Bactrocera tryoni **System:** Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Arthropoda	Insecta	Diptera	Tephritidae

Common name Queensland fruit fly (English), Q-fly (English), QFF (English), Fruchtfliege Queensland (German), Mouche des fruits de Queensland (French)

Synonym
Chaetodacus tryoni , (Froggatt)
Dacus ferrugineus tryoni , (Froggatt)
Dacus tryoni , (Froggatt)
Strumeta tryoni , (Froggatt)
Tephritis tryoni , Froggatt

Similar species *Bactrocera aquilonis, Bactrocera neohumeralis*

Summary The Queensland fruit fly (*Bactrocera tryoni*), also known as Q-fly and QFF, is common in towns and horticultural areas throughout eastern Australia. It was introduced into New Caledonia around 1969 and French Polynesia around 1970. It is now widespread in New Caledonia, French Polynesia and Pitcairn Islands. It was introduced but eradicated from Perth (Western Australia) and Easter Island in the mid-Pacific. More recently, it was detected in Rarotonga, Cook Islands, on the 21st November 2001. Its detection prompted a quick emergency response. The Q-fly is very destructive to a large range of fruit hosts, and has significant economic impacts on the areas in which it lives.

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Species Description
The adult Queensland fruit fly (Q-fly) is about 7 mm long. It has a wing span of 10 – 12 mm. They are a reddish brown colour, with yellow markings. Its “abdomen is constricted at the base, flared in the middle, and broadly rounded at the tip” (Weems & Fasulo, 2007). The female has a retractable ovipositor at the tip of her abdomen, with which she can lay several hundred eggs during her lifetime inside maturing and ripe fruit. Q-flies can move quickly if disturbed. They are usually found either on maturing fruit, or on the underside of leaves (Dominiak, 2007a). Larvae, which can be up to 10mm long, emerge from the eggs relatively quickly, and cause damage inside the fruit by feeding inside it for a number of days. The infested fruit can appear to be undamaged.
NSW Agriculture have produced an Online ID key to distinguish fruit flies.
Please see PaDIL (Pests and Diseases Image Library) Species Content Page for Queensland fruit fly for high quality diagnostic and overview images.

Lifecycle Stages
Egg: Normally about six white, banana-shaped eggs are laid in a flask-shaped chamber, which is dug out about 3mm deep in the outer layer of host fruit (Dominiak, 2007a).
Larva (maggot): The eggs normally hatch after 2 or 3 days (MAFBNZ, 2008a), and a small maggot emerges from each egg. These maggots use eat towards the centre of the fruit, utilising their sharp cutting jaws. The fruit can continue to look perfect from the outside while this is happening on the inside. Maggots have cutting jaws which help to tear the fruit into pieces small enough to swallow. Maggots tend to eat towards the centre of the fruit. This also promotes rotting of the fruit, although it may look perfect from the outside (DPI, 2008).
The larvae are usually feeding inside the fruit for 10 to 31 days after hatching (MAFBNZ, 2008a). After its growth is completed, the maggot eats its way out of the fruit, which has by now usually fallen onto the ground, and burrows into the soil (DPI, 2008). Up to 70 individuals can develop from a single fruit (MAFBNZ, 2008a).
Pupa: After the larvae enter the soil, they become inactive and change into brown, hard, oval-shaped pupae, in which the adult fly develops (DPI, 2008). Pupal development time varies from a week in Summer to over a month in Winter (Weems & Fasulo, 2007). High levels of pupal mortality occur at high and low extremes of soil moisture (Hulthen & Clarke, 2006).
Adult (fly): After emerging from the pupae, adult flies first find a food source. After feeding, flies search for a mate, and mating occurs. After “passing through a two-week pre-oviposition stage following emergence from the pupae” (Weems & Fasulo, 2007), females then look for ripening fruit. She then either punches a hole into the fruit, in which she lays groups of up to 7 eggs. Q-fly females often use existing punctures within fruit (DPI, 2008). Studies have shown that Q-flies “prefer to oviposit in existing punctures rather than drill a fresh puncture” (Prokopy *et al.* 1991). Female fruit flies can lay between 500 and 800 eggs in the duration of their life, which can last anywhere from 6 months to a year (Heaven, 2007).

Habitat Description
Major hosts of *Bactrocera tyroni* include *Malus* (ornamental species apple), *Pyrus* (pears), *Cydonia oblonga* (quince), *Malus domestica* (apple), *Prunus armeniaca* (apricot), *Coffea arabica* (coffee), *Eremocitrus glauca* (australian desert lime), *Persea americana* (avocado), *Morus nigra* (black mulberry), *Rubus fruticosus* (blackberry), *Rubus ursinus* (california berry), *Physalis peruviana* (cape gooseberry), *Averrhoa carambola* (carambola), *Anacardium occidentale* (cashew), *Citrus medica* (citron), *Ficus racemosa* (cluster fig), *Ficus carica* (fig), *Psidium guajava* (guava), *Annona reticulata* (custard apple), *Phoenix dactylifera* (date palm), *Musa acuminata* (wild banana), *Juglans regia* (walnut), *Vitis labrusca* (fox grape), *Passiflora quadrangularis* (giant granadilla), *Citrus x paradisi* (grapefruit), *Opuntia ficus-indica* (indian fig prickly pear), *Ziziphus mauritiana* (jujuba), *Flacourtia jangomas* (indian plum), *Spondias cytherea* (jew plum), *Solanum laciniatum* (kangaroo apple), *Dovyalis caffra* (kei apple), *Citrus limon* (lemon), *Eriobotrya japonica* (loquat), *Citrus reticulata* (mandarin), *Mangifera indica* (mango), *Prunus cerasifera* (myrobalan plum), *Olea europaea* (olive), *Carica papaya* (pawpaw), *Prunus persica* (peach), *Pyrus communis* (pear), *Diospyros kaki* (persimmon), *Prunus domestica* (plum), *Punica granatum* (pomegranate), *Citrus grandis* (pummelo), *Passiflora edulis* (passionfruit), *Syzygium jambos* (rose apple), *Fortunella japonica* (round kumquat), *Mimusops elengi* (spanish cherry), *Psidium littorale* (strawberry guava), *Annona squamosa* (sweetsop), *Eugenia uniflora* (surinam cherry), *Prunus avium* (cherry), *Citrus sinensis* (orange (sweet), *Capsicum frutescens* (chilli), *Lycopersicon esculentum* (tomato), *Terminalia catappa* (tropical almond), *Syzygium aqueum* (watery rose-apple), *Ficus benjamina* (weeping fig), *Morus alba* (mulberry), *Casimiroa edulis* (white sapote), *Vitis vinifera* (grapevine), *Cananga odorata* (ylangylang).
Queensland fruit fly has also been recorded from 60 wild hosts , belonging to the following families: Anacardiaceae, Annonaceae, Apocynaceae, Capparidaceae, Celastraceae, Combretaceae, Cunoniaceae, Davidsoniaceae, Ebenaceae, Euphorbiaceae, Lauraceae, Meliaceae, Moraceae, Myrtaceae, Naucleaceae, Oleaceae, Passifloraceae, Rhamnaceae, Rutaceae, Sapindaceae, Sapotaceae, Siphonodontaceae, Smilacaceae, Solanaceae and Vitaceae. This very wide host range enables Queensland fruit fly to build up large populations in forest areas (in its native range), which then act as reservoirs from which to invade crops (Botha *et al* 2004).

Reproduction
The Queensland fruit fly mates at dusk (Raphael *et al.* 2004). Female Q-flies have been found to be poor at detecting a difference between the numbers of calling males, in groups of different sizes (Weldon, 2006). The Q-fly does not mate continuously throughout the year, but it passes the winter in the adult stage. The total life cycle of the Q-fly requires 2 weeks in summer but up to 2 months in autumn. Adult females usually live for a number of months (Weems & Fasulo, 2007).

Nutrition
Over 100 species of fruits and vegetables can act as hosts of the Queensland fruit fly. “Adults feed primarily upon juices of host plants, nectar, and honeydew secreted by various kinds of insects” (Weems & Fasulo, 2007).

General Impacts
The Queensland fruit fly is the most costly and serious insect pest effecting agriculture in Australia. It infests all commercial fruit crops in Australia, other than pineapple and strawberry. The majority of an estimated A$100 million a year potential losses if fruit flies were not controlled in Australia would be caused by Queensland fruit fly (Botha *et al.* 2000).
The Queensland fruit fly (Q-fly) lays its eggs in a wide range of maturing or ripe fruit. The maggots, which hatch from the eggs inside the fruit, tend to destroy the fruit, either due to their feeding, or decaying. The Q-fly is such a problem as it has a large number of host fruits world-wide, and has a fairly wide climatic tolerance.
Research has found that the Q-fly can displace other *Bactrocera* fruit flies (*Bactrocera tryoni* and *Bactrocera kirki*) in coastal areas (Vargas *et al.* 2007).

Management Info
Preventative measures: Early detection of an outbreak of any invasive species is very important, as it increases the odds of a successful eradication, before the pest becomes established. In South Australia there is an ‘early warning system’ of traps to detect outbreaks of adult Q-flies. “A grid of more than 3800 fruit fly trapping sites in metropolitan Adelaide, Northern Adelaide Plains, Adelaide Hills, Riverland and a number of country towns are checked regularly by PIRSA officers” (Heaven, 2007). There is also a ‘Fruit Fly Hotline’ for the public to report possible discoveries of Q-fly.
In New Zealand, an annual fruit fly surveillance trapping program is undertaken by MAF Biosecurity New Zealand (MAFBNZ) to detect any incursions of fruit flies, including the Q-(MAFBNZ, 2008b).There are over 7500 traps used nationwide in this surveillance, and they are “concentrated in populated areas serving as centers for tourism and/or trade, areas of significant horticultural activity and areas specified as being climatically conducive to the establishment of fruit fly” http://www.biosecurity.govt.nz/pests/queensland-fruit-fly (MAFBNZ, 2008a).
Integrated management: As with the control of many pest species, a single control method by itself is often not sufficient to eradicate (or even effectively control) the Queensland fruit fly (Q-fly) from an area. The best results are gained from a combination of the methods found in the section below. For example, bait spraying, male annihilation and good hygiene have been used in combination in attempts to eradicate Q-fly in New South Wales, Australia (Gilchrist, pers. Comm. 2008).
Please follow this link for detailed information on the prevention, control and management of the Queensland fruit fly

Pathway

Principal source:

Compiler: IUCN/SSC Invasive Species Specialist Group (ISSG) with support from the Overseas Territories Environmental Programme (OTEP) project XOT603, a joint project with the Cayman Islands Government - Department of Environment

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[1] FRENCH POLYNESIA
[1] NEW CALEDONIA
[1] PITCAIRN

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Summary: This compilation of information sources can be sorted on keywords for example: Baits & Lures, Non Target Species, Eradication, Monitoring, Risk Assessment, Weeds, Herbicides etc. This compilation is at present in Excel format, this will be web-enabled as a searchable database shortly. This version of the database has been developed by the IUCN SSC ISSG as part of an Overseas Territories Environmental Programme funded project XOT603 in partnership with the Cayman Islands Government - Department of Environment. The compilation is a work under progress, the ISSG will manage, maintain and enhance the database with current and newly published information, reports, journal articles etc.

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