LIVING WITH QUEENSLAND FRUIT FLY

Bactrocera tryoni

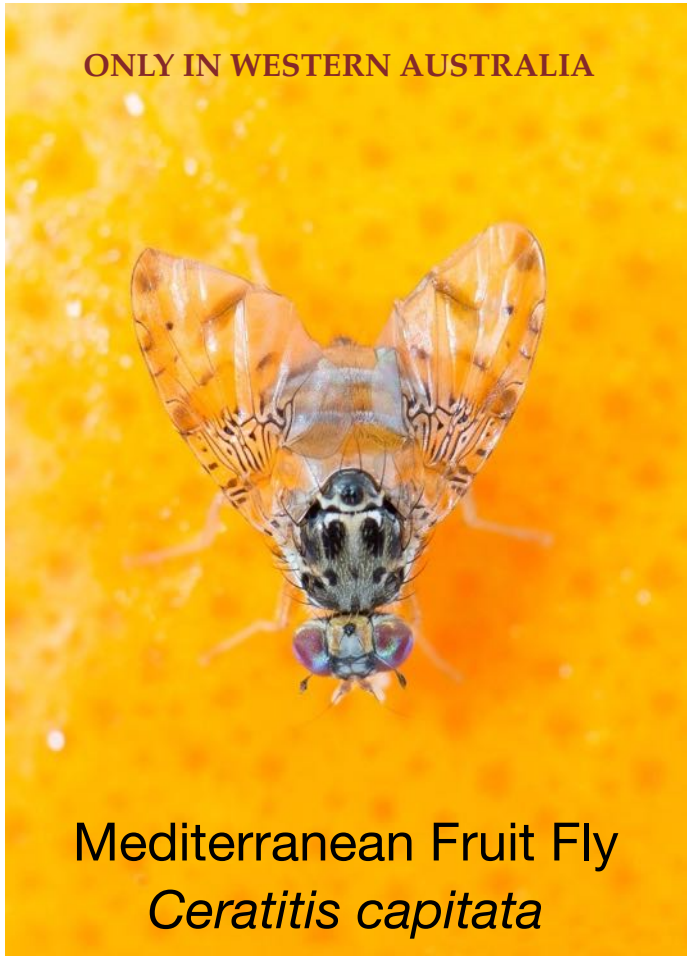
Rob Pelletier March, 2025 for Shire of Yarriambiack
Hopetoun Recreation Reserve Friday, 7 March 2025 at 6.30pm
Warracknabeal Municipal Office - Meeting Room, Saturday, 8 March 2025 at 10.30am
Murtoa Neighbourhood House, Sunday, 9 March 2025 at 12.00pm

Please note

This document is based on the live presentations listed above and therefore does not include all the verbal information delivered at the time. Product prices are current at the time of writing.

Readers are encouraged to explore the links to further information supplied at the end of the document.

Know your enemy!



Mediterranean Fruit Fly
Ceratitis capitata

Queensland Fruit Fly
Bactrocera tryoni

Rundown

- Know your enemy
- Lifecycle
- Behaviour
- Strategy
- Techniques
- Product resources

Home made remedies

There are numerous recommendations and recipes around for homemade baits and DIY methods. While these are worth a try this document focuses on adapting recognised products and strategies developed to deal with QFF in a commercial environment for use in home garden and community areas in a cost effective approach.

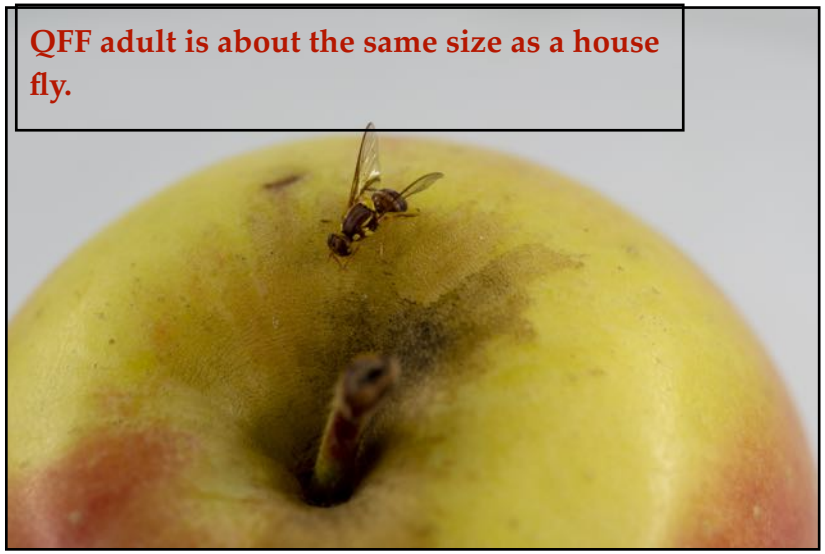
Images and Diagrams

Images used in this document have been purchased from stock photo libraries or sourced from government websites and product supplier websites

QUEENSLAND FRUIT FLY

- A fly, order Diptera
- native to the tropical and subtropical rainforests of Queensland and northern New South Wales.
- Active during the day, mate at dusk.
- infect almost all commercial fruit crops as hosts, in all at least 300 species of cultivated fruits and vegetables. NOT pineapple.
- Outbreaks are most likely to occur from November to May after periods of rain or high humidity, but some activity may continue during cooler months of the year.

QFF adult is about the same size as a house fly.



One of about 150,000 species of fly in the insect order Diptera which includes mosquitoes and Tsetse flies.

It lays eggs which hatch into maggots!

Lifecycle

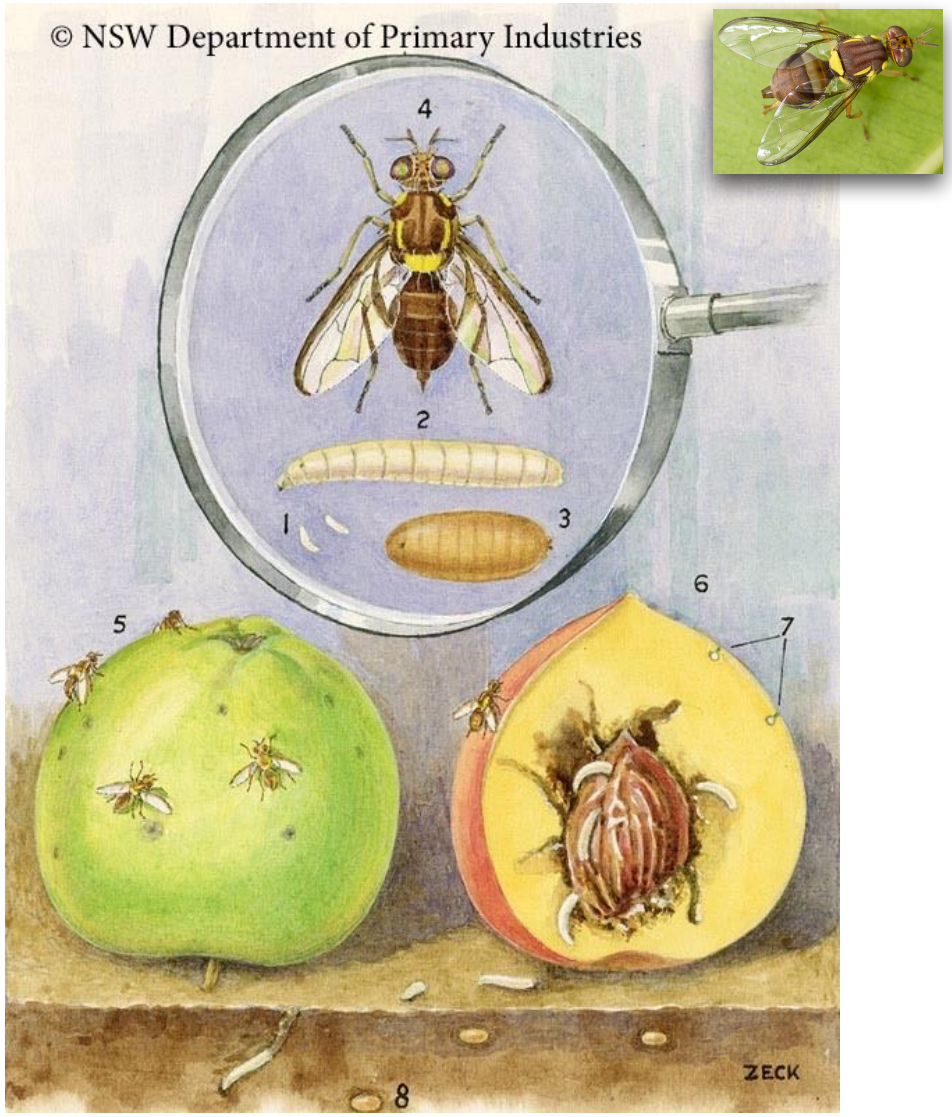
Four stages in the lifecycle:

1. Egg: laid into healthy fruit, 1mm long
   hatch in 2-3 days, in groups of 6 or 7.

2. Larvae: i.e. maggots, grow to 10mm+
   in 7 to 10 days.

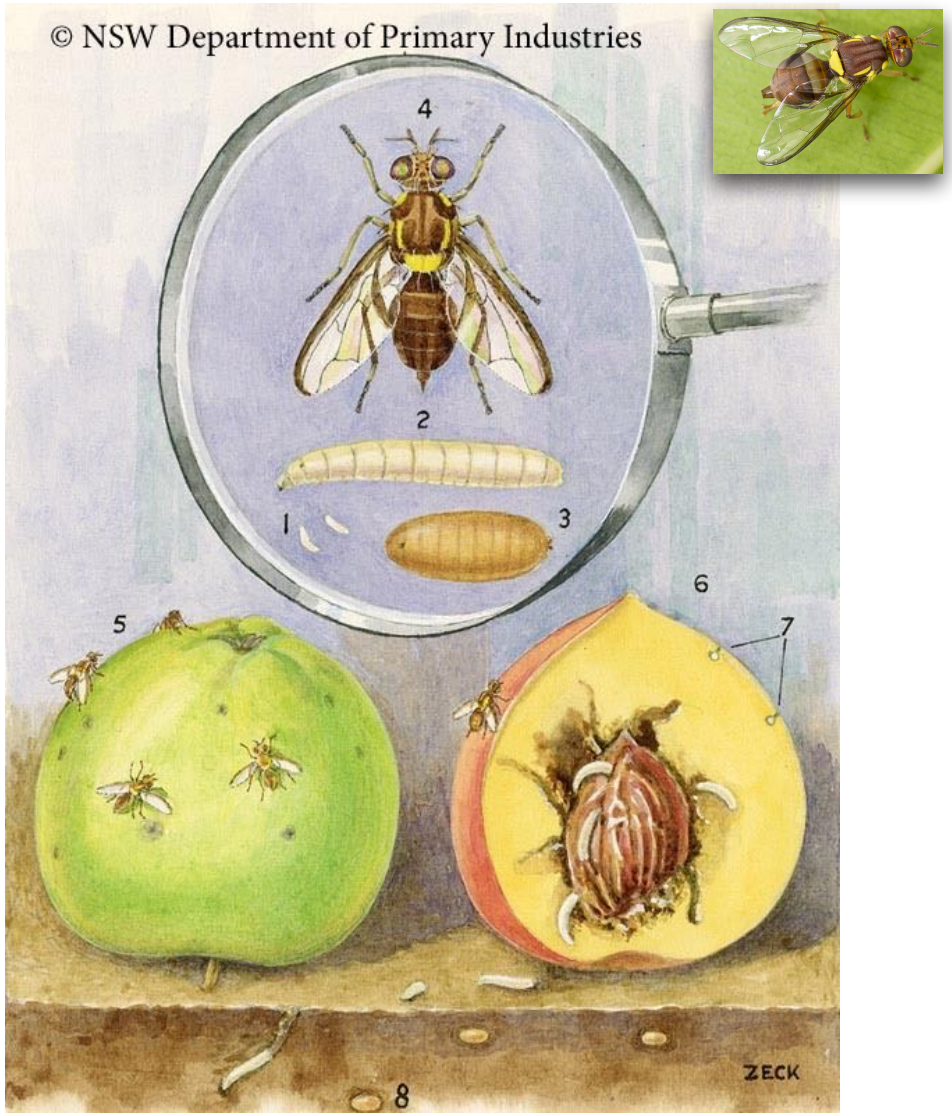
3. Pupae: hard-skinned, brown,
   barrel-shaped 4–5 mm long
   hatch in 9 days to several wks.

4. Adult: female takes a week or so to find
   protein and can then lay eggs.
   Adults can live for many weeks.
   Female flies usually mate once or twice
   and can lay several hundred eggs.
   Male flies mate multiple times.



Lifecycle

5. Multiple females can sting each fruit.
6. Larvae cause fruit to rot and drop.
7. Puncture marks are visible
8. Mature larvae, 3rd instar, burrow and transform by hardening outer covering.




EGGS


ADULT


PUPAE


LARVAE

Behaviour - breeding

- In suitable weather from egg to adult in 3 weeks
- Females lay approx 7 eggs/puncture up to 100 eggs/day
- Adults may live for a year or longer.
- *B. tryoni* does not breed continuously, but spends the winter in the adult stage.

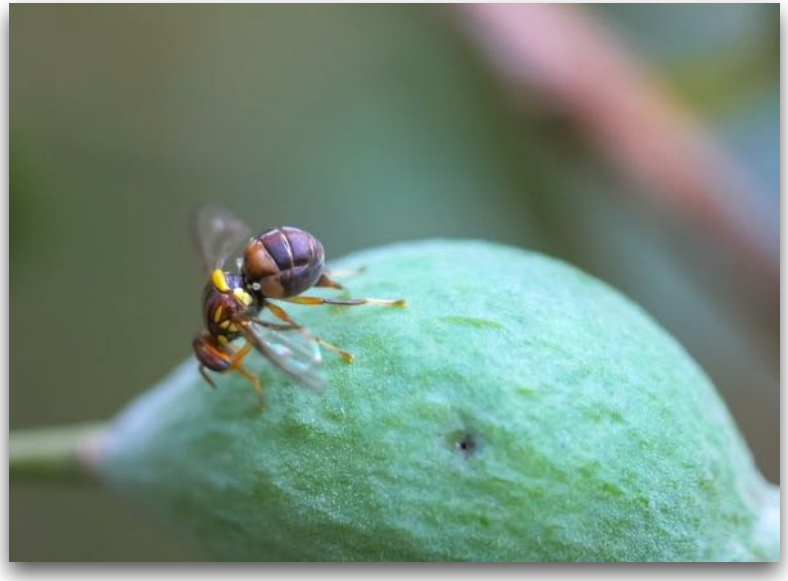
Behaviour - seasonally

- QFF numbers increase in spring and there is suitable host fruit.
  Four or five overlapping generations of females annually.
- *B. tryoni* disperse widely, travel large distances.
  Have spread over many years with European food growing.
- Adult flies seek overwintering sites or avoid dry or cold weather.
- Tolerate extremely high temperatures,have a minimum necessary temperature to breed; therefore, global warming has fostered their spread across Australia and Polynesia.
- Exhibit extreme plasticity and adaptation allowing them to survive in cooler temperatures and at higher altitudes.
- Can survive throughout winter in protected sites.
- During winter months the QFF population will diminish. However some adults survive the winter by sheltering in protected places.

Behaviour - daily

Most active from dawn and the first few hours of the day and then towards late afternoon.

Adult flies feed on leaf surface bacteria as a major source of protein.



Require a protein source to become sexually mature.

Feed on a sugar source (honeydew, nectar) for energy.

Rest during the day in shady trees (fruit trees, ornamental trees and shrubs)

mate at dusk.

Strategy - multifaceted approach

MONITOR

We need to know when numbers are building
TRAP and COUNT
Trapping kills giving a body count AND a reduced breeding population

DISRUPT

Understand lifecycle stages and requirements
Prevent mating, prevent maturation

KILL

Remove males and females

MANAGE

Exclusion netting, orchard hygiene

Information we can use

Like most creatures QFF behaviour is driven by the need to procreate. Our recognition of this irresistible urge combined with knowledge of the specie's lifecycle allow us to control if not eradicate it and succeed in harvesting undamaged crops.

- Adult QFF need protein soon after emergence in order to reach sexual maturity.
- Adult QFF also need a carbohydrate energy source.
- An artificial pheromone called Cue-Lure has been developed which is highly attractive to male QFF.
- There is no equivalent lure for females however newly emerged female QFF are strongly attracted to protein and energy food sources they need in order to be able to lay eggs.
- Food based baits have been developed which are highly attractive to females.

A Low Environmental Impact Strategy

We need to know when QFF is present and when it is we must stop females laying eggs. Therefore:

- Even before the QFF season begins we place traps to detect the very first males to appear for the season.
- As soon as males are detected we know females are also around so without delay we deploy poison baits to kill females.
- The baits may also kill males (those not caught in our monitoring traps), but females are the primary target.

This two pronged approach, with crop and location related refinements, is the basis of QFF control in commercial horticulture. It serves as a good model on which to base strategies for non-commercial areas ranging from home gardens to urban and rural localities.

Netting - a limited solution

Insect netting, with spaces no larger than 2mm x 2mm, will prevent the entry of QFF and other insect pests. It is a good solution to protect fruit on a particular trees but will not eradicate the pest.

- Netting should be deployed immediately after petal fall to ensure young developing fruit is not attacked.
- Netting must be meticulously attached as any gap will allow QFF entry and once inside the net a single female fly can sting many fruit.
- Netting is best supported by a frame that prevents fruit touching the net which can then be stung.
- Cheaper grades of net may easily be damaged when handled and can be torn by birds, foxes and rodents.
- To promote longer life nets should be repaired, cleaned and stored out of the sun after harvest.

Cover Spraying - a last resort

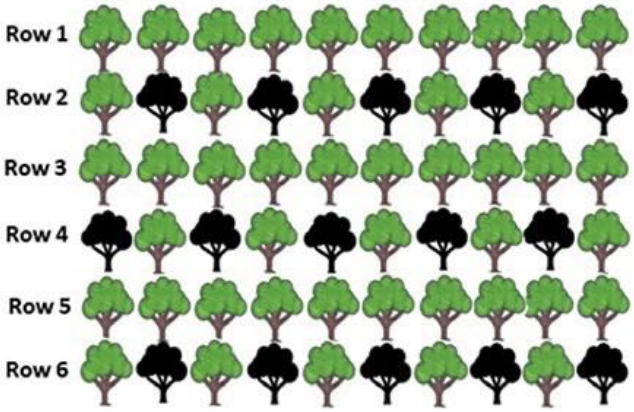
A cover spray is an insecticide spray which covers the entire orchard, garden, park or other planted area.

- Such a cover spray would be ineffective in any event as it would not kill the pupae or much of the larval population feeding within fruit.
- Cover sprays would result in widespread destruction of non-target species nearly all of which are not pest species and are a crucial part of the local ecosystem.
- They are sometimes employed in commercial horticulture when other methods for some reason have failed.
- Similarly soil drenching to kill pupae will be unsuccessful as that lifecycle form is well protected and would also result in widespread destruction of desirable soil based life.
- Monitoring traps attract and kill QFF so have virtually no environmental downside while in use. Cardboard versions are available which also avoid the introduction of spent plastic traps to the waste stream.
- A directed protein bait spray, while potentially attracting some non-target species is only applied to small surface areas, eg. Fence posts, tree trunks, stakes, garden edges, etc. and therefore has a much lower impact on beneficials.

Commercial QFF Control

MAT Monitor

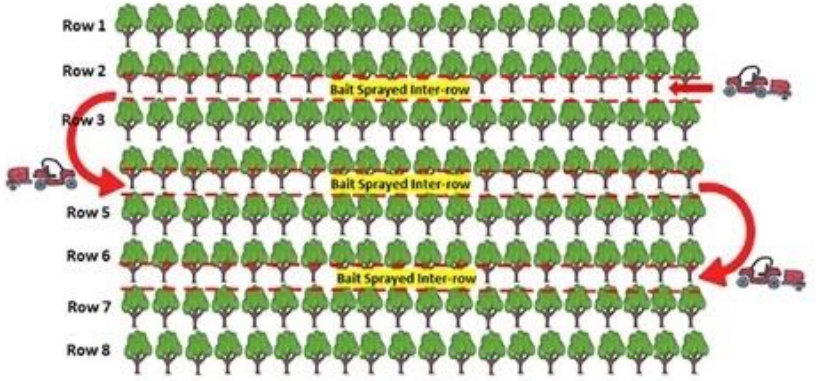
SPOT



Spot spray every second tree (black) in every second row in high density blocks.

Not using cover sprays - a last resort.

CONTINUOUS



Bait spray every second inter-row (red dotted lines). For the next 7-day application, spray alternate inter-rows.

Management

There are significant benefits to continued site management because no matter how effective an early monitoring and baiting program may be QFF may enter from less well managed neighbouring areas.

Hygiene

- Promptly, on a daily basis, remove fallen and infected fruit. Larvae growing within fruit need to reach the ground so they can burrow into the soil and pupate.
- Do not transport fruit away from areas with fruit fly.

DO NOT

- Feed fallen fruit to poultry, many larvae will survive.
- Put it into landfill - this just moves larvae somewhere else.
- Add it to compost heaps which are an ideal environment for larvae to pupate.

DO

- Kill larvae by freezing fruit - needs to be in the freezer until frozen usually for up to 24 hrs. (PREFERRED METHOD)
- Kill larvae by sealing inside a robust plastic bag and leaving in the full summer sun for several days before disposal.

Traps – Monitor and remove adult QFF

Fruit fly traps help monitor Queensland Fruit Fly (QFF) populations, guiding timely prevention and control actions. However, traps alone do not control QFF and should be part of a broader area wide management strategy.

Best Practices:

- Install traps with fresh lures and remove expired or inactive ones.
- Check traps at least weekly to ensure accurate data.
- Record QFF catches and spread the word to neighbours and other interested parties including through local social media based groups.

Traps help detect population changes, indicating whether additional control measures are needed or if current strategies are effective. Fruit inspections also complement trapping for better monitoring.

Trap Types & Lures

Various trap designs exist, using three main attractants: male lures, protein/food scents, and fruit-mimicking baits. Using a mix of trap types provides a clearer picture of QFF activity.

Male QFF Attractant

Male QFF traps use a para-pheromone (Cue-lure) to attract males, which they need to produce their own female-attracting pheromones.

Lures come in pad, wax block, or liquid form. For best results, deploy traps early in the fruit season, spaced in a 400m x 400m grid. Male lures attract QFF from up to 200m. If a single fly is caught, begin or increase control efforts, intensifying if catches rise.

Food (Protein) Attractant

Protein-based traps attract hungry 'teenage' QFF and virgin females, which need high protein intake. Some non-target flies may also be drawn to the decaying organic scent. Protein lures come in gel or liquid form.

Home gardeners can make traps using recycled bottles and kitchen ingredients. For best results, install protein traps before females mate. They attract QFF from 15–20m.

Fruit Attractant

Fruit-mimicking traps use scent, colour, and shape to attract egg-laying female QFF from up to 20m away. Commercial options exist, or home gardeners can make their own using fruit juice and common kitchen ingredients.

Traps – Kill Mechanisms

- **Insecticide Traps:** Contain an insecticide-soaked wick, mallet, or block with a lure, or an added insecticide cube.
- **Sticky Traps:** Feature a replaceable sticky card inside the trap to prevent harm to wildlife. These are insecticide-free, ideal for organic systems, and useful for identification and counting.
- **Drowning Traps:** Use liquid to drown insects. The liquid level must be maintained, especially in hot or rainy conditions. Additives like dish soap reduce surface tension, increasing effectiveness.

Male Annihilation Technique (M.A.T.)

M.A.T. helps control Queensland Fruit Fly QFF by reducing the number of males available to breed leading to population decline. Use throughout the year starting late winter.

M.A.T. traps are placed in trees at 1–1.5m high, following a grid pattern over a wide area. Males are attracted to the lure, come into contact with the insecticide, and die. The insecticide is not applied to fruit.

Since even a few males can sustain a breeding population, M.A.T. should be combined with other controls, such as area-wide protein baiting. It is most effective when deployed early and over a large area.

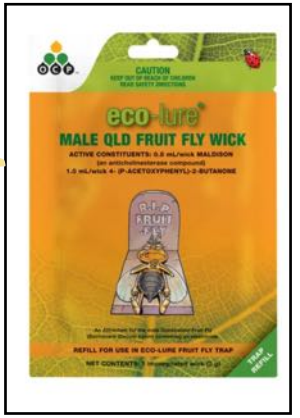
Regularly replace expired M.A.T. devices to maintain effectiveness.

50 pack plastic or cardboard $178.09 MAT cups

Traps for control and monitoring: insecticidal bait

Single Trap with 1 wick $20.90
Replacement wick $9.95

- Attracts and kills male QLD fruit flies when they touch the wick
- Catches dead insects in clear container allowing monitoring
- Attract flies from approximately 400m (wick product says 400 sq.m.)
  Replace wick every 3 months.

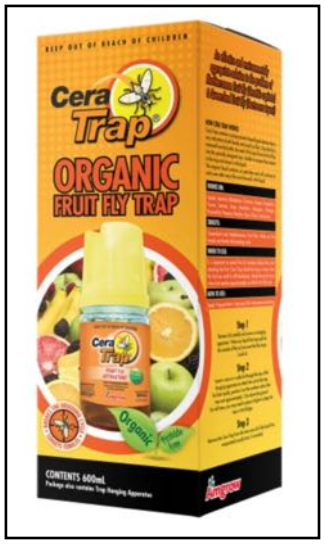


Traps for control and monitoring: non toxic/organic

Non-specific traps

- Liquid hydrolysed proteins that is very attractive to both female and male fruit fly.
- Traps and kills by drowning.
- One trap per tree

PESTROL $37.90 1L refill (8-10weeks) $32.90



Traps for control and monitoring: non toxic/organic

Male only traps - allow monitoring

Covers around 1000 square metres kills by drowning.
$24.90 with two refills
PESTROL Refill 500ml $19.90

This lure will attract fruit flies from up to 3-400 meters
Kills with sticky card.

PESTROL $28.90 with one wafer; Refill wafers $9.95; Sticky inserts 5 Pk $13.95

Protein Bait Sprays

- A protein + toxicant attracts and kills female flies
- Female fruit flies must feed on protein before they can sting fruit

Fruit Fly Lure is an autolysed protein highly attractive to Queensland and Mediterranean fruit flies. It needs to be mixed with a thickener and a toxicant and can then be used to attract and kill adult fruit fly.

1L $59.95 BUGS FOR BUGS

+

A food grade thickener that improves weathering and longevity in the field.

Thickener 2 kg pack $48.51
BUGS FOR BUGS

+

- **Active Ingredient:** 18g/L Abamectin
- **Broad Spectrum Control**: Effectively targets a wide range of mites and insect pests across various crops.
- **Active Ingredient Abamectin**: Rapidly impacts pests' nervous systems, leading to effective control.
- **Long-Lasting Protection**: Offers residual activity that ensures continued protection against pests.
- **Versatile Crop Compatibility**: Suitable for use on fruits, vegetables, cotton, and ornamental plants.
- Withholding periods up to 14 days on food crops
- Not absorbed by foliage, biodegradable

PESTROL 1L $119.90

Add Bugs for Bugs Fruit Fly Lure at 2 L per 100 L of thickened water
+
Abamectin 18 g/L 25 mL/100L water

Detailed instructions at:
https://bugsforbugs.com.au/product/fruit-fly-lure/

Baiting combines a protein food with an insecticide registered for QFF control

Fruit Fly Destroys Citrus Crops

Active ingredients and trade names extracted from the Agricultural Pesticides and Veterinary Medicines Authority (APVMA) database in May 2020.

The list includes products that were registered, or permitted under permit, for control of Qfly in citrus, in NSW and Victoria, in May 2020.

Chemical labels and the status of registration or permits can change. Refer to label **Direction for Use** for application rates and restrictions on use.

ait – Spot spray or band spray weekly onto foliage or bark. Avoid contact with fruit.

PURPOSE	ACTIVE INGREDIENT	PRODUCT NAME	COMMENT
A food source in the bait mixture attracts Qfly	Protein	Fruition® Natflav® 500 yeast bait	Add insecticide
		Hym-Lure® Protein Bait	
		Bugs for Bugs Fruit Fly Lure Yeast Autolysate	
		Cera Bait® hydrolyzed protein	
An insecticide in the bait kills Qfly that feed on the protein or yeast	Chlorpyrifos	Lorsban 750 WG, Pyrigran (NSW and Qld)	Add protein attractant
	Maldison	Fyfanon® 440, Fyfanon® 1000, Hy Mal®	
	Trichlorfon	Lepidex® 500, Dipterex® 500, Tyranex® 500 SL Surefire Trepidex 500, AC Tripster500 SL	
	Abamectin	PER 14932 allows use of abamectin as Vertimec Insecticide/Miticide or Vantal Upgrade Miticide/insecticide as band sprays	
Some bait products contain a food source and insecticide as a pre-mix	Protein + sugar + spinosad	Amgrow organix fruit fly control	This is a pre-mix of attractant and an organic insecticide
		Eco-naturalure® fruit fly bait concentrate	
		Naturalure® fruit fly bait	

Protein Bait Sprays

Potential Organic Solution

Yeast-based protein and sugar-based fruit fly bait containing the active ingredient spinosad.

Naturalure™

Pack size 10L. $279.90
BUGS FOR BUGS

Yates Nature's Way Fruit Fly Control

200ml $34.95
EASY PEST SUPPLIES

Concentrated Solution
Mix 1 part of Naturalure Fruit Fly Bait Concentrate with 1.5 parts of water.
Eg: Add 4L Naturalure to 6L water for 10L of bait mix in a backpack to treat 4ha.

Dilute Solution
Mix 1 part of Naturalure Fruit Fly Bait Concentrate with 6.5 parts of water.
Eg:Add 1L Naturalure to 6.5L water for 7.5L of bait mix in a backpack to treat 1ha.

USEFUL LINKS

Products

Local hardware and garden suppliers

If fruit fly is present in your area ask local produce merchants, farm suppliers, hardwares and garden centres to consider stocking suitable products through their trade suppliers.

BAITS, LURES, TRAPS

FRUIT TREE FOLK SHOP

https://fruittreefolk.com.au/folkfavourites/

PESTROL

https://www.pestrol.com.au/

BUGS FOR BUGS

https://bugsforbugs.com.au/

EASY PEST SUPPLIES

https://www.easypestsupplies.com.au/

Online searching will uncover many other sources.

INSECT NETTING

HAVERFORD

https://haverford.com.au/collections/fruit-fly-insect-netting

SAGE HORTICULTURE

https://www.sagehort.com.au/product-category/insect-mesh/page/2

Information

Bugs for Bugs Toolkit

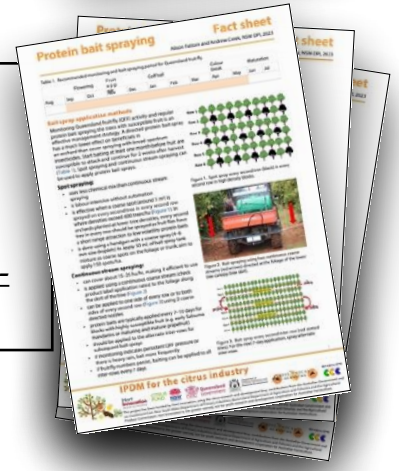
https://bugsforbugs.com.au/wp-content/uploads/Fruit-fly-toolkit-Aug22.pdf

NSW Department of Primary Industries

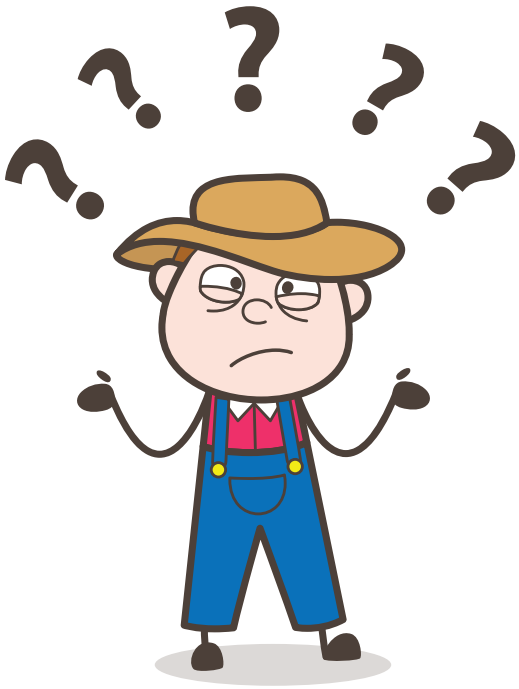
https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0008/1482740/Queensland-fruit-fly.pdf

NSW Department of Primary Industries

https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0010/1482742/Queensland-fruit-fly-protein-bait-spraying.pdf



Confused?



A lot of information! A lot of products, many doing similar jobs.

Very confusing with brand names and different state government and industry bodies actively disseminating material.

Best results from a coordinated action by neighbours.

WHAT NEXT?

Is there any hope?

We know that QFF is moving south and grows in numbers year by year in each locality it has reached. We know from first hand accounts, eg Hopetoun March 2025, that after a few years home gardeners may start to feel they cannot defeat QFF and may have to stop growing fruit and other food crops altogether. But there is hope!

An individual using the measures described in their own garden can to some degree control fruit fly and harvest clean produce, but they will have to repeat the same actions every year possibly with growing fruit fly pressure.

A wider neighbourhood or locality approach is necessary to gain ground over time. This has been achieved in commercial horticulture regions where all growers follow good practices and most successfully where local communities have also become involved often through local and state government sponsored programs.

Communicate and Collaborate

Start a Fruit Fly Action group to educate, plan, bulk buy suitable products and take control. Seek funding where possible. Hold meetings and events to share knowledge and techniques. Start a WhatsApp group.

Deploy MAT traps around town ASAP. This will start the ball rolling and reduce males immediately taking some pressure off next season.

Keep MAT traps up-to-date and get a head start next spring. Share trap counts through WhatsApp, and the local newspaper, and start baiting as soon as the first males are detected.

Help neighbours with bait spraying where help is wanted.

Collaborate to remove unwanted and abandoned fruit trees.

Liaise with your local council to obtain the many forms of support they may be able to provide.

Such an approach is unlikely to eradicate QFF from any district completely but experience in areas where it has been prevalent for a long time demonstrates that a high level of control is possible.