

Gardennote

Managing Mediterranean fruit fly in backyards

By Sonya Broughton, Senior Research Officer, South Perth



Figure 1 Female Medfly pierce the skin of soft fruits to lay their eggs

Mediterranean fruit fly (*Ceratitidis capitata*) is a serious horticultural pest in the South West of Western Australia. It attacks a range of cultivated fruits and some fruiting vegetables.

Medfly, as it is commonly known, infest more than 200 hosts worldwide. The first sign of damage is often larvae-infested or 'stung' fruit. Stinging is caused by the female laying eggs into unripened or ripe fruit. Larvae may develop from the eggs, depending on when they are laid and the fruit type. For example, stings can occur in apples and peaches when they are unripe, but the eggs do not hatch at this stage. As the fruit ripens the eggs can develop.

Life cycle of Medfly

Medfly activity depends on temperature. In the South West, Medfly is active in late spring, summer and autumn. In winter, it can become inactive in cold areas. Medfly can overwinter as adults, eggs and larvae (in fruit), or as pupae in

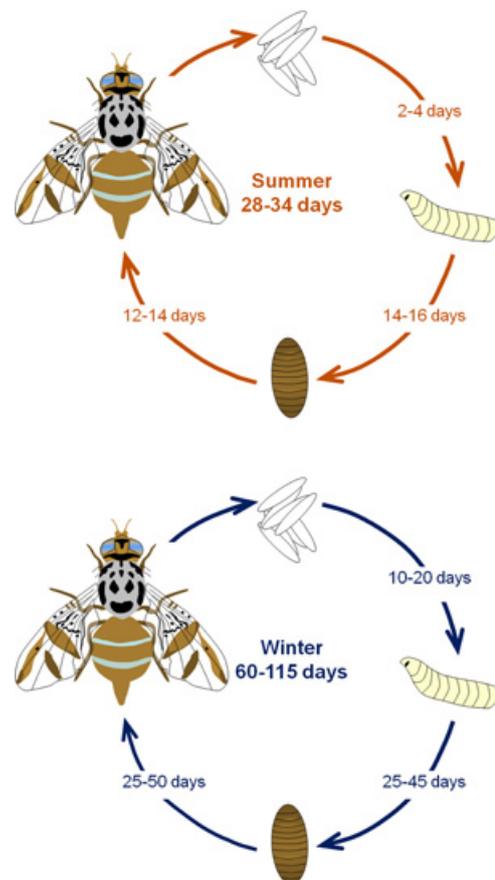


Figure 2 Life cycle of the Mediterranean fruit fly

the ground. Adult Medfly are active in winter when temperatures exceed 12 °C.

As temperatures increase in spring, adults begin to emerge from the ground and overwintering flies become active. If control is not started at this time, Medfly populations will increase to cause problems later in the season.

Important disclaimer

The Chief Executive Officer of the Department of Agriculture and Food and the State of Western Australia accept no liability whatsoever by reason of negligence or otherwise arising from the use or release of this information or any part of it.

Adult stage

The adult fly is 3–5 mm long (see Figure 2). Its body is light brown, and the abdomen is encircled by two light-coloured rings. The thorax (middle) has irregular patches of black and silver, giving it a mosaic appearance. The wings are mottled with distinct brown bands extending to the wing tips.

The female has an ovipositor or egg-laying organ but the male does not. Adult Medfly may live for 2–3 months and are often found in fruit tree foliage, especially citrus trees. As long as fruit is present, most Medfly do not move more than 50 m. However, they will travel further if no hosts are present.

Eggs

Medfly prefer to lay eggs in soft-fleshed fruit such as apricots, peaches, plums and nectarines. When Medfly numbers are high and competition is greater, females become less choosy and will infest less preferred hosts such as olives. They will also infest such fruits or vegetables if preferred hosts are not available, even when their populations are low.

Once a suitable host is found, the ovipositor is used to pierce the fruit skin (Figure 1). Batches of up to 300 white banana-shaped eggs are laid into this hole. Eggs are just visible to the naked eye and take 2–4 days to hatch in summer and 19–20 days in winter.

Larvae (maggots)

The larvae are white with a flat, pointed head. This stage of the life cycle is when they are most likely to be seen (Figure 2). When the larvae first hatch they are about 1 mm long, but grow quickly to 8 mm. The larvae feed on the fruit, causing it to decompose. When fully grown, larvae stop feeding and jump out from the fruit, burrowing into the soil to pupate. The larval stage takes about 14–16 days in summer and 25–45 days in winter.

Pupae

Pupae resemble small brown capsules or barrels about 4 mm long. Within the pupal case the Medfly slowly develops into an adult. When mature the adult fly cuts through the case and burrows up through the soil. The pupal stage lasts 12–14 days in summer, and 25–50 days in winter.

Managing Medfly

Fruit trees such as stone fruit (apricots, peaches, plums, nectarines) can be difficult to grow free of fruit fly in areas such as Perth where Medfly populations are high. Backyard fruit can be a significant source of Medfly to commercial orchards where they occur close to each other. If you are unable to manage Medfly or do not want to harvest your fruit, consider removing unwanted trees.

Hygiene

Under the *Plant Diseases Act*, the control of Medfly is compulsory. For control to be effective, it is essential for growers (both commercial and home garden) to dispose of fly-infested or unwanted fruit, including fruit left on the tree. Fruit disposal is the responsibility of the grower. Infested fruit should be picked and all fallen fruit gathered from the ground.

Possible disposal methods include:

Boiling and then feeding cooked fruit to poultry or pigs.

Solarising by placing fruit in plastic bags, preferably black garbage bags. Bags should be sealed and left in the sun for a few days. The heat from the sun kills the eggs and larvae.

Freezing for at least one day.

Burying – not ideal as larvae can survive burial, then pupating and emerging from the soil as adults. However, if there are large quantities of fruit, bury it at least 1 m deep.

Chemical control

Two main chemical control techniques are recommended – baiting, and lure and kill. Each technique has its own advantages and disadvantages.

Baiting

You should start during the early stage of fruit development (a third of final size), and continue until all fruit has been harvested.

Females require a source of protein to mature their eggs and to maintain egg production. They usually obtain protein from fruit juice, bacteria and bird droppings. Baiting consists of applying coarse droplets of protein laced with insecticide to leaves. Male and female Medfly are attracted to the protein as they forage for food, feed on it, and acquire a lethal dose of insecticide. Baiting targets only Medfly adults and conserves beneficial insects.

Baiting may not provide control of Medfly in crops that are highly susceptible, or in high pressure areas such as in suburbs with many established fruit trees. Female Medfly may find ripening stone fruit more attractive than baits. Effectiveness is increased if applied over a wide area such as in a community baiting scheme – so encourage your neighbours to bait their trees also.

The organophosphate maldison and a biologically-derived insecticide spinosad are currently registered for use (see Table 1). Spinosad is only available in a pre-made formulation with insecticide and protein added. It requires dilution with water.

The bait is applied to the foliage as a coarse spot spray of 60 to 100 mL for each tree depending on size. Entire tree coverage is not necessary as the flies are attracted to the protein by smell. The bait can be applied with a garden pressure sprayer, hand-held spray bottle, or flung onto foliage from a bucket with a paint brush. Make sure that the droplets are large – at least 2 mm across.

As the insecticides used in baits have a short residual life, baits need to be re-applied at weekly intervals. They also need to be re-applied if there is more than 5 mm of rain.

Baiting is a safe method of fruit fly control, but still requires care and commonsense precautions. As with any pesticide, precautions should be taken particularly when transporting and handling the insecticide concentrate, and mixing and applying bait material.

Lure and kill

Lure and kill devices work in a similar way to baits, exploiting the need of female Medfly to obtain dietary protein for egg production. Traps are hung on trees and the protein in the device attracts male and female flies. Depending on the trap, the flies drown or obtain a lethal dose of insecticide.

Ceratrap is the only lure and kill device currently registered in Australia. It consists of a plastic base and yellow lid, where the base contains a liquid that is attractive to Medfly. The flies enter through small holes in the lid, and eventually drown in the liquid. Freshly killed flies float on the surface.

You can also make your own traps out of empty soft drink bottles, water bottles or 2 L milk or juice cartons, as seen in (Figure 3). Remove the label first as it may deter flies or attract young children. Drill, punch or burn at least four holes on opposite

Table 1 Insecticides currently registered for baiting Medfly adults (home garden)

Product name(s)	Application rate	Frequency of application	Comments
Spinosad eco-naturaleure® Fruit Fly Bait Concentrate	Mix 10 mL in 15 mL of water: treats 1 square metre of foliage	Weekly or more frequently if it washes off	Apply to foliage; avoid continually spraying the same area
Nature's Way® Fruit Fly Control	Mix 40 mL with 260 mL of water in a spray bottle; treats six trees		
Amgrow Organix Fruit Fly Control	Mix 10 mL in 60 mL of water; treats 1 square metre of foliage		
Maldison David Gray's Malathion Garden Spray, David Gray's Fruit Fly Garden Spray, Amgrow Chemspray Malathion Insecticide	Mix 25 mL in 4 L water + 25 mL protein such as Bugs for Bugs Fruit Fly Lure OR 2 teaspoons of Marmite or Vegemite OR 20 g sugar	Weekly or more frequently if it washes off	Do not pick fruit for 4 days after spraying

Table 2 Recipes to lure Medfly in home gardens

Solution 1 80 g white sugar 1.5 g dry brewer's yeast 920 mL water
Solution 2 5 mL imitation vanilla essence 20 mL household ammonia 1 L water
Solution 3 Peel from 6 mandarins (or 2 oranges) 50 mL household ammonia 1 L water
Solution 4 2 tsp honey 2 tbsp ammonia 2 tbsp imitation vanilla essence 1 L water
Solution 5 1 tsp borax 1 tsp sugar 2 tsp bran 1 L water



Figure 3 Home-made traps for Medfly can be cheap and effective

sides of the bottle, near the 'shoulders'. The size of the holes should be 6-8 mm. The trap can be hung from its neck by wire or string to a branch. Fill one-third of the trap with your selected recipe, such as those suggested in Table 2.

Many fruit fly recipes are available on the web. You can also make your own using wheatgerm (or bran), honey, sugar, jam, vinegar, vegemite, beer or fruit juices.

Home-made or commercial devices should be hung 1.5 to 2 metres above the ground in fruit trees. These do not need to be fruiting at the time. Try to place the device in the shady part of the tree. Some traps can also be placed in nearby non-fruiting trees where flies may shelter.

The attractiveness of food lures extends just a few metres, so traps should ideally be no more than 5–6 metres apart. You should hang at least two home-made traps per tree.

Traps may dry out during summer and should be topped up with more liquid. The entire contents of home-made traps should be replaced at least weekly, as the trap contents will attract other insects besides Medfly. However, a commercial lure is likely to attract Medfly only. If a trap dries out, Medfly may still be attracted, but will not be killed. When disposing of the trap contents, make sure that you do so away from fruit trees as the liquid may attract Medfly.

Lure and kill devices are not likely to kill all flies present, as the ripening fruit may be more attractive to the female Medfly than the trap contents.

Lure and kill devices can be used in conjunction with baiting or physical exclusion, which could involve fly-proof bags tied around individual fruits or branches.

Physical exclusion

Whole trees or fruits can be protected by excluding Medfly with mosquito netting, shade-cloth or nylon flyscreen. Large nets will need to be supported by a frame. Frames for nets to enclose whole trees can be made from polyethylene irrigation pipe (5 cm in diameter), which does not lose its shape in the sun. The frame is constructed by crossing over and tying together two lengths of pipe over the tree.

Frames can be secured in the ground by slipping the end of poly-pipe over posts such as star pickets embedded in the ground. Covers should only be left in place while fruit is ripening to avoid damage to the tree.

Individual fruits or branches can be protected by making bags or sleeves out of cloth such as gauze curtain material, muslin or mosquito netting. Tie off bags around the base of the fruit or branch with a twist tie or string. Commercial fruit fly exclusion bags are also available in either waxed paper or cloth.

Final advice



Figure 4 Tying bags around individual fruit can help protect them in home gardens

There is no 'silver bullet' to rid fruit trees in home gardens of Medfly which is widespread throughout South West Western Australia. If all property owners in a neighbourhood work together to control the pest, there is a much better chance of keeping populations down so that everybody can enjoy harvesting unblemished fruit.

Specimen identification requirements

When sending or delivering samples, the following information is required:

- Collector's name, location (where the specimen was found), full address, telephone number and e-mail address, description of the damage and date collected.

Department of Agriculture and Food
Pest and Disease Information Service
3 Baron Hay Court, South Perth WA 6151
Freecall: 1800 084 881
Email: info@agric.wa.gov.au