Habitus (lateral) of *B. minax*

It attacks mandarins when the fruit diameter is 1-2 mm. It is a univoltine species, adults can only be spotted on canopy during May-June, it overwinters as pupae.

Management

- Male annihilation (MA) through para-pheromone (Methyl Eugenol) traps standardized by ICAR-DFID project (Plywood block, impregnated with para-pheromone (lure) in suitable containers called traps. Erect 8–10 traps/ acre, or NBAIR lures @5/ acre at a height of 3–6 feet from ground level, starting from 60 days prior to harvest. The traps need plywood lure replacement once in 30 days, and twice in late varieties. (Traps with ICAR-IIHR or ICAR-NBAIR license are recommended)
- A placement combination of male- female traps (ICAR-NBAIR) with MA traps 5:5 ratio/acre respectively enhances control.
- Keep basins of trees clean and raked from flowering to destroy pupae and prevent pupation. This will also facilitate collection of fallen fruits.
- Collect all fallen fruits regularly and put it in pits 3'x 3'x3' cubic feet, and treat with any insecticide. Females are attracted to such rotting fruits and they get killed in the pit. Cover the pits with poultry meshed nets to prevent non-target animals falling into the pit. After harvest the pits should be covered with soil and will serve as a source of soil nutrition enrichment.
- If aforementioned option cannot be done, then bait-spray with 10% jaggery/molasses with any toxicant (2ml Cypermethrin/litre) on the tree trunk from the base of the tree at 10-day interval should be done. This should start 30 days before harvest, and three bait-sprays should be given. (Note this should not be given on the canopy or in organic orchards.)
- In organic orchards, MA traps can be placed outside the border, or plywood block lures can be kept inside sticky delta traps. This trap is less efficacious than conventional traps, so at least 12 traps/acre are needed. Further, 2-3 sprays of neem oil emulsion [neem oil @5ml + 3ml soap (pH=7) / liter of water] should be given from base of the tree to entire canopy.
- Post-harvest: if the fruits are for export or distant markets or for processing, one hour dipping of de-sapped fruits in hot water tanks (46°C maintained thermostatically) will kill eggs and first instar maggots.
- In case of low-height, high density orchards bagging with poly propylene bags of suitable size are recommended. This is a very effective way of preventing infestation. The only caution is that adequate management of anthracnose should be ensured.
- In backyard mangoes with single or few trees, quite common in Goa and Kerala, a combination of MA trap (for each tree), followed by neem oil emulsion spray (as above) is sufficient.
- Retail consumers should always select hard semi-ripe fruits and keep it dipped in 5% salt water for one hour and then washed and air-dry and safely consume after ripening. This eliminates >90% of eggs and early instars.

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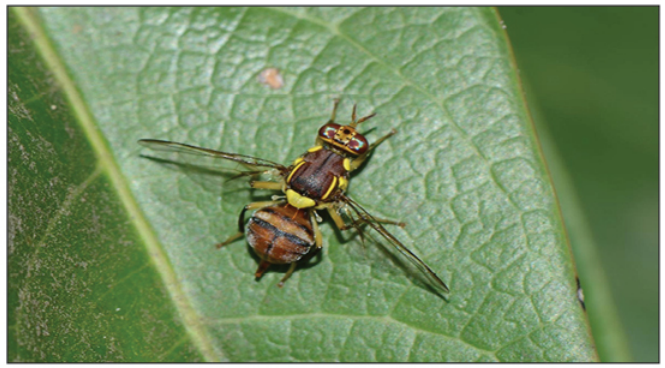
Identification of common fruit fly pests of fruit crops in India and its management



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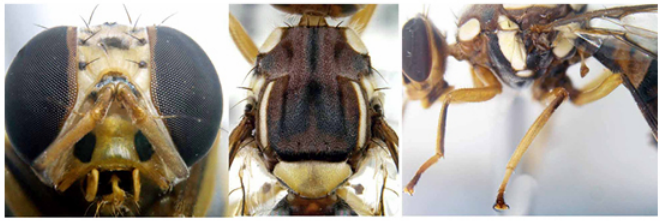
Introduction: Fruit flies are one among the significant pests of quarantine concern across the world owing to its concealed nature of feeding and highly invasive nature. Precise identification is mandatory for proper management of fruit flies as they are attracted to male parapheromones which have been employed for Male Annihilation (MA) techniques. In this folder, diagnostic characters of major fruit fly pests of fruit crops along with illustrations and management practices with special reference to mango orchard are provided .

Bactrocera dorsalis (Hendel)

Diagnosis: Medium sized fly (6–7 mm) with reddish-brown/black thorax, yellow lateral vittae, hyaline wing with narrow, continuous costal band confluent with vein R_{2+3} and all femora yellow without any preapical spots/ markings. It is widely distributed in India infesting several species of fruit crops. Males of this species are attracted to methyl eugenol.

Habitus female



Face Thorax Lateral view and legs

Bactrocera caryeae (Kapoor)

Diagnosis: Predominantly black, medium sized fly (6–7 mm), thorax black with narrow, yellow lateral vittae, wing hyaline with narrow costal band, all femora with elongate preapical markings, abdomen

Habitus female

Face Thorax Lateral view and legs

with broad lateral black markings. It is predominant along Western Ghats of India infesting various fruit crops and males are attracted to methyl eugenol.

Bactrocera correcta (Bezzi)

Diagnosis: Small sized fly (4–5 mm), with black thorax, broad lateral vittae, reddish brown abdomen, discontinuous costal band and face with two transverse markings unlike spots in related species. They are distributed all over India but more abundant in southern India infesting various fruit crops. Males of this species are attracted to methyl eugenol.

Habitus male

Head Thorax Legs

Bactrocera zonata (Saunders)

Diagnosis: This species can be often confused with *B. correcta* by its discontinuous costal band and small size, but can be differentiated by round black, facial spots, reddish-brown thorax and abdomen. It is more abundant in northern parts of India infesting several fruit crops.

Habitus male

Head Thorax Legs

Males of this species are attracted to methyl eugenol.

Bactrocera carambolae Drew and Hancock

Diagnosis: Medium sized fly (5–6 mm) with black thorax, scutum with yellow lateral vittae, reddish brown abdomen and hyaline wing with a narrow costal band slightly overlapping vein R_{2+3} with apical expansion. It resembles *B. dorsalis* but can be distinguished by preapical spot on forefemur. It is a polyphagous pest reported so far from Andaman & Nicobar Islands in India.

Facial spots Thorax Lateral view and legs

Abdomen (male) Wing

Bactrocera minax (Enderlein)

Diagnosis: Large sized fly (10–12 mm), reddish brown with yellow lateral and medial vittae. Wing hyaline with broad costal band confluent with vein R_{4+5}. Abdomen elongate with bulb shaped oviscape in females. It is a pest of Khasi mandarins in northeast India particularly Sikkim and Darjeeling.