



Fruit fly trial in Western Australia



Western Australian researchers are trialling new technology which offers an environmentally-sustainable way to control the destructive horticultural pest, Mediterranean fruit fly.

The research is led by the Department of Agriculture and Food, Western Australia (DAFWA) with supporting funding from Horticulture Innovation Australia Limited.

The trial involves a new Medfly strain developed by United Kingdom-based company Oxitec, and trialled by DAFWA for assessment in Western Australian conditions.

Frequently asked questions

Q: What is Mediterranean fruit fly (Medfly)?

Mediterranean fruit fly (*Ceratitis capitata*) is a serious horticultural pest in Western Australia. Medfly, as it is commonly known, attacks more than 200 cultivated fruits and some fruiting vegetables. The first sign of damage is often maggot-infested or 'stung' fruit. Stinging is caused by the female fly laying eggs into unripened or ripe fruit.

Q. Why is Medfly an issue for Western Australia?

Medfly costs the WA horticulture industry millions of dollars annually in lost production and control costs. Growers use a range of methods to combat fruit fly, including pesticides, baiting and orchard hygiene.

There have been changes to the pesticides allowed for fruit fly control in Australia. The withdrawal of organophosphates from Australian orchards has renewed interest in sustainable control solutions for fruit fly.

Q: What is Sterile Insect Technique (SIT)?

Technology currently in use, called Sterile Insect Technique (SIT), involves breeding male Medfly and using radiation to render them sterile. These sterile male flies are released in targeted fruit growing areas that have large populations of the pest. The females mate with the sterile flies, but are not able to produce offspring from the mating.

It is a clean, environmentally friendly method of pest control. However, irradiated sterile flies can be less vigorous than wild flies. Radiation can weaken the newly sterilised insects, shortening their life spans and making them less able to compete with wild males. It therefore takes a large release of sterile male flies to 'flood' the population sufficiently to ensure that wild females choose the sterile mates. The process must be repeated to reduce the Medfly population.

SIT can be used to suppress insect pest populations as part of local eradication programs or to prevent new incursions in crop production areas. The technique is generally used in conjunction with other control methods.

Q: What is the Medfly lifecycle?

The Medfly develops from an egg to a larva (maggot) to a pupa to an adult fly. The adult male seeks out females to mate with. Egg-laying females then penetrate the skin of fruit and the larvae feed on the fruit. The life-cycle of these flies (egg-to-reproducing adult) can be as short as 21 days in ideal conditions.

Adult Medfly typically survive three months.

Q: What will the DAFWA trial involve?

The DAFWA trial will study the rearing and mating ability of an imported strain of Medfly under contained laboratory conditions.

The flies were brought into Western Australia from the United Kingdom under permit in October 2015 at the egg stage and reared at DAFWA's approved research facilities.

Their performance will be tested in glasshouse trials. This involves the release of Oxitec males into a tent within the glasshouse with females to examine their mating performance. The trial will be replicated to compare their mating competitiveness against the control pest males and SIT males.

The outcome of the trials will inform future research. Further trials would be subject to approval from the Office of the Gene Technology Regulator and other Australian regulatory agencies.

Q: What is this Medfly strain being used in the trial?

Oxitec Ltd, a spinout biotechnology company from the University of Oxford, has pioneered an improvement on the SIT approach to help control insect pests. It works to reduce pest Medfly populations in a similar manner to SIT but instead of using radiation to render the male sterile, the trial flies are genetically modified to carry two genes.

The first is a 'self-limiting gene'. The males pass on the 'self-limiting gene', which prevent female offspring from developing to adulthood. With successive releases of these male flies, the number of females in the pest population drops, reducing the pest problem.

The second is a 'marker gene', a fluorescent protein visible under special light, which allows researchers to track and trace the male flies and their offspring.

The male flies are expected to be free of the adverse effects of sterile male flies weakened by radiation under conventional SIT methods.

Q: Is this technology being used anywhere else?

Yes. Oxitec insects have been evaluated in trials in several countries, including open releases in the US, Cayman Islands, Brazil and Panama. In Brazil the national biosafety group has approved the Oxitec mosquito for release throughout the country to control the *Aedes aegypti* mosquito, which can spread the diseases dengue fever and chikungunya virus.

The US Department of Agriculture has also been conducting field trials with a strain of the cotton-damaging pink bollworm (*Pectinophora gossypiella*) in Arizona since 2006.

More information on Oxitec's approach is available from oxitec.com.

Q: What approvals were required for this trial?

In this trial, Medfly are contained in approved laboratory conditions. The trial is subject to quarantine and regulatory conditions required by the Australian Department of Agriculture and Water Resources, and Department of Environment, and the Office of the Gene Technology Regulator. Further trial work would be subject to additional approvals.

Q: How will you know the trial has been successful?

Researchers will assess the performance of the male Oxitec Medfly based on their mating ability and rearing ability. The outcomes of the trial will indicate whether there is potential to use this strain in commercial pest management programs.

More information

More information on the trial is available from the DAFWA website agric.wa.gov.au