



SOUTH PACIFIC COMMISSION
QUEENSLAND FRUIT FLY



Adult female Queensland fruit fly ($\times 10$).

The **QUEENSLAND FRUIT FLY** (*Dacus tryoni*) is the most destructive insect pest of fruit and vegetable crops in coastal eastern Australia. Within the South Pacific Commission region it is known to occur on the Austral and Society Islands (French Polynesia), New Caledonia, and Papua New Guinea. It was also introduced on Easter Island, but was eradicated in 1974.

HOSTS

This fruit fly infests all commercial fruit crops (although it is only rarely found on pineapples) as well as many vegetable crops. Over 100 host plants are reported in Queensland. Favourite plants are avocado, capsicum, guava, mango, pawpaw and tomato. The fruits of many 'bush' trees also are attacked.

DESCRIPTION

The Queensland fruit fly is about the size of a house-fly. It has coloured markings on the body and a single pair of transparent wings. (The markings are variable and, since there are several other fruit flies in the Pacific Islands, identification is difficult and should be confirmed by reference to a specialist.) The fruit flies have a habit of holding their wings at an angle to the body and slowly raising and lowering them. The abdomen (body) of the male fly is rounded, but that of the female has a conspicuous pointed ovipositor, which is greatly extended when eggs are being laid.

The eggs are cream-coloured and are about 1.0 mm long and 0.2 mm wide; they are laid in batches (Fig. 1). The



Fig. 1: Egg mass ($\times 5$).

larvae (grubs or maggots) vary in length from about 3–15 mm long. They are whitish or yellowish in colour, broad at the rear end and narrow to a point at



Fig. 2: Larvae in tomato fruit ($\times 1\frac{1}{2}$).

the head end (Fig. 2). The mature larvae can jump — they curl up lengthwise and, when they release the 'spring', jump distances of at least 15 cm. The pupa is enclosed in a smooth brown oval puparium, about 3–5 mm long, (Fig. 3).



Fig. 3: Puparia ($\times 3$).

DAMAGE AND LIFE-CYCLE

The female fly lays eggs just below the surface of the rind or the skin of the fruits which are within a few weeks of maturity (Fig. 4). The eggs are laid in batches; after 2–3 days, the larvae hatch and feed and burrow into the fruit. Externally, the damage from the



Fig. 4: Female Queensland fruit fly about to oviposit (approx. x5)

'sting' may show as a circular, brown spot (Fig. 5). If the fruit is cut open, the larvae can be seen. (NB. Fruit-piercing moth damage is similar, but no larvae are found in the fruit.) The 'sting' can also admit fungi and bacteria, which



Fig. 5: Oviposition damage to tomato fruit (x 1¼).

cause rapid decay. Sometimes a clear glistening 'window' can be seen in some types of fruit where the larvae have eaten the fruit tissue and left the skin. The larvae mature in seven or more days, leave the fruit and pupate in the soil, under debris, in fruit cases, etc. The adult fly develops inside the puparium and, after about two weeks, hatches and emerges from the soil. Adults may live for long periods and can travel over distances of several

kilometres. Female flies do not lay eggs until they are 2-3 weeks old. One female fly can lay several hundred eggs. The generation time is about 4-5 weeks.

CONTROL

Cultural control

Regular collection and destruction of all fallen and infested fruit is important. Fallen fruits should be picked up at least every three days. All infested fruit, whether on the ground or from the tree, should be destroyed. At intervals no greater than three days such fruit should be burned, boiled, or placed in a watertight container, covered completely with water for at least ten days and sealed. (The height of the material in the container should not come within 20 cm of the top.)

The eradication of other types of non-productive fruit trees from the area surrounding commercial orchards is also recommended.

Chemical control

Poison bait sprays

These consist of an insecticide mixed with liquid food material containing protein.

Fruit flies are attracted to the protein bait and are killed by feeding on the insecticide. Bait sprays are most effective in dry climates, where they are not washed off by rain.

Applications of poison protein bait spray should start five weeks before the crop ripens and continue until one month after harvest. The following bait spray may be used:

Maldison (Malathion) 50 per cent emulsifiable concentrate (EC)—
25 ml (1 fl oz)
Protein hydrolysate liquid 22 per cent—
50 ml (2 fl oz)
Water — 1 litre (1 quart)

This should be applied to trees at the rate of 30-170 ml (1-6 fl oz) per tree, depending on the tree size, at least once weekly. The mixture should be splashed on to the crop with a brush or with a bottle having a perforated stopper. The aim should be to deposit the bait on the underside of the leaves, *not* on the fruit.

Cover sprays

Apply sprays of dimethoate (Rogor) or fenthion (Lebaycid) so that the fruits are completely covered. Though egg-laying may occur, larval development will be prevented.

For citrus, spray with dimethoate 0.06 per cent (20 ml of 30 per cent concentrate in 10 litres of water, or 1 fl oz in 3 gal), or with fenthion 0.06 per cent (11 ml of 55 per cent concentrate in 10 litres water, or 1 fl oz in 5 gal) 8 weeks, and again 7 weeks, before harvest.

For tomatoes, spray with dimethoate 0.03 per cent or with fenthion 0.03 per cent 4 weeks and 3 weeks before harvest. A weekly spraying with dimethoate may be necessary if the crop produces fruit over a long period.

NOTE: Some fruits are sensitive to these sprays (e.g., figs, Meyer lemon, Seville orange) and a trichlorphon (Dipterex) cover spray schedule may be preferred.

Minimum intervals which *must* be observed between last application and harvest are:

Dimethoate — 7 days; Fenthion — 2 weeks; Trichlorphon — 2 days.

Male attractants

'Cue-lure' attracts the males of *Dacus tryoni*. A mixture of 4 ml cue-lure and 1 ml of 50 per cent w/v concentrate of malathion or dichlorvos is put on the wick of a trap. Trap designs are given in *Economic fruit flies of the South Pacific Region* by R.A.I. Drew, G.H.S. Hooper and M.S. Bateman. (Brisbane: Department of Primary Industry, 1978.) The lure remains attractive for several weeks and may attract male flies from

long distances. The main function of cue-lure traps is detection; they can also be used to monitor population levels and to time spray applications.

For use in detection (i.e., in countries where no Queensland fruit fly occurs but where infestation is a possibility — because of shipping or aircraft connections), a set of traps that could be easily checked in densely populated areas may be a useful precaution.

Biological control

The parasitic wasp, *Opius oophilus*, lays its eggs in the eggs of *Dacus tryoni*. The wasp eggs do not hatch until the fruit fly larva begins to grow rapidly. It is reported that this parasite has only a small effect on fruit fly populations in Queensland.

ERADICATION

If a Queensland fruit fly infestation is detected in a previously uninfested island, the possibility of eradication should be considered. The methods used in eradication are the poison bait spray, male attractants, and release of sterile male flies. The procedures that might be used are given in *Economic fruit flies of the South Pacific Region*.

QUARANTINE

The following fumigation treatment is used by the Ministry of Agriculture in New Zealand for fruits that are likely to be hosts of this fruit fly: Ethylene dibromide (EDB) at 20 grams per cubic metre for two hours, at 20°C or above (chambers should not be filled with fruit to more than half of their capacity). The use of EDB as a fumigant is currently under review and may be withdrawn.

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