Tel: 1300 695 098
www.gardencityplastics.com

Biocontrol & Integrated Pest Management (IPM) in Nurseries

A key problem at present is resistance of many major pests to pesticides e.g. mites, aphids, whiteflies and thrips. Biocontrol and Integrated pest management (IPM) programs are intelligent options to protect crops and reduce pesticide usage.

IPM is an environmentally sensitive way of managing pests. It uses a combination of practices and control methods with the aim of preventing problems from occurring and reducing the need for pesticide intensive activities such as broadacre spraying.

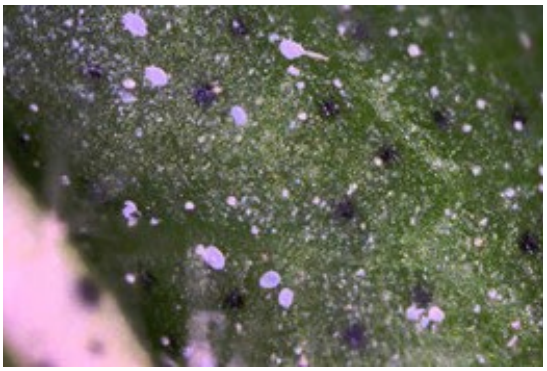
Garden City Plastics Agronomy Team

In this IPM guide...

In this IPM guide we cover information for managing key pests that damage plants in many nurseries in Australia.

Monitoring: The Backbone of IPM

1. Provides early warning of any developing problems
2. Determines the cause and severity of issues
3. Identifies locations that might require treatments (and those that don't)
4. Determines time of treatment
5. Evaluates any previous controls
6. Builds a history of pest problems
7. Improves crop quality and sales revenue
8. Section the property into areas:
   (1) Propagation (2) Greenhouse
   (3) Shade house (4) Outdoor
9. Then divide every area into houses or bays (A to Z or 1 to 50)
10. Draw a map of the property
11. Organise plants of the same species or family in the same area. This will make it easier to treat with biologicals and sprays when necessary. Also, group plants that are susceptible to the same key pests together (e.g., mites).
12. Monitor younger plants first and older plants later to reduce the spread of established pests to newly propagated areas.
13. If there is a chance of transmitting infection whilst monitoring, use disposable gloves, boot covers and coats, and footbaths.



1. Broad Mite Control:

Biological Organisms

Release preventatively prior to noticing symptoms on susceptible verities.

- Neoseiulus Californicus also feeds on some small insects, Two-spotted Mites(TSM) and pollen.
- Can be used as a preventative as alternative food sources may sustain it over time.
- Use N. Cucumeris/ T. Doreenae preferentially for broad mites when the pest has been detected. T. Doreenae is better at tolerating hot temperatures.

Supporting Pesticide Management Options

- Wettable sulphur – After releasing, at first sign of Broad Mite spot spray or spray whole crop with Wettable sulphur (200g/100L).
- good option but leaves residue (follow label directions)
  - products with 800g/kg sulphur active ingredient. If Sulphur has not been used previously on any variety only spray a few plants to ensure it is safe.
- Abamectin – Apply if high presence of Broad mites present.
  - Vertimec® Pro (18g/l abamectin) – 30ml/100L is enough to control Broad mites. Do not require higher concentration sprays, but good coverage of all growing points is important.

2. TSM & BRSM Mite Control:

Biological Organisms

- Neoseiulus Californicus also feeds on small insects and pollen.
- Can be used as a preventative as alternative food sources may sustain it over time and also tolerates hot/ dry conditions.
- Phytoseiulus Persimilis release at first sign of TSM and repeat 2-4 weeks later.
- Use Persimilis preferentially as soon as TSM detected.

Supporting Pesticide Management Options

- Bifenazate (Safe for IPM). Do not use prior to predator release. Need to save this product for when really needed after predators released.
- Miticides with 480g/l Bifenazate as active ingredient. PER81707 Sept 2020.
- Miticides with active ingredients of either Fenbutatin Oxide, Clofentezine, Hexythiazox are also safe to use in conjunction with predators.
- If spraying prior to predator release, use Vertimec® Pro (18g/L Abamectin) or Milbemectin and wait 7-14 days before predator release.

3. Aphid Control:

Biological Organisms (release preventatively)

Aphid parasites

- Mixture of 4 species of parasites (Aphidius colemani, A. ervi, Aphelinus abdominalis & Diaeretiella rapae). Each of these parasites have slightly different host ranges so are more likely to be able to control mixed populations of aphids in a crop.
- Aphid bankers can also be utilised. This will help to boost parasite levels in the absence of aphids in the main crop.

Supporting Pesticide Management Options

- Versys® (100g/L Afidopyropen) Safest to many beneficial species. Do not use too often. Rotate this with other insecticides after 2-3 sprays.
- Insecticide Sprays of Velifer® (Beauveria bassiana), Pirimicarb, Pymetrozine and Flonicamid are also a good option and not very toxic to Parasitic wasps.

4. Fungus Gnats Control:

- Hypoaspis miles, Hypoaspis aculeifer and Dalotia coriaria can be used for control of fungus gnats. They also feed on thrips pupae present in the soil. If Thrips are problematical Hypoaspis aculeifer has a higher propensity for thrips pupae compare to Hypoaspis miles.
- Hypoaspis miles and Hypoaspis aculeifer can be supplied in separate packaging or mixed together where needed.
- Hypoaspis release rate for seedlings/cuttings are 1L/25m^2. Preventative release in low pressure areas in production zones is 1L/200 - 400m^2.
- Predators should be released evenly throughout where pots are placed apart from each other. It is best to release into each pot.
- Each new batch of pots will require retreatment.
- Dalotia should be released into hot spot areas and wettest areas of the houses. Dalotia adults are able to fly, so distribution through the house doesn't need to be as even as Hypoaspis.
- Drenching of Vectobac during high pest pressure is compatible with predators. Nematodes are also compatible.
- This must not be used preventatively, or resistance will occur, so contact your consultant for advice.

5. Thrips & Western Flower Thrips (WFT) Control:

Thrips can be controlled by using a combination of predators such as Cucumeris, Lailae, Montdorensis and Orius above ground, & Hypoaspis / Dalotia in the soil (the soil predators also aid in control of fungus gnats). Orius require a constant flower source and if this is not available a system of banker plants using basil & alyssum is required. Release rate for Cucumeris, Lailae and Montdorensis is 10L/ha (when pressure is low) repeat every 4 weeks but increase rates and frequency when Thrips pressure is high.

There are no safe compatible sprays for thrips. Velifer®, Spinosad and natural Pyrethrum could be used to reduce thrips, but predators will need topping up or replacement.

6. Whitefly Control:

Whitefly can be controlled by releasing Encarsia and Eretmocerus parasites in conjunction with the predatory mites Lailae and Montdorensis.

- Start releasing Encarsia and Eretmocerus from the very first signs of Whitefly preventatively using 1-2 wasps/ m^2 weekly. Increase the release amount as pressure of these pest increases.
- Predatory mites should also be released preventatively and may need topping up every 4-8 weeks depending on pest pressure and type of crop.
- Compatible sprays are Buprofezin/Pyriproxyfen/Soaps/Velifer® etc.
- Should monitoring identify increased populations of broad mite or further evidence of broad mite damage in the crop, apply compatible chemical treatment and release N. Cucumeris/T. Doreenae afterwards. Targeted spot spray should be applied first then repeat steps 3-7.

Suggested Management

Step 1	At beginning of growing season, e.g. spring (August/September)
Step 2	Apply 2 sprays of Abamectin and Spinetoram 10-14 days apart
Step 3	7-14 days post chemical application, Neoseiulus californicus can be released. (preventative release rate is 2.5L/ha.) along with Aphid parasite mix (1 vial/2,000 m²) Releases for beneficials for thrips, Whitefly and Fungus Gnats can also commence either preventatively or as monitoring dictates.
Step 4	Monitor every 14 days
Step 5	Follow-up release of Aphid parasite mix (1 vial/2,000 m²) 2 weeks post initial release and continue every 14 days. If Aphids are present, increase rates and release weekly.
Step 6	Follow-up release of Neoseiulus californicus (2.5L/ha) 4 weeks post initial release
Step 7	Continue 14-day monitoring program
Step 8	In TSM susceptible crops release Persimilis at first signs of TSM or in early November whichever occurs first (1 bottle/2,000 m²)

Important Notes

- Should monitoring identify increased populations of Two Spotted mite or TSM damage in the crop, increase rate of Phytoseiulus persimilis to 1 bottle/1,000m² or apply second release of 1 bottle/2,000 m². Monitoring should continue with further release of beneficials as required. Spot spraying of 'hot spot' locations with Bifenazate products at label rates can support beneficials only if deemed necessary.
- Should monitoring identify significant aphid population increases or severe aphid damage in the crop, a compatible pesticide application should be applied. Continue to release parasites.
- Release rates will vary depending on the crop and infestation level. Please reach out to your nearest GCP office or Biological Services should you require more assistance.

Kindly note that the information in this guide sheet has been prepared by the GCP Agronomy Team and Biological Services consultants in good faith to help guide growers who are looking to implement IPM in their nurseries.

It is the growers responsibility to read and adhere to product label instructions in accordance to state or local legislation and jurisdiction.

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agronomyteam@gardencityplastics.com
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