



FRUIT FLIES IN FRENCH POLYNESIA AND PITCAIRN ISLANDS

Fruit flies (Diptera: Tephritidae) (Figures 1-4) are pest insects whose larvae or maggots live in and feed on the flesh of fruits and fleshy vegetables. They cause extensive damage and limit the export of fruits to other countries. In French Polynesia and Pitcairn Islands, there are eight species of fruit flies. Four of them are introduced major pest species, while the others are native and endemic species that infest mostly wild host plants. Fruit flies may be sampled and monitored by setting up lure traps that attract male flies (using Cue-lure or methyl eugenol) and by collecting and holding suspected host fruits in plastic containers over moist sawdust for two weeks.



Figure 1. *Bactrocera kirki*.



Figure 2. Queensland fruit fly (*Bactrocera tryoni*).



Figure 3. Oriental fruit fly (*Bactrocera dorsalis*).



Figure 4. Pacific fruit fly (*Bactrocera xanthodes*).



NZODA

ECONOMICALLY IMPORTANT SPECIES

***Bactrocera kirki* (Froggatt)** (Figure 1) occurs in Tonga, American Samoa, Samoa, Niue, Wallis and Futuna, and Fiji (on Rotuma only). It was first recorded in Tahiti in 1928 and is now widespread over practically all French Polynesia (except the Marquesas and Rapa Island). Throughout its range, it is known to infest 45 host plant species, in 30 genera and 23 families.

In French Polynesia, *B. kirki* it has been recorded from avocado, ripe banana, bullock's heart (*Annona reticulata*), carambola, eggplant, giant granadilla (*Passiflora quadrangularis*), golden apple (*Spondias cytherea*), guava, hog plum (*Spondias mombin*), loquat (*Eriobotrya japonica*), mandarin, mango, orange, Pacific lychee (*Pometia pinnata*), pomelo, ripe papaya (rarely), Malay apple (*Syzygium malaccense*), pumpkin (*Cucurbita pepo*), rose apple (*Syzygium jambos*), soursop, star apple (*Chrysophyllum cainito*), strawberry guava (*Psidium cattleianum*), Tahitian chestnut (*Inocarpus fagifer*), and tropical almond (*Terminalia catappa*).

It can be recognised by its glossy black thorax, its scutellum (triangle at the posterior end of the thorax) which is black medially and yellow laterally, its glossy black abdomen with two longitudinal grayish bands on segments II to V, and the dark spot on the face below the antennae. It should not be confused with, *B. setinervis* (Figure 6), which is similar. Male flies are attracted to Cue-lure.

***Bactrocera tryoni* (Froggatt) (Queensland fruit fly)** (Figure 2) is the number one pest fruit fly in Australia, present across northern parts of the country and along the eastern coast south to Melbourne. It was introduced into New Caledonia around 1969, and discovered in Tahiti in 1970, probably brought from New Caledonia by travellers carrying infested fruits. It is now widespread over most islands of French Polynesia and the Pitcairn group, but is still absent from the Marquesas and from Rapa Island.

Host surveying in Australia show that Queensland fruit fly attacks over 113 species of edible and wild fruits in 79 genera and 35 families. In French Polynesia, it has been reported to attack avocado, ripe banana, bullock's heart, carambola, cashew, eggplant, giant granadilla, golden apple, guava, hog plum, loquat, Malay apple, orange, mandarin, mango, orange, Pacific lychee, papaya, passionfruit (*Passiflora edulis*), pomegranate, pomelo, rose apple, soursop, star apple, strawberry guava, Surinam cherry, Tahitian chestnut, tomato, and tropical almond. Wild hosts are *Barringtonia asiatica*, *Canarium vulgare*, *Morinda citrifolia*, *Phyllanthus acidus*.

B. tryoni can be separated from other species by the predominantly red-brown colour of dorsal part of thorax, with lateral vittae (two longitudinal yellow stripes on the sides of the thorax dorsal surface), the predominantly red-brown abdomen with darker markings on segment III to V, and the small black spots on the face below the antennae. Male flies may be trapped using Cue-lure.

***Bactrocera dorsalis* (Hendel) (Oriental fruit fly)** (Figure 3) is one of the five most damaging and aggressive pest fruit flies in the world. It is native from tropical Asia and has been accidentally introduced to several Pacific Islands. It was detected in Commonwealth of Northern Mariana Islands in 1935, Hawaii in 1945, Guam in 1948, Nauru in the 1980s, Tahiti in July 1996 and Palau in September 1996.

A very serious pest, Oriental fruit fly has been recorded from 117 host species in Southeast Asia and up to 173 host species in Hawaii. In French Polynesia, it has been reared from avocado, banana, carambola, golden apple, guava, orange, mango, papaya, pomelo (*Citrus grandis*), soursop, Tahitian chestnut, and tropical almond.

Diagnostic features of the species are the dark coloured dorsal surface of the thorax, and the orange-brown to dark orange-brown abdomen with a medial dark longitudinal band that forms, with the dark transverse band along the base of segment III, a T-shaped pattern. Male flies come to methyl eugenol.

The strong attraction of male flies to methyl eugenol is the basis for the fruit fly eradication method known as male annihilation. Fibreboard wood blocks, cotton strips or coconut husk pieces, soaked in a mixture of methyl eugenol and an insecticide, and distributed by nailing them on trees or dropping them from an aircraft or helicopter. These attract and kill large numbers of male flies, eventually breaking the reproductive cycle of the species. New blocks are applied every two months. Six to eight campaigns are usually sufficient to eradicate a species attracted to methyl eugenol, especially when protein bait spraying is also applied in hot spots where large numbers of flies are breeding. Male annihilation was used to successfully eradicate Oriental fruit fly from Guam and Commonwealth of Northern Mariana Islands in 1965 and from Nauru in early 1999. Impregnated coconut husk blocks were distributed by ground teams and from the air in Tahiti and Moorea six times in 1997, in an attempt to eradicate Oriental fruit fly. Hot spots of breeding fly populations were not completely eradicated, and from these fly populations spread again all over the two islands. Male annihilation to eradicate the species has resumed in 1999.

***Bactrocera xanthodes* (Broun) (Pacific fruit fly)** (Figure 4) occurs in Fiji Islands (including Rotuma), Tonga, Niue, Samoa, American Samoa and Wallis and Futuna. It was introduced to the Southern group of Cook Islands in the early 1970s and to Nauru (first detected in 1992). In French Polynesia, it was detected on Raivavae in April 1998. It is being eradicated from Nauru and Raivavae. There are no host records on Raivavae, but host fruit surveying in other countries showed that it attacks 24 host species in 18 genera and 16 families. It is easy to recognise this species by the translucent shining orange-brown colour of the thorax and abdomen, and the three parallel yellow stripes on the thorax. Males may be sampled with methyl eugenol.

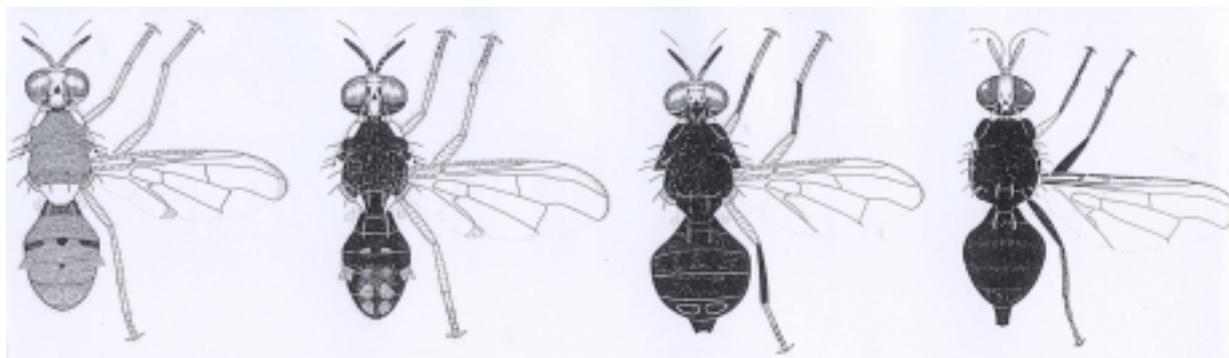
NON-PEST SPECIES

***Bactrocera luteola* (Malloch)** (Figure 5) is known from Bora Bora and Hao. It is not known to be attracted to male lures. Its diagnostic characteristics are the shining orange-brown dorsal part of the thorax, which does not have lateral yellow vittae, the shining orange-brown abdomen with oval dark-brown spots at the base of segment III and the small central dark-brown round spots on segments IV and V, and the absence of black spots on the face below the antennae.

***Bactrocera setinervis* (Malloch)** (Figure 6) is a species endemic to Henderson Island and Pitcairn Island and is attracted to Cue-lure. It is similar to *B. kirki*, but differs in that the orange-brown bands on the abdomen are reduced to two rows of spots and that the black spots on the face below the antennae are absent.

***Bactrocera atra* (Malloch)** (Figure 7) is known only from Raivavae (Austral Islands) and is sampled with Cue-lure. Its entirely glossy black thorax and abdomen are distinctive.

***Bactrocera perfusca* (Aubertin)** (Figure 8), another species attracted to Cue-lure and recorded from Hiva-oo, Nuku Hiva and Ua Huka (Marquesas Islands) and Tahiti, is similar to *B. atra*, but differs by having broad pale stripes on lateral sides of the thorax, known as mesopleural stripes. Larvae infest sandalwood (*Santalum*), tropical almond, rose apple and mango, but it is not a significant pest.



Figures 5 to 8, left to right: *Bactrocera luteola*, *B. setinervis*, *B. atra*, and *B. perfusca*.

REFERENCES

Host plants of the fruit fly species in French Polynesia have been compiled from recent intensive host fruit survey work carried out by Rudolph Putoa, and from the following published references:

Anonymous. 1998. *Bactrocera dorsalis* and *Bactrocera xanthodes* in French Polynesia in 1988. Report. 2 pp.

Hammes, C., Chant, H., Mu, L. 1989. Manuel de défense des cultures en Polynésie Française. ORSTOM. Entomologie Agricole. Notes et documents No 03. 304 pp.

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Figures 5-8 drawn by Meredith Romig and published in:

Drew, R.A.I. 1989. The tropical fruit flies (Diptera: Tephritidae: Dacinae) of the Australasian and Oceanian regions. Memoirs of the Queensland Museum, Vol. 26, 521 pp. This publication includes detailed descriptions of the species covered in this leaflet.

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