

Citrus NZ investigations into alternatives to Diazinon

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Background

The NZ Environmental Protection Authority (EPA) reassessed OP insecticides from 2010 – 2013. This resulted in some actives being given a 10 to 15-year phase out period. As 2023 approaches the first phase out deadlines are looming. In submissions provided to the EPA in 2013 – industry pointed out that, given the importance of these OPs to some crops, this short phase out may not be long enough to find alternatives.

CNZ is interested in retaining past 2028 the active diazinon.

Key points

- Dew (diazinon) is registered on mandarin and oranges for control of Aphids, Mealy bug, Scale insects, Australian citrus whitefly (ACW) and thrips.
- If the phase out is not extended – it is likely the last year of import of diazinon into NZ would be around 2026.
- For citrus growers there are not many insecticides with label claims and set MRLs for use on citrus that are also highly efficacious.
- From a grower perspective diazinon is very cost effective, and only needs 1 spray at the adult life stage to control Australian Citrus Whitefly.
- Diazinon is a broad-spectrum insecticide but with no observed disruption of biocontrol.

The Australian citrus whitefly (*Orchamoplatus citri*) was first detected in Auckland in 2000 and has now spread to all the main commercial citrus-growing regions. Australian citrus whitefly causes significant sooty mould problems on commercial and home garden citrus. Up to 90% crop damage has been reported on commercial mandarin and orange crops. All varieties of citrus are susceptible. Mandarin and orange growers regard diazinon as critical to the effective control of ACW. This pest causes the growth of sooty mould caused by excretion of honeydew (Fig 1). This causes significant cosmetic issues on fruit, and high levels of sooty mould can lead to uneven ripening of fruit and can lead to reduced tree vigour.

The New Zealand citrus industry follows an integrated pest and disease management (IPM) programme that was developed through a MAF Sustainable Farming Fund project (project number 02/073) and launched to the industry in 2005. The programme is documented in an industry manual called Practical, Safe and Effective Integrated Pest Management Strategies for New Zealand Citrus, and is now available to growers online via the industry website.

Investment by the Citrus industry to find alternatives

For the last 15-20 years the Citrus industry has invested over \$150,000+ of grower levy funds to look for alternatives to diazinon to control Australian Citrus Whitefly. This is a significant investment of grower levies on trying to find alternatives given our annual total R&D budget is ~\$80-100,000. The programmes and initiatives funded by Citrus NZ are listed in Table 1. Given that there are many records of insecticide resistance in whitefly species, the citrus industry recognises the importance of having a variety of insecticides available for rotation within a resistance management strategy.

Past studies funded by Citrus NZ have focused on evaluating new chemical and non-chemical alternatives for efficacy against all ACW life stages (eggs, nymphs, and adults), as well as investigations into biological control options.

New chemical control options have been identified by the industry through this work. However, efforts to obtain label registrations for citrus have been unsuccessful.

There is a particular active ingredient which is registered in NZ on several crops to control sucking and chewing (Lepidopteran) insect pests and is softer on certain beneficial arthropods (parasites and predators). This active ingredient is also registered in Australia for use on citrus. Through extensive investigation from Citrus NZ with the NZ EPA and registrant on this product – it became clear that the NZ regulatory requirements to register this product at the same rate and timing etc. as the label in Australia for citrus would be too costly as significant additional toxicological data would need to be generated to satisfy the NZ regulator. The registrant has advised that the return on investment for use on citrus in NZ is too low to justify the expense of generating this data.

Biological control options have been explored with Plant & Food Research carrying out surveys in Australia for naturally occurring parasitoids of ACW that could be potential BCAs in New Zealand. These studies did identify potential parasitoid species, however rearing sufficient numbers for testing in the laboratory has proved difficult. Further research is needed to develop rearing technologies and to trial the parasitoid to gain an understanding of the BCA potential against ACW. Application to the EPA would then be required to release these parasitoids in NZ. This work is expensive and long-term, and Citrus NZ has only been able to fund initial surveys and preliminary laboratory studies due to R&D budget constraints.



Figure 1. ACW adults on leaf (L), adults and eggs laid in circular rafts (R).

Table 1. Research carried out by Citrus NZ to find effective controls for ACW.

Year	Research topic	Cost
2016	ACW agrichemical control options – feasibility study (NZCGI 176)	██████
2016	ACW efficacy trial – Grandevo (trial and efficacy data assessment) (NZCGI 176)	██████

Year	Research topic	Cost
2014	Targeted insecticide applications to control ACW nymphs (Pyle/Anderson report) (NZCGI 132)	██████
2013	SFF whitefly biocontrol (NZCGI 121) (2013) Importation of the candidate biocontrol agent Encarsia iris against Australian citrus whitefly (Orchamoplatus citri) and colony establishment in containment (PFR report)	██████
2010	Whitefly biocontrol survey. A survey of natural enemies of Australian citrus whitefly, Orchamoplatus citri (Takahashi) in Australia – SFF project (PFR report)	██████
2010	Targeted insecticide applications to control ACW (PFR report) (NZCGI 83)	██████
2009	Seasonal phenology of Australian citrus whitefly (Orchamoplatus citri) in New Zealand (PFR report) (NZCGI 61) <ul style="list-style-type: none"> - Phenology of Australian citrus whitefly (Orchamoplatus citri) in citrus-growing regions of New Zealand (PFR report) (NZCGI 61) - Susceptibility of different life stages of Australian citrus whitefly (Orchamoplatus citri) to insecticides in laboratory bioassays (PFR report) (NZCGI 61) 	██████
2009	The current status and economic impact of Australian Citrus Whitefly on New Zealand Citrus (Pyle report) (NZCGI 68)	██████
2008-09	Whitefly spray trial – adults (NZCGI 71) <ul style="list-style-type: none"> - (2009) Australian Citrus Whitefly Spray Trial. Part one of three: spray applications targeting whitefly adults (Pyle/Minchin report) 	██████
2009	Whitefly spray trial – nymphs (NZCGI 72) <ul style="list-style-type: none"> - The efficacy of insecticides against Australian citrus whitefly crawlers and young nymphs (PFR report) 	██████
2009	Whitefly spray trial – imidacloprid (NZCGI 73) <ul style="list-style-type: none"> - Australian Citrus Whitefly Spray Trial. Part three of three: soil application of imidacloprid (Pyle report) 	██████
Total		\$150,278