



## Integrated Pest Management (IPM) for Guava Fruit Fly

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### Abstract

Guava, *Psidium guajava* L., is the prime fruit of India and is cultivated in many tropical and subtropical regions. In which there are two important fruit flies, *Bactrocera dorsalis* and *Bactrocera diversus*, may destroy up to 100% of the fruits and affect both the quantity and quality of the fruits. Because of their polyphagous, multivoltine, highly mobile, and their immature stages are protected inside the fruits, the fruit fly is extremely difficult to manage. To manage the fruit flies, the application of insecticides will disrupt the agroecosystem. As a result, the potential of an Integrated Pest Management (IPM) approach in controlling these flies through male annihilation and bait application techniques is eco-friendly and novel.

**Keywords:** Fruit flies, Guava, IPM, Strategies

### Introduction

Guava is commonly called “a poor man’s apple” in the tropics and known for its delicious, pleasant aroma and outstanding nutritional values throughout the world. Due to various constraints, guava production is severely affected (Singh, 2020). Among all the known factors, insect pests are of prime importance. Fruit flies are a highly destructive pest of guava fruit production, causing yield losses and product quality degradation. The yield losses can be minimized by following proper management practices. The binomial effects, damage symptoms, and management measures of the pest are described below.

### Bionomics

The females lay eggs singly or in groups of 4-10 on flowers and fruits. The shiny white eggs are sub-cylindrical in shape and slightly curved. The female fly makes a cavity with the help of its sharp ovipositor (pseudovipositor) and thrusts the eggs inside the pulp. After the release of eggs, the female releases a gummy secretion that cements the tissue surrounding the puncture, making it water-proof. The egg period lasts 2-9 days. The apodous and acephalous maggots are yellowish to cream-colored. Upon completion of the third instar, the larval skin hardens to form a puparium with an inactive fourth instar larva inside. Summer larval period is 3-5 days; winter larval period is 21 days (Mondal *et al.*, 2015). Eventually, the maggot within the puparium sheds

the skin, transforming into a coarctate pupa, which usually occurs in the soil at about 1.5-15 cm depth. The puparium is dirty white in colour. The pupal period is 5-9 days in summer and 30 days in winter. The adult is a smoky brown colour with a greenish-black thorax with yellow markings (Figure 1).

### Damage Symptoms

The maggots bore into fruits and feed on the soft pulp content of the fruit. The infested fruits show small cavities with dark greenish punctures (Figure 2), and when cut, the wriggling maggots are seen inside. The infestation causes rotting, a bad smell, and the dropping of fruits.

### IPM Tactics

- Field sanitation and clean cultivation reduces fruit fly infestation.
- Collect and destroy all the fallen, infested fruits.
- Plough the field after harvest to expose the puparia to the sun and predators.
- *Opius incisi* (Braconid) is a naturally occurring larval parasitoid against fruit fly.
- **Trapping:** Oviposition of fruit flies can be prevented by trapping them using chemically attractive substances like citronella oil, eucalyptus oil, vinegar, dextrose, acetic acid and lactic acid. The traps have to be placed @ 25 ha<sup>-1</sup> (Sharma *et al.*, 2022).

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Figure 1: *Bactrocera dorsalis*



Figure 2: Fruit fly infested fruit with small cavities (Punctures)

- **Male annihilation:** Citronella oil contains methyl eugenol (3,4-dimethoxyallyl benzene), which is attractive to the fruit flies, especially the males, to congregate and feed. Thus attracting and killing the male fruits flies with methyl eugenol is known as the *male annihilation technique* (Hussain et al., 2022).

- **Protein baits:** Enzymatic protein hydrolysates of corn, yeast or soybean contain elements essential to the normal development of fruit flies, especially females. Soybean protein hydrolysate is the milk extracted from the paste of

soybean. It is rich in protein and has comparatively lower fat content than the ordinary milk. The flies are strongly attracted to these proteinaceous materials owing chiefly to products of microbial action, *i.e.*, alcohol, aldehydes, esters, fatty acids and pyridinine. These baits are used to lure the flies to traps or sprayed on plants in combination with malathion 50 EC 0.1% (Khan et al., 2017).

- **Poison baits:** This bait is prepared by adding 5 ml of malathion 50 EC to 10 ml solution of fermented palm juice or beer (50 ml) + saturated sugar solution (50 ml). Keep the bait in bait stations (earthen lids or traps) at various places.

- Pheromone traps baited with lure will attract the fruit flies.

- Spray neem oil 2% to suppress oviposition by the adult flies.

### Conclusion

The above mentioned IPM measures can be productively imposed wherever applicable for the management of fruit fly in guava. The farmers should be made aware about this damaging pest and different management practices like cultural, mechanical, biological and chemical methods. Regular monitoring and scouting should be done for mass trapping and control of the pest effectively.

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