

## Eco-Friendly Management of Guava Fruit Fly

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### SUMMARY

Guava is an important fruit crop of India and is commonly called a poor man's apple. It bears twice a year; the rainy season crop is normally discouraged, since it bears poor quality of fruits having high fruit fly infestation. It is reported to cause 95-100 per cent damage to guava fruits during rainy season. In winter season adult fruit flies are found in inactive state, outbreak of fruit fly occurs from month of July-August. Most of the insecticidal treatments are ineffective to mango fruit fly, since eggs and maggots remain protected inside the host tissue and only adults are exposed. Moreover, the uses of chemical insecticides cause residue problems. Hence, eco-friendly managements are required to focus among different integrated pest management strategies, which can be adopted by the guava growers, to enhance the yield and quality of marketable fruits, minimizing the use of harmful chemical insecticides. These eco-friendly management modules and other safe options need to be popularized amongst the guava growers for producing residue-free fruits that would fetch higher market prize.

### INTRODUCTION

Guava, *psidium guajavaL* is an important commercial fruit crop of India. It is successfully grown under both tropical and subtropical climate. It is commonly called a poor man's apple in the tropics and known for its delicious, pleasant aroma and outstanding nutritional value throughout the world. It is highly rich in minerals like phosphorus and Calcium. In India, it occupies an area of 276 thousand hectares with a production of 4253 thousand metric tonnes (Anonymous, 2020). Different biotic and abiotic factors are responsible for low yield of guava fruits. Out of biotic ones, the insect-pests have been reported to attack guava at different stages, particularly during rainy season crop. It is infested by around 80 insect pest species like fruit flies, bark eating caterpillar, capsule borer, mealy bug, hairy caterpillar and many sucking pests, out of which fruit fly is the major one, causing a heavy loss in the yield. (Verghese and Sundha Devi, 1998, Singh *etal*, 2003, Atwal and Dhaliwal, 2009). Fruit Flies belong to the family Tephritidae which is one of the largest, most diversified families of order Diptera. In India, 392 species of fruit flies have been recorded (Kapoor, 1993). From economic point of view fruit flies, *Bactrocera dorsalis* (Hendel) and *Bactrocera Zonata* (Saunders) are highly destructive pests of guava causing up to 95-100 percent fruit infestation depending on population, locality, variety and season (Sharma *etal*, 2011, Bajaj and Singh 2020). In general, fruit flies are very difficult to manage due to the fact that they are polyphage, multivoltine, adults have high mobility, fecundity and all the development stages are unexposed (Vargas *etal*, 2010). For management of fruit flies, the basic pre-requisite is to have a good knowledge on bionomics, characteristics and feeding behaviours of the pest which has been discussed below :

### Host plants:

Fruit fly is a polyphagous pest attacks over 300 cultivated and wild fruits including guava, mango, ber, peach, banana, papaya, citrus, annona, avocado, coffee, pepper, tomato, and passion fruits. This pest is usually seen in breeding in all the fleshy fruits.

### Distribution :

India, Japan, Taiwan, Indonesia, Sri Lanka, Island and Hawaii, Pakistan, and Micronesia also distributed every cultivated part of guava crop in the world.

### Identification :

Maggot is legless, cylindrical and yellow in colour and measures 5-8 mm in length. The adult is stout and possess brown body, yellow legs, dark red thorax and hyaline transparent wings. Thorax is without yellow middle stripe.

**Bionomics :**

The female fly lays eggs in small cluster to 10-30, just underneath the skin of the fruit, 1-4 mm deep in the rind. The female can lay more than 2000 eggs in her lifetime. Eggs hatch within 1-4 days. Larval Stage lasts for 4-5 days. Maggots pupate in soil and pupal period is about 7-13 days. The total life cycle is completed 15 to 75 days, depending upon the season. Being facultative breeding and having a short life cycle. Fruit flies are multivoltine in nature having more than one generations per year *B. dorsalis* can complete 3-5 generations per year whereas, It complete 5-10 generations in a year in tropical areas and less than 4 generations in subtropical areas. The pest is more active during May to August, especially on guava and peach. The insect overwinters in adult stage.

**Damage symptoms :**

The adult female punctures the rind of near ripe fruit at colour break stage with its needle like ovipositor. The infested fruits show depressions with dark greenish punctures. The maggots after hatching bore and feed on soft pulp. The infested fruits rot and fall down, which are unfit for human consumption. Unripe fruits are rarely attacked. Fruit flies are serious during rainy season.

**Eco-friendly management practices :**

- Avoid taking rainy season crop only in orchards with history of severe fruit fly infestation.
- Collect and destroy fallen and infested fruit's every alternate day during fruiting period.
- Shallow ploughing with cultivators immediately after harvest is effective in exposing and killing the pupating larvae and pupae which are mostly present at 4-6 cm depth.
- Summer ploughing to expose pupa.
- Grow resistant varieties of guava such as Lucknow-49, A-C.-10 etc.
- Regular removal and burying of fallen fruits at least 10 cm depth is advocated.
- Bagging/Wrapping/Netting the guava fruits with news paper, polythene or paper bags before it reaches to maturity may escape infestation.
- Use methyl eugenol lure trap (25 traps / hectare) at a height of 150-180 cm to monitor and kill adults of fruit flies (prepare methyl eugenol and malathion 50 EC @ 2ml/L mixture at 1:1 ratio and take 10ml mixture /trap).
- UV light traps also effectively used to kill fruit flies. (6 traps/ hectare.)
- Methyl eugenol lure traps should be also used.
- Three sprays of NSKE 5% proved to be most effective against the fruit flies, and Spray of NSKE 5% also act as oviposition deterrent for fruit fly on guava fruits.
- Protein bait or food lure can also be applied as mass trapping tool, in combinations with methyl eugenol. Because protein bait attracts females and males with methyl eugenol attracts males only.
- Physical methods of fruit fly management by the post-harvest quarantine treatments as irradiation with gamma rays from a cobalt-60 or Caesium-137 Source to kill the developing fruit flies stage.
- Behavioural methods of fruit fly management includes Male Annihilation Technique (MAT) by using attractant methyl eugenol and cue-lure for *Bactrocera speciosa* spraying the soil under trees with *Metarhizium anisopliae* or other entomopathogenic fungi may be helpful in reducing fruit fly larvae / pupae in the soil.
- Two rounds of bait spray at fortnightly interval before ripening of fruits combining molasses / Jaggery @ 10 g/L and one of the insecticides viz, Fenthion 100 EC @ 1 ml/L, Malathion 50 EC @ 2 ml /L, Dimethoate 30 EC @ 2 ml/L.

**Chemical methods:** The use of a single control measure such as insecticides cannot give total reduction of fruit flies infestation, since the damage done by the larvae in fruit is internal, and therefore difficult to control. Synthetic chemicals cause enormous problems because fruits are eaten raw and toxic residue remains in the soil for longer duration in guava orchard that affects the microbial flora and fauna. In case of severe infestation of fruit fly, spraying the following insecticides at fortnightly intervals: on ripening fruits commencing from July onwards till the rainy season over.

Malathion 50 EC	-	2 ml/L
Fenthion 100 EC	-	1 ml/L
Dimethoate 30 EC	-	2 ml/L
Sumicidine 20 EC	-	2 ml/L

**CONCLUSION**

Fruit flies *Bactrocera dorsalis* is the most important destructive pest problem associated with guava, which causes 98-100 percent damage to fruits in almost all the states of the nation. Therefore, different management strategies have been suggested which can be adopted by the growers, to enhance the quality fruit yield and also minimizing the use of synthetic insecticides. These eco-friendly management measures and other safe options are urgent need to be popularized amongst the growers for producing residue free fruits and also safe for human consumption.

**REFERENCES**

- Anonymous (2020) Area and production of horticultural crops, 2018-19. Pocket Books of Agricultural Statistics. Ministry of Agriculture and farmers welfare, *Government of India*, P.36.
- Atwal, A.S. and Dhaliwal, G. S. (2009) Agricultural pest of South Asia and their Management. Kalyani publishers P. 38.
- Bajaj, K. and Singh, S. (2020) preference of *Bactrocera spp.* to methyl eugenol based different coloured traps. *Indian Journal of Agricultural Sciences*90(1):233-235.
- Kapoor, V. C. (1993). Indian Fruit Flies, Oxford and IBH publishing Company, New Delhi, pp. 80-91.
- Sharma, D.R., Singh, S., and Aulakh, P.S. (2011) Management of fruit flies in fruit crops. *Indian Journal of Horticulture* 70(4): 512-518
- Singh, G., Misra, A. K., Masarrat, H. Tandon, D. K. and Pathak R.K. (2003) The Guava. Central *Institute of subtropical Horticulture, Lucknow*, P. 38.
- Vargas, R.I, pinero, J.C., Mau, R. F. L., Jang E.B., Klungness, I. M., Melniss, D.O., Harris, E. B; Mequate, G. T.; Bautista, R.C., and Wong, L. (2010). Area Wide Suppression of the Mediterranean fruit fly, *Ceratitidis Capitata* and the Oriental fruit fly, *Bactrocera dorsalis*, in Kamuela, Hawaii. *Jannal of Insect Science*, 10:135.
- Verghese, A. and Sudha Devi, K. (1998). Relations between trap catches of *Bactrocera dorsalis* (Hendel) and abiotic factors. In: Reddy Krishna P. P., Kumar N. K. and Verghese, A (Eds), Advancement in IPM for Horticultural Crops. proceeding of First National Symposium on pest Management in Horticultural Crops Bangalore. India, pp 15-18