

# Nursery Papers

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## The Virginia Farm Trials

The Virginia Farm Trials in South Australia have been investigating practical onsite methods to better control pests and diseases in commercial vegetable and herb farms. The results are applicable to nurseries and the good news is that control of Western Flower Thrips (WFT), and other pests like white fly and mites, can be greatly improved by simply assessing and improving existing pest management programs.

The key areas for improvement are:

- Nursery hygiene and design features
- Routine pest monitoring
- A selective and smart spray program.

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## Pest & disease – prevention is better than cure!

Nursery crops are extremely vulnerable to pest and disease incursions, resulting in anything from retarded crop growth to plant death. And keeping in mind it is likely that up to a 20% reduction in crop growth will go undetected, without an optimal growth comparison, prevention will always be better and more profitable than cure.

### Integrated Pest Management (IPM)

A key component of Integrated Pest (and disease) Management, or IPM, is reducing the opportunity for pest and disease organisms to become established and spread. As a result, pest exclusion is part of IPM and includes a range of management factors working together in the following way:

- Hygiene and greenhouse/shadehouse design features to restrict pest entry where possible, reducing the need for insecticides
- Routine monitoring of pests to improve decision making about the need to use an

insecticide and to measure their effectiveness when they are used

- A selective and smart spray program that ensures when insecticides are used, they are as effective as possible at minimum cost and can be used in a way that prevents insecticide resistance emerging.

The results from the Virginia Farm Trials showed that these strategies lead to a more sustainable pest control with reduced reliance on chemicals. Many growers reduced their chemical use by 20%–50%, and some even by 75%, and achieved better crop protection at the same time.

This paper deals with how to reduce pest pressure on your crop, making it easier to deal with pests and reducing the time and money spent on chemical treatments. The IPM trials referred to here were conducted in temperate climatic conditions and in low technology greenhouse structures with limited climatic control. More humid climates and high tech. houses will modify some aspects of pest management.



Healthy plants are the result of good management practices with regular monitoring for pests or diseases a critical component. Oasis Nursery, NSW.

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## Strategies for reducing pest pressure

There are two main ways of reducing pest pressure on commercial crops:

- Maintaining thorough outdoor and indoor hygiene to reduce the presence of pests near and/or in the crop
- Incorporating greenhouse design features that can restrict pest entry.

When pest pressure is reduced by these means and a reliable monitoring program is in place, insecticide usage can be dramatically reduced. The use of biological control agents also becomes a possibility. While rapid crop turnover in seedling nurseries may have implications for maintaining populations of biological control agents, longer lasting crops are more prone to building up pest infestations, especially if pest control methods are ineffective. Old plants can have a build up of insect eggs and pupae that are not affected by various insecticides.

**Sticky traps and a magnifying glass, as well as being able to recognise pests, are an essential component of preventing the spread of pest and diseases.**



## Where to begin?

There are three likely sources of pest incursion:

- Outdoor or nearby host vegetation for pests
- Poor hygiene practices in the growing area
- Poor spray program.

During the farm trials growers were successful in improving their WFT control by including strategies for these potential sources in their management program. Most importantly each of these areas should be regularly assessed to find out what contribution they are making to various pest incursions. **Pest monitoring** is the only way to identify where pests are coming from and the level of infestation, which is necessary information for effective management.

## Nearby host vegetation for pests

Plants outside of the growing area can be pest hosts providing a steady trickle of pests or large-scale invasions when weather conditions are right. For example, WFT are on the move most years in late Spring as host plants and annuals die off. Thrips species like plague thrips, onion thrips and tomato thrips may move

earlier in Spring while others move around in Autumn.

Outside thrips, whitefly and aphid levels can be checked by inspecting suspect plant areas or by putting sticky traps outside of the growing structure and checking them at timed intervals of a few days to two weeks to gauge changes in flying pests. Pests may be present on surrounding vegetation but not move until the plants begin to die or stop flowering.

To reduce the threat of weeds and other outdoor host plants:

- It is highly recommended that outdoor weeds be cleared before mid spring. If pest levels are already high in the weeds an insecticide should be used before clearing to prevent a sudden migration into the growing area!
- Keep a close watch on other plants located near the growing area and entry door. They may also require spray treatment or removal if they are keeping pests close at hand.
- If there is host vegetation you have no control over, say on a neighbours property, you need to be extra vigilant at times of increased threat (e.g. late Spring or when the host vegetation is being disturbed) and not let your monitoring and spray applications lapse.



**Maintaining weed control in the immediate nursery area is essential for managing potential pest and disease hosts. Redlands Nursery, QLD.**

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## Hygiene practices in the growing area



Restricting access of staff and visitors is required to maintain hygiene. *Advantage Plant Production Nursery, NSW.*

Pests can be brought into growing areas or allowed to breed on old abandoned stock or weed patches. As a result, suspect areas within the growing area should be checked regularly. Staff may move pests from one area to another on their clothes. Pests may emerge in growing areas that have not been used for some time until watering recommences and a rise in humidity triggers emergence from eggs/pupae that have been lying dormant. Regular monitoring should begin even before planting or restocking occurs.

The basic rules for maintaining internal hygiene are:

- Maintain rigorous weed control within the growing area.
- Do not bring plants infested with pests onto growing areas. Remember pests may be in the egg, larval or pupal stage and not be obvious. It is best to put all new stock in a quarantine area for at least a week or until new growth

occurs and monitor for any pest or disease symptoms.

- If a growing area is known to have a pest problem, staff should not move from this area into pest free areas without a change of clothing. It is better to begin working in less affected areas.
- Identify and remove any suspect plants promptly.
- Do not leave old plant stock in growing areas, especially if they are not being sprayed!

## Pest exclusion features in greenhouses

Additional protection from pests can be achieved by focusing on greenhouse design to restrict the entry of pests.

Exclusion measures encountered during the Virginia Farm Trials included:

- Fine 'anti-virus' mesh was seen to be effective in the farm trials as a way to restrict the entry of flying pests through greenhouse openings. It excludes most WFT from entering but many other common species are smaller than WFT and therefore can get in. Thrips are likely to get in and begin breeding at some point.

There is, however, an unfortunate drawback with using fine mesh because it restricts airflow making climate control more difficult. Any plans to use such mesh should include adequate climate control measures like

misting, fans, heating and perhaps expanded mesh annexes on the sides of greenhouses.

- A double entry door together with fine mesh will further reduce the entry of thrips and whitefly, especially if the entry bay is fitted with an outward directed fan that operates whenever the door is opened.
- There are a range of coloured plastic sheeting and shade-cloths on the market that are claimed to contribute to pest control. None of these products were involved in the Virginia Farm Trials.

The combination of good hygiene and pest exclusion will often reduce the need for insecticides over extended periods of time. A number of growers were able to withhold sprays for 1-3 months at a time, including in the warmer months, without developing high pest populations.

However, even with an improved greenhouse you will still have to monitor and control pests so that they don't sneak past and build up to damaging levels undetected.

Before you spend your money consider getting the most from your improvement dollars by investing in other changes like:

- Better climate control from increased ceiling height, overhead misting, heating and fans.
- Changing plant/row spacing to increase productivity and ease crop care and harvest labour.
- Putting in a hydroponic system.



A double entry door with fine mesh and an outward directed fan that operates every time the door is opened can significantly reduce pest incursion. *Virginia Horticultural Research Centre, SA.*

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## Spraying programs

Spray programs can be ineffective for a range of reasons including; the wrong choice of chemical or chemical group, inaccurate spray calibrations, poor spray coverage, water quality issues or adverse weather conditions. Pest persistence can be easily assessed by monitoring pest survival rates on plants or fresh sticky traps one to two days after spray applications. Pest numbers three or more days after spraying may be due to new incursions or to hatchings from eggs and pupae within the growing area.

*Note: A forthcoming 'Nursery Paper' on 'Managing Western Flower Thrips using Integrated Pest Management' will detail strategies for effective spray programs.*

## For further information

This *Nursery Paper* is the first in a series of *Nursery Papers* focusing on improved pest and disease management in nurseries. The next *Nursery Paper* will cover simple Integrated Pest Management techniques.

### Integrated Pest Management

*Integrated Pest Management in Ornamentals Information Guide*, NSW Agriculture, second edition 2002. Available from NSW Agriculture or NGIA, phone 02 9876 5200.

*The Good Bug Book*, Australasian Biological Control Inc, second edition 2002, phone 02 4570 1331.

A step-wise programme for practising IPM, *Nursery Papers* issue number

1997/05. Further information is found on the NGIA *Nursery Papers Collection CD-Rom* – Volume 1.

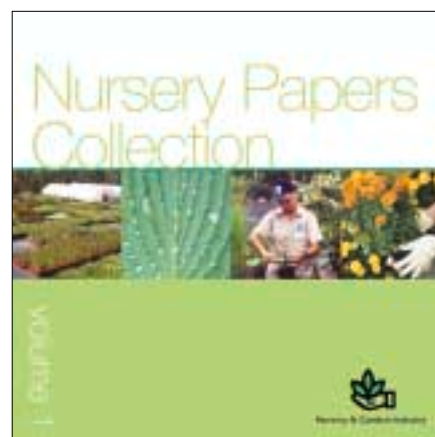
### Greenhouse design

Greenhouse Modernisation Project Manager at the Virginia Horticulture Centre, phone 08 8282 9200

The National Centre for Greenhouse Horticulture in New South Wales, phone 02 6391 3100 or [www.agric.nsw.gov.au/reader/15441](http://www.agric.nsw.gov.au/reader/15441)

Greenhouse insect screens – making the right selection, *Nursery Papers*, issue number 1999/01

Keeping pests out with screening, *Nursery Papers*, issue number 1997/07



**IPM training workshops for nurseries will be available throughout Australia from May. Contact your state NIDO for further details.**

## Acknowledgements

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