Protein bait spraying Fact sheet

Alison Fattore and Andrew Creek, NSW DPI, 2023

Table 1. Recommended monitoring and bait spraying period for Queensland fruit fly.

	Flowering		Fruit drop		Golf ball				Colour break		Maturation	
Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul

Bait spray application methods

Monitoring Queensland fruit fly (QFF) activity and regular protein bait spraying the trees with susceptible fruit is an effective management strategy. A directed protein bait spray has a much lower effect on beneficials in an orchard than cover spraying with broad-spectrum insecticides. Start baiting at least one month before fruit are susceptible to attack and continue for 2 weeks after harvest (Table 1). Spot spraying and continuous stream spraying can be used to apply protein bait sprays.

Spot spraying:

- uses less chemical mix than continuous stream spraying
- is labour intensive without automation
- is effective when a coarse spot (around 1 m²) is sprayed on every second tree in every second row where densities exceed 600 trees/ha (Figure 1). In orchards planted at lower tree densities, every second tree in every row should be sprayed as fruit flies have a short range attraction to low-volatility protein baits
- is done using a handgun with a coarse spray (4–6 mm size droplets) to apply 50 mL of bait spray tank mixture as coarse spots on the foliage or trunk; aim to apply 150 spots/ha.

Continuous stream spraying:

- can cover about 15–25 ha/hr, making it efficient to use
- is applied using a continuous coarse stream (check product label application rates) to the foliage along the skirt of the tree (Figure 2)
- can be applied to one side of every row or to both sides of every second row (Figure 3) using 2 coarse directed nozzles
- protein baits are typically applied every 7–10 days for blocks with highly susceptible fruit (e.g. early Satsuma mandarins or maturing and mature grapefruit)
- should be applied to the alternate inter-rows for subsequent bait sprays
- if monitoring indicates persistent QFF pressure or there is heavy rain, bait more frequently
- if fruit fly numbers persist, baiting can be applied to all inter-rows every 7 days

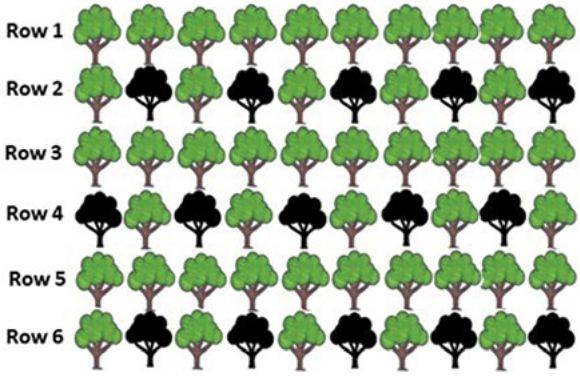

Figure 1. Spot spray every second tree (black) in every second row in high density blocks.

Figure 2. Bait spraying using two continuous coarse streams (red arrows) directed at the foliage of the lower tree canopy (tree skirt).

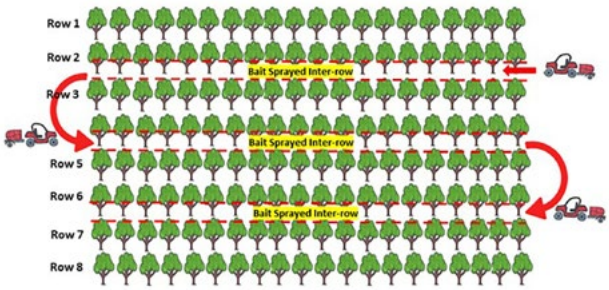

Figure 3. Bait spray every second inter-row (red dotted lines). For the next 7-day application, spray alternate inter-rows.

IPDM for the citrus industry

This project has been funded by Hort Innovation, using the citrus research and development levy, contributions from the Australian Government and co-investment from New South Wales Department of Primary Industries, Queensland Department of Agriculture and Fisheries and the Agricultural Produce Commission. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

Alison Fattore and Andrew Creek, NSW DPI, 2023

- wicks should be replaced every 3 months.

To avoid fruit blemish, follow all label directions of the products used.

Bait preparation and mixing

- Mix protein bait and insecticide following label instructions. Applying more than the recommended rate can damage the fruit. Wear the recommended personal protective equipment (PPE).

Protein bait and insecticide mixing method

Water must be added to the tank first; half-fill the tank with water.

1. Dissolve the required amount of protein bait in a 20 L bucket with a small volume of water. Add this to the tank and mix thoroughly. The protein bait is very thick and must be thinned with water before adding it to the tank.
2. Add the measured volume of insecticide to the tank.
3. Fill the tank to the appropriate capacity with water and mix thoroughly.
4. Note: if using a thickener, pre-mix the thickener with the required amount of water the day before application (e.g. if using 100 L of spray and 1 L of insecticide, mix the thickener with 99 L of water). In this example, the thickener will be added to 99 L of water the day before application. Thickeners are useful in higher rainfall, humid and dewy conditions. Thickeners can be used to stabilise the bait mixture by reducing bait drying in hot weather and extending the life of the bait mixture.

Several protein bait spray mixtures can be used effectively in citrus orchards to manage Queensland fruit fly (Table 2 and Table 3). These include a variety of proteins, insecticides and thickeners.

Table 2. Examples of Queensland fruit fly foliar bait spray, insecticide and thickener mixtures.

Protein bait/lures	Bait/lure application rate/100 L	Mix with insecticide	Insecticide application rate/100 L	Mix with thickener	Thickener rate/100 L
Bugs for Bugs Fruit Fly Lure	2.0 L	Abamectin 18 (18g/L) or Hy-Mal® (1150 g/L) (Maldison)	25 mL 435 mL	Keltrol®	500 g
Fruition® Natflav® 500 (420 g/L) Fruit Fly Lure	2.0 L	Abamectin 18 (18 g/L) or Hy-Mal® (1150 g/L) (Maldison)	25 mL 435 mL	Keltrol®	500 g
Hym-Lure™ (425 g/L) Fruit Fly Lure	1.5 L	Abamectin 18 (18 g/L) or Hy-Mal® (1150 g/L) (Maldison)	25 mL 435 mL	Keltrol®	500 g

Table 3. An example of a pre-mixed Queensland fruit fly foliar bait spray and insecticide concentrate.

Protein bait/lure	Mix rate	Insecticide	Application rate/ha
Naturalure®	Mix 1 part of Naturalure® Fruit Fly Bait concentrate with 6.5 parts of water	Pre-mixed fruit fly bait concentrate with Spinosad (0.24 g/L) Certified allowed organic input	1 L

Note: application rates are guides only. Please note that chemical registrations can change at any time. Always read the label.

This project has been funded by Hort Innovation, using the citrus research and development levy, contributions from the Australian Government and co-investment from New South Wales Department of Primary Industries, Queensland Department of Agriculture and Fisheries and the Agricultural Produce Commission. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

Alison Fattore and Andrew Creek, NSW DPI, 2023

Bait spraying conditions

Before applying any sprays, ensure the weather conditions are suitable for spraying. Ideal protein bait spraying conditions include:

1. temperatures below 30 °C (it is optimum to spray early morning so fresh bait is available when Queensland fruit fly are actively searching for food)
2. relative humidity above 45%
3. wind less than 15 km/h
4. rain is unlikely within 4 hours
5. re-apply after more than 5 mm of rain.

Male monitoring traps

- Male lure traps (e.g. Bugs for Bugs, RapidAIM, BioTRAP, Eco-lure, GEPRO Organics) should be hung and serviced all year to monitor fruit fly activity.
- Wicks must be replaced every 3 months.
- Hang one trap (Figure 4) every 5–10 ha, about 250–400 m apart, on the eastern side of trees at 1.5 m high and monitor weekly.
- Hang a trap in higher risk areas (i.e. shed, house garden, orchard boundary, neighbouring properties).
- Check traps weekly in spring, summer and autumn, then fortnightly in winter.
- Once checked, empty traps and record Queensland fruit fly numbers to monitor populations.
- Use trap counts as an indication of the effectiveness of the control program. Sudden spikes indicate a problem.

Figure 4. A male Queensland fruit fly lure trap.

Optimum Queensland fruit fly management is attained by the region adopting an area-wide management strategy. A neighbourhood community approach with primary producers and urban areas each monitoring and managing fruit fly will give the best results.

More information

Citrus Australia Limited. Fruit fly. https://citrusaustralia.com.au/growers-industry/fruitfly/

Creek A and Falivene S. 2021. Citrus plant protection guide. NSW Department of Primary Industries. https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/1187654/Citrus-plant-protection-guide-2021.pdf

NSW DPI Horticulture Citrus Team. 2021. Managing Queensland fruit fly in citrus. Primefact 752, third edition. NSW Department of Primary Industries. https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0017/120608/Managing-Queensland-fruit-fly-in-citrus.pdf

Acknowledgement

Stefano De Faveri, Queensland Department of Agriculture and Fisheries.

This project has been funded by Hort Innovation, using the citrus research and development levy, contributions from the Australian Government and co-investment from New South Wales Department of Primary Industries, Queensland Department of Agriculture and Fisheries and the Agricultural Produce Commission. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.