha (Ganeshamurthy *et al*.,2019). There has been a steady rise in the demand for mangoes in both the domestic mar ket and the foreign market. However, unlike many other fruit crops, mango is highly susceptible to infestation by over 400 insect pest species worldwide (Tandon and Verghese, 1985), which can significantly impact both yield and fruit quality. Accurate identification of these pests and their associated damage symptoms is critical for implementing effective management strategies. This article gives a brief overview of biology, damage symptoms and control measures for major insect pests affecting mango. The information presented aims to enhance the knowledge of farmers and researchers, thereby facilitating the sustainable pest management practices.

Important pests of mango and their Management

1. **Leafhoppers: *Idioscopus clypealis* (Lethierry); *I. niveosparsus*; *I. nitidulus* and *Amritodus atkinsoni* (Lethierry) (Hemiptera: Cicadellidae)**

Hoppers are the most devastating as well as monophagous pests across all mango varieties, with no known alternative host.

Biology: Adult hoppers possess wedge shaped body and female deposit 100-200 eggs individually on soft leaves, flower buds and blooming shoots. Egg and nymphal period are from 4 to 7 and 8 to 13 days, respectively. Its entire life cycle completes in 15 to 19 days.

Symptoms and Damage: Nymphs and adults and suck sap from tender portion of stems, panicles and inflorescence. Fruit establishment failed as a result of the withering and dropping of flowering buds and flowers. A sticky honey dew secretion emitted by hoppers encourage development of sooty mold which give blackish appearance to tender foliage and ultimately reduces photosynthetic efficiency and fruit yield (Singh and Baradevanal, 2021).

Hopper

Infested on leaf and inflorescence

Management:

1. Avoid high density planting and prune overcrowded brunches after monsoon.

2. Use of bioagents- Predators like *Chrysoperla ciperda*, *Mallada boninensis* and egg parasitoids- *Polynema* spp. and *Tetrastichus* spp.

3. Entomopathogenic fungi namely- *Verticillium lecanii*, *Metarhizium anisopliae* @ $1x10^8$ cfu/ml, *Beauveria bassiana* @ 10^8 cfu/ml on tree trunk twice during the flowering period and once during the off-season helps to regulate hopper population.

4. Spray need based CIB&RC approved chemical pesticides – Buprofezin 25% SC@1-2ml/liter of water, Oxydemeton-methyl 25% EC @ 1500-2000, Lambda cyhalothrin 5% EC@ 0.5-1.0 ml/l, Imidacloprid 17.80% SL @ 0.4ml/lit, Deltamethrin 2.8% EC@0.33 to 0.5 ml/lit, Thiamethoxam 25% WG @ 1gm/lit.

2. **Mealybugs: *Drosicha mangiferae* (Green) (Hemiptera: Pseudococcidae)**

This pest poses a significant threat, causing extensive damage to mango trees. Adult females have no wings, while males are crimson-red and covered in a powdery white coating.

Biology: Individual female can lay up to 450-550 eggs. First, second and third female instar lasts for 45-71, 18-38 and 15-26 days, respectively. The male took 67-119 days to complete lifecycle and 77-135 days by females.


Infested shoot **Infested fruit**

Symptoms and Damage: The cell sap from developing shoots and panicles consumed by both nymphs and adults which resulted into drying and withering of shoots and blossom. They also release honeydew, which encourages the growth of sooty mold, thereby lowers the fruit quality and premature fruit drop also occurs in severe infestation.

Management:

1. Flooding an orchard with water in October can kill mealybug eggs.
2. Keeping 25 cm wide polythene sheets (400 gauge) or grease bands around the stem effectively, prevents the rise of trees with nymphs.
3. Predators such as ladybird beetle, *Cryptolaemus montrouzieri* @ ten beetles/plant found effective.
4. Apply label claim insecticides for control of mealybugs *viz.*, Dimethoate 30 % EC and Spirotetramat 11.01 % + Imidacloprid 11.01 % w/w SC.

3. **Mango stem borer: *Batocera rufomaculata* (Coleoptera: Cerambycidae)**

The most damaging and common noticeable borer in mango orchards is *B. rufomaculata*. widely encountered borer in mango orchards.

Biology: Adult female deposits single egg beneath the loose bark or stem and in cracks and crevices on the mango tree trunk. Egg, grubs and pupal duration lasts for 1-2 weeks, 6 months and 19-36 weeks, respectively. The average lifespan for adults is six months.

Symptoms and Damage: The destructive stage is the grubs which first form tunnels beneath the bark of branches to feed, then burrow into the main stem. The presence of stemborer is indicated by frass and sap emerging from the entry spot. The borer infestation results into yellowing, drying and dropping of leaves, subsequently causes the drying out of the terminal shoots and twigs, which ultimately ends in the death of tree.


Infested stem **Grub infested trunk**

Management:

1. Eliminate alternative host trees and eradicate infested trees from mango orchards.
2. Use an iron or wire hook to mechanically extract the grubs from the infested trunk holes.

3. Apply coal tar + kerosene after removing loose bark @ 1:2 ratio to the base of the trunk, which is three feet high, thereby prevent oviposition.

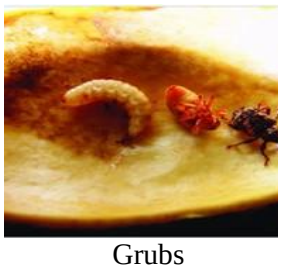
4. To protect the trunk from egg-laying by adults, the Indian Institute of Horticultural Research (IIHR), Bengaluru, developed a formulation called 'sealer cum healer.' This formulation is applied to the stem along with an insecticide (dichlorvos) and a fungicide (copper oxychloride) (Bajracharya, 2012).

4. Mango Seed / Stone Weevil*: Sternochaetus mangiferae* (Fabricius) (Coleoptera: Curculionidae)

It is one of the monophagous of mango fruit. This insect has led to a ban on the shipment of mango fruits from India to the United States and other nations, thus it is of quarantine importance.

Biology: The female scoops out the surface of developing fruits and lays eggs individually. Grub stage lasts for 22-70 and pupal stage lasts for 7 days. Pupation occurs within the mango stone. Adults live for roughly 60 days.

Symptoms and Damage: Freshly hatched grubs initially feed on pulp leads to discolouration of pulp and later destroy cotyledons. T- shaped marking observed on marble size fruits, resulted into dropping of fruits. This pest also cause loss to processing industry.


Grubs


Infected fruit

Management:

1. Eliminate all leftover infested seeds from the orchard and processing facilities.

2. Fruits are treated using vapour heat treatment *i.e.*, 46°C for 280 minutes to kill the grubs which were found inside stone.

3. Application of 0.1 percent dimethoate twice at intervals of 15 days once the fruits reach marble size.

5. Thrips [*Scirtothrips dorsalis* (Hood), *Rhipiphorothris cruentatus* (Hood) and *Coliothrips indicus* (Bagnall)] (Thysanoptera: Thripidae)

Two thrips species namely, *R. cruentatus* and *C. indicus* feed on foliage and other *S. dorsalis* mainly on buds, inflorescence and young fruits. In the Konkan region of Maharashtra, *S. dorsalis* is considered as dominant pest of mango.

Biology: Individual female can deposit upto 200 delicate white eggs within leaf tissues. There are 2 instars in nymphal stage with one pre pupal stage. The durations of the incubation, larval, pre-pupal and pupal phases are 6-8 days, 6-7 days, and 2-4 days, respectively. Female and male lives for 10-30 and 7-20 days, respectively. *S. dorsalis* takes 14-20 days to complete their life cycle.

Symptoms and Damage: Adults and nymphs both initially scrap the plant epidermal tissues and later consume leaking cell sap. Species that consume mesophyll tissues close to the tips of leaves results into silvery appearance, curl upward at the margins of tender foliage and have tiny faecal matter spots. Infested fruit shows bronze rough areas.

Affected leaves

Affected fruits

Management:

1. Setting up blue and yellow sticky traps aids in both monitoring and management of thrips.

2. 5% NSKE or other neem-based formulations, as well as entomopathogens such as *Verticillium lecanii* and *Metarhizium anisopliae*, can be sprayed to effectively manage thrips.

3. Chemicals such as spinosad (0.25 mL/L), imidacloprid (0.3 mL/L), thiamethoxam (0.5 g/L) and dimethoate (2 ml/L) Beta-Cyfluthrin 8.49% + Imidacloprid 19.81% OD (1 mL/L), can be used to control thrips infestation.

6. Fruit fly: *Bactrocera dorsalis* (Hendel) (Diptera: Tephritidae)

This pest commonly called as Oriental fruitfly, which is serious pest of qurantine importance and also it has displaced Mediterranean fruitfly in many countries.

Biology: Individual female inserts lay upto 3000 eggs in tiny clusters of 10 to 50 inside the mesocarp of mature fruits by puncturing the outer wall with its pointed ovipositor. The maggot stage lasts 11–15 days. Pupal phase lasts around 10 days.

Symptoms and Damage: The larva consumes fruit pulp after hatching, which on the outside seems normal but gradually falls off. Fruits with infestations show puncture wounds and oozing, resulted into dropping and rotting. Such fruits are unfit for human consumption.

Adult infested fruit

Management:

1. Mature fruits should be harvested early to prevent fruitflies.

2. Fruits are bagged to prevent fruit flies from depositing eggs.

3. Keep fruitfly trap in orchard using methyl eugenol @ 4/acre to monitor its population.

4. Use bait sprays two weeks before to fruit ripening that contain 10 g of protein hydrolysate, molasses, or jaggery / litre of water, along with Dimethoate 30 EC 1 ml/l or Malathion 50 EC 2 ml/l.

5. Vapour heat treatment: 48°C for 8 hours is found effective for control of fruit fly in post-harvest.

CONCLUSION:

Effective management of insect pests is crucial for minimizing yield losses and maintaining mango fruit quality. Among the numerous pests affecting mango, certain species contribute significantly to economic damage. Accurate identification and a thorough understanding of their biology and damage symptoms are essential for implementing targeted control tactics. The use of Integrated Pest Management (IPM) techniques, such as cultural practices, biological control and the judicious use of pesticides, is crucial for suppressing pests. There is necessity of more study on the ecology, behaviour and management of mango pests in order to eventually lower crop losses and enhance the sustainability of mango production systems using non chemical management approaches.

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