Technical
Nursery Papers
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Western Flower Thrips (WFT)

The Virginia Farm Trials in South Australia have proved and collected useful recommendations for pests such as WFT using IPM techniques. These include:

- Identifying and knowing how to locate pests in a crop
- Monitoring pest levels using regular and accurate crop scouting
- Analysing the best response to changes in pest levels including NOT spraying
- Ensuring chemical treatments are carried out according to sound technical advice
- Managing resistance by planning rotations of approved chemicals by chemical group,
- Keeping regular and complete records of spray applications and results.

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Managing Western Flower Thrips using Integrated Pest Management (IPM)

Integrated Pest Management (IPM) is the modern strategic approach to pest management that relies on management factors working together in the following way:

- Farm hygiene and greenhouse/shadehouse design features to reduce pest entry where possible, therefore reducing pest pressure and the need to use chemicals
- Routine pest monitoring to improve decision making about using or withholding insecticides and/or biological control agents and measuring the effectiveness of all actions, and
- A spray program that is checked and fine tuned to ensure that when insecticides are applied they are as effective as possible at minimum cost and can be implemented in a way that prevents insecticide resistance emerging.

A good IPM system will enable more reliable control of WFT and other pests and probably result in fewer applications of broad-spectrum insecticides. It will also provide a better barrier to, or at least early warning of, new pest problems. This Nursery Paper, the last in a series of three, looks in detail at the control of WFT using IPM techniques and is based on the Virginia Farm Trials research project in South Australia.

While the focus is on control of WFT, the principles explained here are directly applicable to the control of most insect pests.

1 Identifying and knowing how to locate pests, such as WFT, in a crop

Learn about your key pests so you can easily recognise and locate them within a crop, at the various life stages and relate their findings to the threat of increasing plant damage. The correct use of hand lenses for plant scouting and sticky yellow insect traps to estimate changes in adult thrips and whitefly levels is necessary. Microscopes are required to obtain a positive WFT identification from about four common thrips species.

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2 Monitoring pest levels using regular and accurate crop scouting

A timely and robust system of crop scouting is required. Checking the roots, underside of leaves and inside flowers as well as appropriate representative sampling of all crops, paying particular attention to plants near house entry points, are necessary components of an accurate crop scouting program. This can help to:

- Decide when and when not to spray
- Pinpoint any weaknesses in spray programs
- Confirm successful pest control practices, and
- Increase grower confidence in the limited or judicious use of chemicals.

3 Analysing the best response to changes in pest levels, including NOT spraying

Routine spraying without checking pest levels or spray effectiveness is very hit and miss and will likely result in increased levels of resistance where WFT and whitefly are concerned. It is also likely to take more time and money than necessary and give poor results. Below is a summary of the guidelines used with growers to decide when to spray and to assess if the spray application was effective.

What's going on in my crop?

If sticky traps, plant scouting or plant damage show that thrips have started to appear in your crop, you should check two things:

- Use a small lens to check a sufficient sample of plants to thoroughly assess what is happening by looking at flowers, shoots and leaves for thrips levels and estimating the relative proportions of adults and larvae (adult thrips have wings and 'jump' or fly, larvae are slower and can't fly)
- Get the thrips species identified by an expert to find out if they are WFT

If the thrips present are mostly larvae then they are breeding steadily in the crop. If they are all adults they have probably just flown in from outside or from another area in the crop where they are breeding. If they are WFT it may be important to begin control early whereas other thrips species can be 'knocked back' fairly easily once they reach a level that causes commercial concern.

How do I know when to spray?

In some plant species and climates, thrips breeding rates may not be significant and spraying is unnecessary even though low numbers of adult WFT may be present. Control of thrips is more of a priority with seedlings and plants that are susceptible to Tomato Spotted Wilt Virus, which is spread by several thrips species including WFT.

If adult and/or larval thrips numbers are low, you may decide to monitor the situation more closely and wait. If the situation remains unchanged, and you are confident that your monitoring is giving an accurate picture, it should be safe to hold back on spraying. If monitoring identifies either a sudden or a steady increase in thrips levels then you need to get the thrips species identified, and quickly!

A sudden increase in adult thrips numbers may be due to a wave of thrips flying in (not necessarily WFT) whereas a steady increase despite a spray program indicates a probable infestation of resistant WFT. A shift from cool to warm temperature can also stimulate thrips breeding rates. At first, this will cause a noticeable increase in thrips larvae and then in adults a few days to one week later. A heat wave may bring the numbers down if temperatures rise above 45 degrees.

If thrips numbers are high, consider spraying and then monitor the results.

Deciding if the spray application worked

If there were high levels of WFT breeding steadily in the crop, large numbers of larval/adult thrips may reappear just a few days after a spray application. This does not mean that the chemical has failed but that more thrips have emerged from eggs and pupae that were not killed by spray applications. One or two more spray applications will be required 3–6 days apart. *However, if the spray is not effective in killing most adult thrips and larvae in 1–2 days then there is clearly a problem with the spray program!*

What about other pests?

These monitoring principles will give you a much better basis for making spray decisions concerning most pests. Watch the pest levels and try to determine their breeding activity from the proportion and distribution of different life stages present in the crop (adult, larvae, egg, pupae etc.). Look for signs of any spray failure to alert you to the need to take corrective action.

Use a small hand lens to check a sample of plants to thoroughly assess what's happening in your crop.

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4 Ensuring chemical treatments are carried out according to sound technical advice

Spray calibration calculations

It is vital to have the right amount of active chemical in the right volume of water (or other carrier) for the pest, the crop area and the plant growth stage to be treated. Although growers generally don't get this wrong for standard conditions, they are often guessing how to interpret labels for spray applications that the label is not designed for, e.g. foggers. A chemical applied as a conventional spray will probably behave very differently as an aerosol (fogger) or if applied through drippers.

Correct droplet size is often critical for contact sprays. If the droplets are too small and conditions are very dry, the chemical may dry out before contact and not be adequately absorbed. If droplets are too large, coverage under leaves and within heavy foliage will be poor.

Spray coverage

Insecticides, especially contact insecticides, require thorough coverage of fine droplets to be effective. For small, secretive insects like thrips this is critical. In the Virginia Farm Trials, growers found it useful to run a dye to test spray coverage. A fluorescent night dye using different spray jets, pressures and hand movements showed dramatic variations. Growers made corrections for worn and oversize spray jets, increased or decreased pressure as required, modified their hand movements and then checked the results. Generally too much chemical was being applied in oversized droplets and not enough care was taken to penetrate foliage in larger plants.

Factors affecting chemical properties

Insecticides can be very sensitive to many factors that need to be checked. These include:

- pH range
- Water quality
- Interactions with other compounds in the tank
- Humidity
- Temperature
- Ultraviolet light

Compile a reference database

For every chemical you use, compile a reference database and include the contact numbers for experts that can be consulted when questions arise. Always read the product label and/minor use permit information to determine the correct way to use any chemical and if unsure consult an expert advisor. This is even worth doing for chemicals you may be very familiar with and are currently working reasonably well. Chemicals can have different and highly sensitive requirements to be fully active.

The Pesticide Management Diary includes a spray calibration sheet to assist you in calculating the calibration rate.

5 Managing resistance by planning rotations of approved chemicals by chemical group

WFT are very good at developing resistance to insecticides. Poor spray program practices lower insecticide effectiveness and increase the risk of resistance in three main ways:

- Spray applications that are not well prepared or applied weaken chemical effectiveness and increase the chance of partially resistant insects surviving and contributing to totally resistant populations
- Chemicals that are used repeatedly without proper rotation from other chemical groups are very likely to result in resistant thrips
- Cross resistance by pests to two different chemical groups can be caused by repeatedly mixing more than one insecticide group in the spray tank. Double spraying for two different pests can also add to these problems where similar chemicals are being used.

In addition to proper use of insecticides, growers should plan insecticide rotations to a different chemical group every 3-4 sprays and preferably with a 2 week break before the new chemical is used. Insecticides should not be tank mixed on a regular basis. Overlapping use of chemicals for different pests must be carefully planned to avoid encouraging resistance building conditions.

Poor spray program practices lower insecticide effectiveness and increase the risk of resistance.

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6 Keeping regular and complete records of spray applications and results

The only way to continuously assess and improve insecticide effectiveness is to adopt the following practices:

- Routine records of spray applications including the date, crop, target pest(s), conditions, product, concentration and rate. This is required by law, but is also vital for reviewing chemical effectiveness against monitoring data and making adjustments to the spray program.
- Each insecticide application should be matched up with an assessment of pest reduction at the relevant life stages that the chemical is supposed to be active on
- Other notes covering climatic conditions at the time of application are useful

Growers who keep these records are able to provide the information IPM advisors needed to assist them.

The effectiveness of these practices has been consistently borne out by greenhouse vegetable growers who have followed them closely. Control of thrips and whitefly has been greatly improved with generally much lower chemical use!

For further information

- *Integrated Pest Management in Ornamentals Information Guide*, NSW Agriculture, second edition 2002. Available from NSW Agriculture or NGIA.
- *The Good Bug Book*, Australasian Biological Control Inc, second edition 2002. Phone 02 4570 1331.
- *Best Practice Manual for Pesticide Application in the Nursery and Garden Industry CD-Rom* – includes *Pesticide Management Diary* (version 1). Available from NGIA.
- Simple IPM techniques – *Nursery Papers* issue no. 2004/06
- Pest & disease – prevention is better than cure, *Nursery Papers* issue no. 2004/03
- WFT Insecticide management, *Nursery Papers* issue number 2000/01
- Managing Western Flower Thrips, *The Nursery Papers* issue number 1997/12
- A step-wise programme for practicing IPM, *Nursery Papers* issue number 1997/05'.

Acknowledgements

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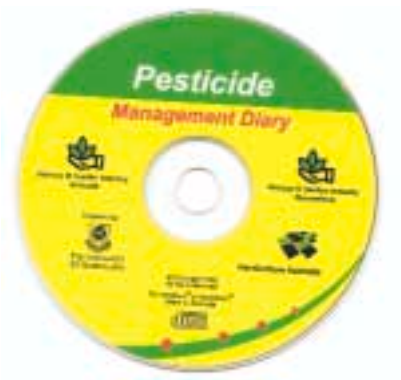
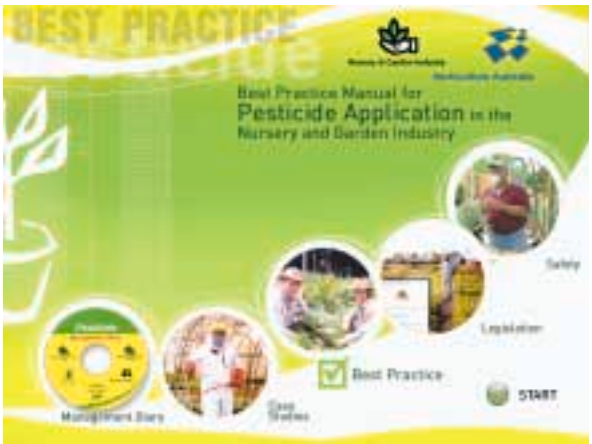
This Nursery Paper is the last in a series of three focusing on improved pest and disease management for nurseries.



The Pesticide Management Diary incorporates several forms to assist you in recording your agrochemical and pesticide usage as well as a spray record sheet.



The Best Practice Manual for Pesticide Application in the Nursery and Garden Industry CD-Rom – incorporates the Pesticide Management Diary (version 1).

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