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Bionomics of Fruit Fly (*Bactrocera Spp.*) and Its Implications In Pest Management

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Fruit flies belonging to the genus *Bactrocera* are among the most destructive pests of fruits and vegetables in tropical and subtropical regions of the world. They cause severe yield losses by ovipositing inside fruits, which results in tissue damage, premature fruit drop, rotting, and reduced market value. Their presence also restricts international trade because of strict quarantine regulations.

The study of their bionomics—including host preference, life cycle, reproductive potential, and seasonal abundance—is essential for developing sustainable management practices. *Bactrocera spp.* are highly fecund, adaptable to various climatic conditions, and capable of multiple generations per year. This article reviews the major aspects of fruit fly bionomics and highlights eco-friendly management strategies under the framework of Integrated Pest Management (IPM).

Fruits and vegetables are vital components of the human diet, providing essential nutrients and contributing significantly to farmers' income.

However, production and marketing are severely hampered by insect pests, among which fruit flies (*Bactrocera spp.*) are of foremost importance. In India, yield losses due to fruit flies range between 30–80%, depending on the host and climatic conditions. Besides



reducing productivity, fruit flies also downgrade the quality of produce, leading to rejection in domestic and export markets.

The genus *Bactrocera* (family: Tephritidae) comprises more than 400 species, of which several are economically important. Common species found in India include the melon fruit fly (*Bactrocera cucurbitae*), oriental fruit fly (*Bactrocera dorsalis*), and guava fruit fly (*Bactrocera correcta*). Their polyphagous nature, high reproductive rate, and

adaptability make them one of the toughest challenges in horticultural pest management

Bionomics of *Bactrocera Spp.*

Host Range

Fruit flies are highly polyphagous pests. They attack more than 250 plant species, including mango, guava, papaya, citrus, banana, cucurbits, and other commercial fruits. Host preference varies with species and availability, but cucurbits and tropical fruits are the most affected.

Life Cycle

The development of *Bactrocera* spp. involves four distinct stages—egg, larva, pupa, and adult:

1. Egg Stage

- Females puncture the fruit skin using their ovipositor and deposit eggs beneath the peel.
- Each female can lay 600–800 eggs in her lifetime.
- Eggs are small, white, and hatch within 1–2 days under favorable conditions.

2. Larval Stage (Maggot)

- The hatched maggots feed on fruit pulp, creating galleries inside.
- Larval duration lasts for 5–7 days, depending on temperature.
- Infested fruits often show premature drop and rotting.

3. Pupal Stage

- Mature larvae leave the fruit and pupate in the soil at a depth of 1–5 cm.
- Pupal period is around 7–10 days, though it varies with climate.

4. Adult Stage

- Adults are strong fliers, capable of dispersing up to 20 km.
- They live for 1–3 months, with multiple mating and oviposition cycles.
- Adults are attracted to methyl eugenol, a chemical widely used in traps.

Seasonal Incidence

Fruit fly population peaks during warm and humid conditions, usually coinciding with the fruiting season (April–September in India). Higher relative humidity favors oviposition and larval survival. In northern India, two to three peaks are observed annually, while in southern regions populations may persist year-round.

Reproductive Potential

- Females lay eggs in clusters inside fruit tissue.
- Fecundity is high, with a single female capable of laying hundreds of eggs.
- This high reproductive rate, coupled with overlapping generations, makes control difficult.

Dispersal And Adaptability

- Adults are excellent fliers and spread rapidly to new orchards.
- Their adaptability to different agro-climatic zones enables them to invade new regions, often becoming quarantine pests.

Economic Importance

- 1. Yield Loss:** Direct feeding damage by maggots causes rotting and fruit drop.
- 2. Quality Deterioration:** Infested fruits lose market value and consumer acceptability.
- 3. Trade Restrictions:** Infestation leads to rejection of export consignments due to quarantine rules.

4. Increased Cost of Cultivation: Farmers spend more on pesticides and

Management Strategies

1. Cultural Methods

- Field Sanitation: Collect and destroy infested and fallen fruits.
- Crop Rotation: Avoid continuous cultivation of host crops.
- Early Harvesting: Harvest fruits before peak oviposition.
- Deep Burial: Infested fruits should be buried at least 50 cm deep.

2. Mechanical and Physical Methods

- Fruit Bagging: Covering young fruits with paper or cloth bags prevents oviposition.
- Trapping: Use methyl eugenol lure traps or pheromone traps to attract and kill males.

3. Biological Control

- Parasitoids: Species such as *Opius compensates* and *Diachasmimorpha longicaudata* attack fruit fly larvae.
- Predators: Ants, spiders, and birds feed on pupae and adults.
- Entomopathogens: Fungal pathogens like *Beauveria bassiana* show promise.

References

1. Allwood, A.J., Chinajariyawong, A., Kritsaneepaiboon, S., et al. (1999). Host plant records for fruit flies in South East Asia. *Raffles Bulletin of Zoology*, 47: 1–92.
2. Dhillon, M.K., Singh, R., Naresh, J.S., & Sharma, H.C. (2005). The melon fruit fly, *Bactrocera cucurbitae*: A review of its biology and management. *Journal of Insect Science*, 5(40): 1–16.
3. Kapoor, V.C. (2002). *Fruit Flies and Their Management in India*. ICAR, New Delhi.

4. Chemical Control

- Bait Sprays: Protein hydrolysate mixed with insecticides attracts adults and reduces population.
- Spot Application: Targeted spraying instead of blanket coverage reduces pesticide load.
- Fumigation: For export consignments, fumigation ensures quarantine compliance.

5. Integrated Pest Management (IPM)

- The most sustainable approach is to integrate multiple methods:
- Field sanitation + bait traps + biological control + need-based chemicals.
- Farmer awareness and community participation are crucial for area-wide management.

Conclusion

Fruit flies (*Bactrocera* spp.) are a serious threat to fruit and vegetable production in India and across the tropics. Their high reproductive capacity, wide host range, and adaptability make them difficult to control. However, a thorough understanding of their bionomics provides the foundation for developing eco-friendly and sustainable management strategies. Adoption of Integrated Pest Management (IPM), involving cultural, mechanical, biological, and judicious chemical methods, is essential to minimize losses, improve fruit quality, and maintain export standards.

4. White, I.M. and Elson-Harris, M.M. (1992). Fruit Flies of Economic Significance: Their Identification and Bionomics. CAB International.