

Queensland fruit fly

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IMPORTANT: *Pesticides Act 1999*

Take note that you must use only a registered pesticide, and it must not be used for any purpose or in any manner contrary to the directions on the label unless a Permit has been obtained under the Act.

A major fruit fly pest

Queensland fruit fly, *Bactrocera (Dacus) tryoni*, lays its eggs in maturing and ripe fruit. Maggots hatch from the eggs and the fruit is usually destroyed by their feeding and by associated decays. This fruit fly can infest many different commercial and native fruits and tolerates a fairly wide range of climatic conditions over a large geographical area. It has therefore come to be regarded as one of Australia's major fruit fly pests. It is an Australian native insect, found regularly in eastern Australia in coastal districts from northern Queensland to eastern Victoria, and in inland areas of Queensland and northern New South Wales.

Queensland fruit fly prefers humid conditions, so in New South Wales it is best suited by the climate in coastal and northern inland areas (approximately north of a line between Sydney and Bourke). The south and south-west of the state are much less suitable to the Queensland fruit fly, but it can thrive there during years of favourable conditions or in the favourable microclimates of the towns and cities.

Serious direct losses occur through the attacks on fruit in orchards and home gardens in coastal and northern inland districts. Preventative routine control measures are therefore required. Because the worst attacks by fruit fly occur in late summer and autumn, varieties of fruit usually grown in orchards in these areas are those that mature before or after this period. This, coupled with adequate control measures, keeps losses low, so

that reliably clean fruit can be marketed from orchards in infested areas.

In seasons of above-average rainfall, fruit fly may be detected more frequently in the west and south-west of the state. In inland fruit-growing areas, such as the Murrumbidgee Irrigation Area (MIA) and Murray River districts, the occurrences or 'outbreaks' are of major economic importance as they cause loss of market access to other states or overseas markets. Although usually very small, these occurrences mean that for part of the season, the production areas are not considered free of fruit fly. Thus fruit from the affected area cannot be marketed readily in other states or countries that maintain very strict quarantines against Queensland fruit fly. Additional costs are then incurred through immediate fruit fly eradication campaigns and in ongoing large-scale programs to maintain area freedom and postharvest treatments.

Description and life history

The adult Queensland fruit fly is about 7 mm long, and reddish brown with yellow markings. The flies move quickly, and readily take flight if disturbed. They are most often seen walking on the undersides of leaves or on maturing fruit. Figures 1 and 2 show the male and female fruit flies.



Figure 1. Male Queensland fruit fly – length approx. 7 mm



Figure 2. Female Queensland fruit fly – length approx. 7 mm

The female has a retractable, needle-sharp egg-laying organ (the ovipositor) at the tip of her abdomen. She is capable of laying several hundred eggs during her lifetime, placing them in maturing and ripe fruits. Using her ovipositor, she excavates a flask-shaped chamber about 3 mm deep in the outer layer of fruit and deposits about six eggs into this chamber. The eggs are white, banana shaped and nearly 1 mm long (see Figure 3). Fruit may show 'sting' marks and may be stung more than once by several females.



Figure 3. Queensland fruit fly eggs – length approx. 1 mm

In 2 or 3 days tiny larvae (maggots) hatch from the eggs and burrow through the fruit. They have a pair of mouth hooks which they use to tear the fruit tissue. To the naked eye, the larvae resemble blowfly maggots. They are creamy white, legless, blunt ended at the rear and tapered towards the front where the black jaws are often visible (see Figure 4). They develop through three larval stages to be about 9 mm long and pale yellow when fully grown. Many larvae can develop in each fruit.

When fully developed, larvae leave the fruit. They fall to the soil beneath the tree and burrow down about 5 cm. Each larva forms a hard, brown, barrel-like shell from its own skin (see Figure 5). The pest completes its development into an adult inside this pupal case.



Figure 4. Queensland fruit fly larvae (maggots) – length approx. 9 mm when fully grown



Figure 5. Queensland fruit fly pupae – length approx. 6 mm

The completion of larval and pupal stages is dependent on temperature and moisture, each stage taking from 9 days to several weeks to complete. When ready, adult male and female flies emerge from their pupal cases in the soil and burrow towards the surface where they inflate their wings and fly away. Adults are able to mate within a week after emerging, and, soon after, females are ready to lay eggs. The adults can live for many weeks and females continue to lay eggs. There may be five or more overlapping generations during one year in coastal New South Wales.

Honeydew, the sweet secretion from aphids and scale insects, has generally been regarded as the main source of energy for the adults. They also use

natural protein sources, including bird droppings and bacteria, to mature into fertile adults.

Seasonal development

During winter the fruit fly population diminishes. Flies survive through the winter ('overwintering') mostly as adults sheltering in protected environments. On fine days in winter, they can often be seen resting on foliage. In a few fruits, such as quince and grapefruit, mature larvae may overwinter in the fruit and complete their life cycle in spring. There is almost no fresh infestation of fruit during winter in cooler parts of New South Wales. Occasionally there may be some egg-laying in suitably mature fruit during warm spells in winter in coastal and warmer districts.

In early spring, overwintering adult flies become active once again. Females usually mate again before laying eggs in suitably mature fruit, such as loquat, mandarin and grapefruit. Infestations may develop successfully in these fruits, and subsequently fruit fly populations build up as successions of suitable fruit, particularly stone and pome fruit, become available for egg-laying.

By late summer and autumn, flies can be very numerous and readily infest any suitable unprotected fruit until the onset of cold weather in late autumn.

Susceptible fruits

Queensland fruit fly can infest a wide range of commercial and native tree and vine fruits and vegetables, such as tomato, capsicum and chilli. It does not infest cucurbits (for example, melons, pumpkins and cucumbers).

Fruit is increasingly likely to be attacked as it becomes more mature and as the fruit fly population increases during summer and autumn. Stone fruits are particularly susceptible to fruit fly attack and are prime larval hosts but fruit fly will also attach to lemon, tomato and passionfruit. In urban home gardens, and in orchards close to urban areas, fruit fly populations are often much higher than in outlying orchards.

Some fruit, such as most citrus varieties early in their seasons, some avocado varieties, grape varieties and astringent varieties of persimmon, usually are not suitable for larval development even though the flies may lay eggs in these fruit.

Fruit fly 'stings'

The egg-site (oviposition-site) punctures in the fruit are referred to commonly as 'stings'. To identify them, make a shallow cut through the skin and look with a lens for the egg cavity containing eggs or the remains of hatched eggs.

In some fruits, for example peaches, the stings are not very noticeable. In others, such as pale, smooth-skinned fruits, the sting mark may be obvious and disfiguring, or is sometimes marked by 'gum bleed'. Some fruits, for example avocado and passionfruit, develop hard, thickened areas where they are stung. In citrus the sting mark may be a brown, depressed spot, or only a vague, bruised appearance, while on green citrus fruit the skin colours prematurely around the sting.

In humid conditions, the fungal decays green mould in citrus and brown rot in stone fruit readily infect stung fruit.

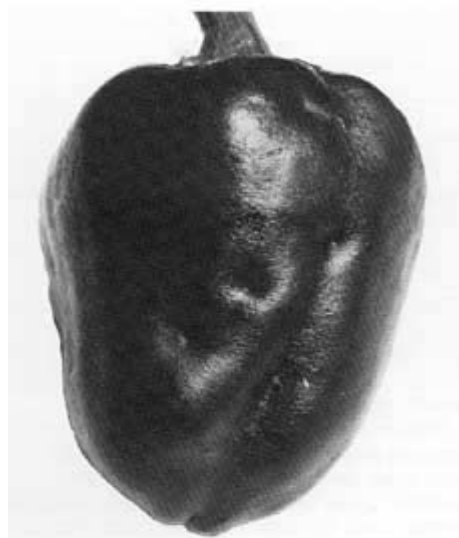


Figure 6. Egg-site punctures ('stings') in a capsicum



Figure 7. Infested loquats



Figure 8. 'Stings' in an orange, with decay starting



Figure 9. 'Stings' in an apple

Damage to fruit

Infested fruit may fall from the tree as a result of larval infestation. The style of damage caused by fruit fly larvae tunnelling in fruit varies with the type and maturity of the fruit, the number of larvae in it, and the weather. The larvae burrow towards the centre in most fruits; in peaches they are commonly found near the stone. Brown, mushy, internal decay usually develops quickly in soft fruits.

In hard fruits a network of channelling is usually seen, followed by internal decay. Development of the larvae can be very slow in hard fruits such as Granny Smith apples.

Larvae develop successfully in mandarins, cumquats, grapefruit, Meyer lemons, tangelos, tangors and trifoliata fruit; in these fruits, larvae often feed in the thick skin and central pith rather than the juice cells. Thick-skinned oranges and lemons are less prone to fruit fly development.

Avocados and passionfruit will often fall after being stung.

Further information

For further information, see the Queensland Fruit Fly page at www.dpi.nsw.gov.au/reader/pe-qff



Figure 10. Peach destroyed by fruit fly

Acknowledgments

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