Managing sucking pests in strawberries

STRAWBERRY INNOVATION

Sucking pests include mites, thrips, mirids, jassids, aphids and bugs (such as Rutherglen bug). The feeding activity of sucking pests can damage plant buds, leaves, flowers and strawberry fruit directly. Calendar-based spray programs to control these pests are expensive, and often ineffective due to insecticide resistance amongst the pest populations. Certain pesticides can also be toxic to beneficial organisms, reducing their numbers, which can cause other pest populations to flare.

This fact sheet summarises the information you'll need to sustainably manage the sucking pests in your crops.

Integrated Crop Production (ICP) considers the production system as a whole, including all pests (insects, diseases and weeds), beneficials, soil and plant health.

Close-up of adult aphids (photo courtesy of Queensland Government Department of Primary Industries and Fisheries)

ICP tips for managing sucking pests

- Read the pest management chapter of the Australian Good Practice Guide for Strawberries at https://static1.squarespace.com/static/57285e9e59827e6e7a1467f2/t/5b1622f9575d1f3054d5e47d/1528177443631/Pest+Management+Chapterv2.pdf.
- Know your potential threats and the pests you are targeting.
- Know which beneficial organisms (natural and introduced) may be relevant.
- Know the impact of your potential treatments on beneficials.
- Maintain thorough site sanitation – remove and destroy weeds, infested plants and crop debris.
- Use clean runners – don't introduce pests and diseases on planting material, compost or growing media (coir/soil/potting mix).
- Monitor regularly. Early detections increase the chance of success. Track changes in pest and beneficial populations.
- Understand 'soft' treatment options and how to achieve maximum coverage.
- Use chemical insecticides only when necessary and do not rely on them.
- Understand resistance management and rotating chemical groups.
- Don't keep treating with something that is not working.

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What is the nature of sucking pests?

These pests suck nutrients out of plants they feed on. Some whiteflies and aphids, like the green peach aphid, excrete a sugary sticky residue on which sooty mould later develops. Mirids cause damage by injecting toxic saliva into the plant as they feed. During feeding whiteflies, various aphids and thrips may also introduce viruses from their mouthparts to plants. Sucking pests can cause stunting, reduced yield and poor fruit size and quality.

To sustainably manage these pests it is important to know:

- how to identify and monitor the pests
- how to identify the symptoms of damage they cause and diseases they may carry
- all relevant management options.

Effective management also relies on understanding the pest's life cycle and environmental conditions that favour population increases of the pests and beneficials. You will need an integrated approach to monitor and manage the pests and their natural enemies, and the introduced beneficials.

Experts in tailoring strawberry ICP programs and their implementation are available in Australia. A review by experienced ICP researchers and consultants of your production system and the threats to it is worthwhile. The valuable and specific guidance provided will motivate change, as evidenced in the case study provided at the end of this fact sheet. Providers of biological control agents (predators and parasitoids) and ICP advice can be found on the website www.goodbugs.org.au.

How can I protect my crops from these sucking pests?

Growers have typically reported their most important steps toward ICP were seeking expert advice, and committing time, effort and resources to crop monitoring and planning.

Important early steps towards ICP

Clean up! Keep alert and keep scouting!

- Control broadleaf weeds and remove waste piles
- Create buffer areas or corridors of non-host vegetation around your sites
- Use clean plant material that has been certified
- Restrict people and vehicle movement onto your farm and into your crops
- Walk through your crops often to spot outbreaks, check pest and beneficial numbers, and effectiveness of all treatments.

Why use an ICP approach?

In general, growers have measured their ICP success in terms of:

- Improved pest control and more reliable reduction in crop losses
- Reduced costs (for labour and chemicals)
- Improved farm occupational health and safety through reduced use of chemicals
- Improved awareness of their pests and the biological balance needed in a crop
- Increased market acceptance even though pack-out in a few cases has been lower in the establishment years
- Increased personal satisfaction as a result of significantly reducing the environmental impact of their practices.

Sticky trap in a strawberry crop

If these sucking pests are already in my crops, what can I do?

Get started on an integrated management program. These programs utilise a range of management options and minimise reliance on chemicals. Take it step-by-step as suggested below.

Start monitoring. For thrips in young (not yet flowering) plantings, use sticky traps to monitor the number of flying adults. For all sucking pests check with a hand lens under the young leaves for adults and nymphs/larvae, and whitefly pupae. Make weekly inspections, increasing to twice weekly during Summer. Checking for adult whiteflies is best done in the mornings at the edge of blocks. Many beneficials are pollen feeders so flowers are a good spot to check for them, and their prey (such as adult and larval thrips). Start checking once flowering commences. Working with experienced ICP specialists can be helpful and rewarding. Discuss with them the results of your monitoring and inform them fully on your crop history and growing environment.

Persimilis (photo courtesy of Queensland Government Department of Primary Industries and Fisheries)

Spray only when necessary. Mirids, Rutherglen Bug and high numbers of Lygaeiids will need spraying from time to time. Try to get key beneficials established first and only spray when necessary. This allows beneficials to restore their populations between sprays.

Critical crop stages and pest thresholds that trigger a response action (such as introducing parasitoids/predators or using 'soft' pesticides for caterpillars, aphids and whiteflies) vary by pest. For example, damage by thrips to young green fruit is more serious than colouring fruit and therefore monitoring in flowers is particularly important.

The successful management of several sucking pests has relied on the introduction of specific predators and parasitoids. These are discussed further in the case study below and include the use of *Phytoseiulus persimilis* (Persimilis) for the control of Two Spotted Mite (TSM), and *Neoseiulus cucumeris* (cucumeris mite) and *Orius armatus* (minute pirate bug) for effective control of Western Flower Thrip (WFT) and onion thrips. Other useful general beneficials for managing strawberry pests (in particular aphids) include hover flies, ladybirds, lacewings, predatory thrips and parasitic wasps.

Chemical control options for managing sucking pests can be found on the Australian Pesticides and Veterinary Medicines Authority (APVMA) chemical database (https://portal.apvma.gov.au/pubcris) and permit database (https://portal.apvma.gov.au/permits). Resistance management is vital for maintaining effective crop protection options. Using integrated management strategies such as those discussed above will reduce the development of resistance and also contribute towards the quality of the environment. When applying insecticides delay resistance development by rotating different active ingredient groups and restrict their use to certain periods of the year. Labels of some products place a limit on the number of times they can be applied. Adhere to these restrictions. For the insecticide resistance management strategy for managing TSM and WFT in strawberries go to: https://www.croplife.org.au/resources/programs/resistance-management/2016-strawberries-ornamentals-two-spotted-mite-western-flower-thrips-2/.

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Case study

The case study below (provided by Lachlan Chilman of Biological Services) shows how biological predators can be used as part of an integrated approach for managing pests such as WFT and TSM.

Adult western flower thrip (photo courtesy of Queensland Government Department of Primary industries and Fisheries)

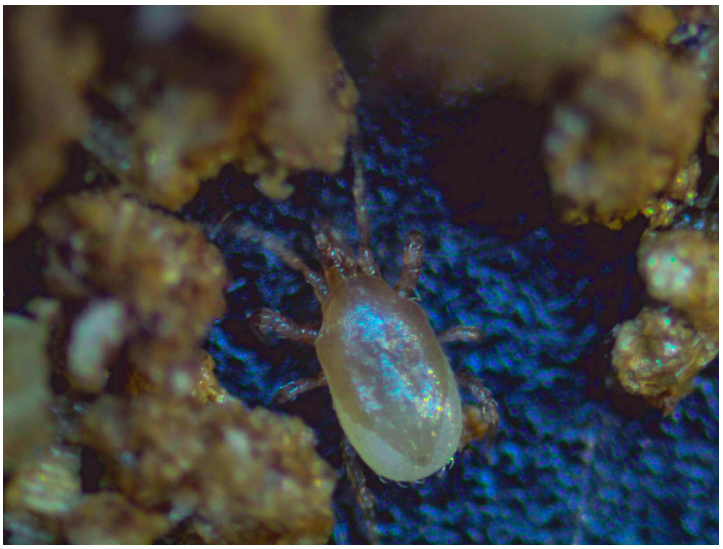
Western Flower Thrip (WFT)

The introduction of WFT to Australia caused a lot of problems for strawberry growers particularly in the southern growing districts of Victoria, South Australia (SA) and Western Australia (WA). Growers resorted to regular applications of broad spectrum pesticides to control WFT. Initial control was adequate but WFT very quickly developed almost complete resistance to these controls, causing a lot of damage. The regular spray applications also caused secondary outbreaks of TSM, which also developed resistance to the applied insecticides.

WFT was first detected in Perth, WA in 1993. It spread quickly in crops around the country despite quarantine measures. The first successful ICP program to combat WFT in strawberries was in Albany WA in 2003. WFT later became a very serious pest in strawberries in Victoria and SA. In 2007 Biological Services and IPM Technologies (Paul Horne) worked together to develop ICP strategies to successfully combat both of these serious pests by 2009. The program has been so effective that around 90% of the strawberry area in Victoria, SA, WA and Tasmania now utilise biological control to manage their key pests.

Prior to implementing an ICP program, it is important that growers contact their strawberry runner providers to ensure there are no residually toxic pesticides present in their plants that might affect their program.

WFT can cause considerable bronzing damage to strawberry fruit, and when uncontrolled down-grade fruit quickly and reduce shelf life. To control WFT, several predators are used in conjunction depending on the pest pressure at each site. A mixture of *Hypoaspis* species (*H. miles* and *H. aculeifer*) are released soon after planting, to control thrips pupae in the soil. This is important in the field as first year plants are usually planted into sterile fumigated ground which leaves no beneficial fauna behind.



Hypoaspis miles (photo courtesy of Lachlan Chilman)

At flowering, releases of *Neoseiulus cucumeris* (Cucumeris) are conducted to control young thrips which develop under the strawberry calyx. This is the main predator used to control WFT in uncovered strawberries. Three releases of Cucumeris a season are generally recommended in spring, early summer and early autumn. If chemical sprays are used to control other pests such as Mirids then further release of Cucumeris is recommended directly after these applications.

Strawberries grown under covered protection develop much higher levels of WFT as the increased temperatures and lower humidity is ideal for thrips development. In this situation releases of *Orius tantillus*, a predatory bug are utilised in conjunction with the Hypoaspis and Cucumeris. Orius not only

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control the juvenile stages but also feed on adult stages of WFT in the flower. Orius takes 4-6 weeks to establish properly and it is critical that good levels of flowers are present in the crop prior to introduction, and that this occurs early in the season prior to thrips being a problem.

Two-spotted mites (TSM)

TSM are present in every strawberry planting. They are extremely damaging to foliage and seriously damage plant health if not well controlled. The key to managing TSM using an integrated approach is to begin by introducing *Phytoseiulus persimilis* (Persimilis) predatory mites. Persimilis are highly effective predators that control all life stages of TSM. Good control of TSM with Persimilis can be achieved in both outdoor and covered strawberry crops. TSM breed faster in covered situations due to higher temperatures, lower humidity and sometimes dusty conditions, making it critical to monitor carefully and introduce Persimilis early and quickly. Obtaining good biological control of TSM is essential so that chemical miticide sprays are reduced or eliminated. When miticides are applied regularly it becomes difficult to properly establish the key predator Cucumeris (also a mite) to control WFT.

All life stages (eggs, nymph, adults and beetle predator) of two-spotted mite (photo sourtesy of Queensland Government Department of Primary Industries and Fisheries)

Helpful resources

1. Predatory Bugs Enhance Bio-control in Australia (2010) Goodwin, S. and M. Steiner, in Practical Hydroponics and Greenhouses, No. 110, Jan-Feb 2010: pages 41-46.
2. Keep it CLEAN – Reducing costs and losses in the management of pests and diseases in the greenhouse (2009) Badgery-Parker J. http://www.dpi.nsw.gov.au/agriculture/horticulture/greenhouse/pest-disease/general/preventing
3. Australasian Bio-control Group, national suppliers of bio-control agents http://www.goodbugs.org.au
4. Strawberry Problem Solver and Bug Identifier (2005) Neil Greer, Don Hutton, Noel Vock, Geoff Waite. Queensland Government Department of Primary Industries and Fisheries
5. Common insect pests of strawberries (2009) Primefacts. L. Ullio. NSW Department of Primary Industries https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0017/306314/Common-insect-pests-of-strawberries.pdf
6. Insecticide Resistance Fact sheet (2017) CropLife Australia https://www.croplife.org.au/resources/programs/resistance-management/what-are-insecticides/

SOURCES

Mega Pest Fact Sheets (2012) developed for the Innoveg Program by Scholefield Robinson Horticultural Services Pty Ltd and Sandra McDougall (NSW DPI)

Pest priorities informed by the Strategic Agrichemical Review for Strawberries and Paul Jones (Bugs for Bugs) (2018)

IPM in Hydroponics (2018) Stephen Goodwin and Marilyn Steiner. Biocontrol Solutions https://www.hydroponics.com.au/%EF%BF%BCipm-in-hydroponic-strawberries/

Notes from Strawberry Bug IPM workshop conducted by Dr Paul Horne (IPM Technologies) Elizabeth Town 2014 http://www.utas.edu.au/__data/assets/pdf_file/0008/859841/Strawberry-Bug-IPM-Workshop1-2014.pdf

Strawberry IPM Program (2018) Lachlan Chilman. Biological Services http://biologicalservices.com.au/crops/strawberries-11.html

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