

Extension Fact Sheet 21: Fruit Flies



Common name: Fruit flies

Scientific names:

Mango fly (*Bactrocera frauenfeldi*) (above, left)

Melon fly (*Bactrocera cucurbitae*) (above, centre)

Breadfruit fly (*Bactrocera umbrosa*) (lower, right)

Solomon fly (*Dacus solomonensis*) (above, right)

There are many more fruit fly species in Solomon Islands, but these are major pests.



Hosts: **Mango fly** has a wide host range; those hosts that are of importance to subsistence and commercial agriculture are: avocado, black sapote, breadfruit, capsicum, carambola, cut nut, golden apple, grapefruit, guava, jackfruit, kumquat, mangoes, Malay apple, papaya, paper mulberry, passion fruit, plantain, pomelo, sapodilla, snake gourd, sour orange, soursop, Tahitian chestnut and tropical almond. Wild hosts are Indian laurel, figs, and many forest fruits. **Breadfruit fly** infests breadfruit, jackfruit and bitter gourd. **Solomon fly** attacks cucumber, pumpkin and particularly snake gourd. **Melon fly** hosts are cucurbits, including watermelon, cucumber, pumpkin, snake gourd, bitter gourd and ivy gourd.

Damage

Eggs are laid in fruit, and maggots cause the fruits to rot. Melon fly may also lay eggs in flower buds and stems. An important fruit fly: destroy crops of pumpkin and snake gourd.

Biology and Life Cycle

Female flies lay eggs in fruit, leaving small holes in the skin. Eggs are white or pale yellow, about 0.8 mm long and 0.2 mm wide. As the female lays eggs, it also adds bacteria from the fruit surface; these help rot the fruit and provide food for the larvae or maggots.

The eggs hatch into maggots after 1 or 2 days, and feed on the rotting fruit flesh. Maggots are white, and their body tapers to a pointed head that contains a pair of black mouth-hooks. The maggots grow to different sizes: mango fly up to 8 mm, melon and breadfruit fly up to 11 mm, and Solomon fly even larger. There are three moults. Maggots usually live in fruit from between 1 and 2 weeks. When

maggots are fully grown they drop to the ground and burrow into the soil. Their skins harden to form brown, barrel-shaped pupae. These hatch into adult flies after 1 or 2 weeks.

Mango fly adults are mostly black, about 6 mm long, with a dark stripe across the wings. **Melon fly** adults are orange-brown, about 8 mm long, with three yellow stripes along their backs, and two brown spots near the wing tips. **Breadfruit fly** adults are about 8 mm long, with bold black, yellow and orange body markings, and three wide brown bands on the wings. **Solomon fly** adults look like wasps with a slim waist, have brown bodies about 12 mm long, and their wings have a brown band along the front edge.

Flies begin to mate and lay eggs about 2 weeks after pupation. Melon and breadfruit flies mate at dusk, while mango fly mates at any time. Young female flies need protein to develop eggs. Melon fly females lay more than 1000 eggs, and they live for about 5 months, longer than the other species.

Detection and Inspection

Look for rotten fruit, and small holes in the skin. Open up fruits and look for maggots inside. Maggots can be reared to find out their species. Distinctive features include: **Melon fly:** a yellow stripe in the middle of the upper body between the wings; a black T on the rear body; dark patches on edge of wings. **Mango fly:** A reddish brown fly, with yellowish abdominal cross bands. Wings are transparent, with small brown spot on the tip of each wing. **Breadfruit fly:** Mix of black with yellow stripes. Wings have broad black bands. **Solomon fly:** large, reddish-brown. Lures are used: either Cue-lure, to attract mango, melon and Solomon fly, or methyl eugenol, to attract breadfruit fly.

Management

Quarantine: Melon fly, which entered Solomon Islands from Papua New Guinea in 1984, is not present yet in Makira, Rennell/Bellona and Temotu Provinces.

Natural Enemies: Fruit fly maggots are parasitised by small wasps. Spiders, ants, assassin bugs and beetles feed on maggots, pupae and adults. Weaver ants (*Oecophylla*) stop flies from laying eggs. Chickens, pigs and flying foxes eat the fruit and maggots.

Cultural control:

- Collect fallen, damaged and overripe fruits, and bury them (at least 50 cm), feed them to pigs or seal them inside plastic bags and put in direct sunlight for several hours;
- Choose varieties of fruits and vegetables that are less susceptible to attack; and, if possible, harvest early to avoid infestation;
- Form a bag with a double layer of newspaper over the fruit and staple or sew in place. Effective for guava, mango and carambola. Use leaves of pandanus, betel nut, sago palm or swamp taro, after softening over a fire. In PNG, whole banana bunches are bagged inside banana leaves to stop banana fly and to improve market look;
- Encourage weaver ants (*Oecophylla*) to reduce fruit fly attack. Encourage ants by placing bamboo poles as 'roads' from nests to new areas. Useful in citrus, almond and mango.

Chemical control:

- Use insecticides as cover sprays, but they will also kill beneficial insects. Better if they are used together with baits as follows:
 - **Protein-bait technique.** A protein and an insecticide are spot-sprayed around crops. The protein is made from yeast, and can be bought in PNG (mango fly on guava and carambola), Tonga and Vanuatu). Useful, but needs farmers to synchronise efforts.
 - **Male-annihilation-technique.** Male fruit flies are killed, so females cannot mate and lay eggs. A high density of bait stations are arranged on a grid - 400 per km² or 1 every 20 m - and treated with a male lure (Cue-lure or methyl eugenol) and an insecticide (fipronil). The baits are made of fibreboard, cardboard or coconut husk. An entire orchard or village is covered, plus a 50 m buffer zone around the outside