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Integrated Pest Management in Carnarvon

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Introduction

Pest management in the horticultural industry of Carnarvon is predominantly based on practices that are heavily dependent on chemical treatments. Some of the chemicals used require withholding periods to be acknowledged to avoid residual chemicals affecting produce. In addition, rotation of groups is required to prevent pesticide resistance from becoming an issue in insect populations.

IPM is an alternative to pesticide based spray programs, it also differs from organic farming as synthetic products can be used. IPM is an approach to pest management that integrates the use of three control techniques; biological, cultural and chemical. In an IPM program pesticides are still applied but they are used as a tool to support biological and cultural controls.

Due to a reliance on chemicals that kill or disrupt populations of beneficial insects and a lack of suitable habitat, resident populations of biological control agents are not present in effective numbers to impact on populations of insect pests throughout the growing season.

This report outlines methods that can be used to enhance IPM in the Carnarvon horticultural area. It identifies practices that could assist in supporting populations of predatory insects in order to sustain populations at levels that will increase their capacity to control insect pests.

It is anticipated that the use of IPM will contribute to minimising biosecurity risks by providing area wide management and an environment that is favourable to predators of pests that transmit disease such as Aphids and Psyllids.

Biological control

Biological control refers to beneficial insects and mites that are either predators or parasites of insect pests. Biological control agents assist with reducing pest numbers and therefore dependence on the use of chemicals. They can also assist in minimising the transmission of certain plant diseases.

A number of predatory insects have been observed as being present Carnarvon. These include:

- Parasitoid (*Aphidius colemani*);
- Hover Flies;
- Traverse ladybirds (*Coccinella transversalis*);
- Green Lacewings (*Mallada signata*);
- *Stethorus* beetles;
- Red Chilocorus (*Chilocorus sp*);
- Native Ladybird (*Cryptolaemus montrouzieri*).

The size and distribution of the populations of these insects are currently unknown. However, if favourable conditions are provided by reducing the use of broad-spectrum insecticides, they can make valuable contributions to the control of insect pests.

Predatory insects can be purchased for release in some situations where populations are low and an IPM program is being implemented. The insect pests that require control in Carnarvon and their predatory insects are detailed in Table 1.

Table 1. Pests and predatory insects

Pest	Predatory insect
Aphids	• Green Lacewing (*Mallada signata*) • Brown Lacewing (*Micromus tasmaniae*) • Parasitoid (*Aphidius colemani*) • Ladybirds (*Hippodamia sp*) • Damsel Bug (*Nabis kinsbergii*) • Hoverflies
Caterpillars/Moths	• Green Lacewing (*Mallada signata*) • Brown Lacewing (*Micromus tasmaniae*) • *Trichogramma pretiosum* • Damsel Bug (*Nabis kinsbergii*)
Two spotted mite	• *Phytoseiulus persimilis* • *Stethorus* beetles
Whitefly	• Green Lacewing (*Mallada signata*) • Whitefly parasitoids (*Encarsia formosa*) • Hoverflies
Thrips	• *Hypoaspis* predatory mites • *Montdorensis* predatory mites • *Cucumeris* predatory mites
Psyllids	• Green Lacewing (*Mallada signata*) • Brown Lacewing (*Micromus tasmaniae*) • Damsel Bug (*Nabis kinsbergii*) • Traverse ladybird (*Coccinella transversalis*) • Common Spotted Ladybird (*Harmonia conformis*) • Hover flies (*Melangyna viridiceps*, *Simosyrphus granicornis*, *Eristalis tenax*)
Mealybugs/Scale	• Green Lacewing (*Mallada signata*) • Native Ladybird (*Cryptolaemus montrouzieri*) • Red Chilocorus (*Chilocorus sp.*) • Parasitic wasps (*Aphytis sp.*) • *Compriella sp*.
Mediterranean Fruitfly	• *Fopius arisanus*, *Fopius ceratitivorus*, *Psyttalia concolor*, *Diachsmimorpha krausii, Beauveria bassiana*, *Metrarhizium anisopliae* and *Lencillium lecanni*

Cultural control

Cultural control techniques involve manipulating certain aspects of the environment to enhance populations of beneficial insects whilst making it unfavorable for insect pests.

Farm hygiene

Crop residues and weeds host a wide range of insect pests sustaining populations within crops and between production periods. Prompt removal of crop residues and reducing weed burdens in and around cropped areas will assist with improved pest management.

Trap crops

Establishing crops that attract pests to a certain area can be a useful technique to attract pests away from productive areas where they can be sprayed. Trap crops also provide an opportunity to observe the presence of pest insects and determine control requirements.

Banker plants

Certain plants can be established within cropped areas to provide a favourable habitat for beneficial insects. Banker plants increase the populations of Green Aphids which do not affect Tomatoes, Capsicum, Eggplant or Cucurbit crops but act as a food source for *Aphidius* wasps which prey on all aphid species. Cereals are commonly grown as banker plants in clumps throughout cropped areas at a density of 10 per hectare.

Traps and lures

Traps and lures are an important component of an IPM program which can be used to control pest insects without disrupting predatory insects. They come in the form of visual attractants, pheromones or sources of food that are used to capture pests. Lures are also available for predatory insects to attract them to locations where control of pest insects is required. Traps and lures are also useful for identifying the insect pests present and monitoring the populations.

Table 2 outlines some of the traps and lures that are available for the control of insect pests.

Table 2. Insect pest traps and lures

Insect pest	Traps/Lures
Aphids	Yellow sticky traps or tape
Thrips	Blue sticky traps or tape
Caterpillars/moths	Delta traps with pheromone lures and sticky inserts
Whitefly	Yellow sticky traps or tape

Habitat enhancement

Although the Carnarvon Horticultural Area is intensively cultivated, there are areas of redundant land that could be used to establish habitats that provide refuge for predatory insects and therefore increase the resilience of resident and released populations.

Areas considered to be suitable include property boundaries, home gardens, perimeters of shade houses and road verges. Some of these areas have existing plantings which form a foundation which can be enriched through supplementary planting. These areas can provide additional benefits such as acting as windbreaks, providing a source of pollen and alternative sources of income.

The main consideration for habitat establishment is design. The site will need to be irrigated and comprised of a range of plants that flower throughout the year and are multi layered. These areas can also act as sites that pest insects are attracted to through the use of traps, lures and banker plants.

Criteria applied to the selection of plants to provide habitat as part of an IPM program include:

- Low water requirement;
- Low weed risk;
- Low maintenance;
- Does not host pests or diseases;
- Provides a source of pollen and nectar throughout the year;
- Does not negatively impact on the production of crops and;
- Modifies the microclimate by acting as a windbreak, which also assists with reducing dust.

Some native plants that could assist in achieving habitat enhancement as part of an IPM program include:

- *Eucalyptus fruiticosa* (Mallee);
- *Eucalyptus victrize* (Coolabah);
- *Acacia sclerosperma* (Limestone Wattle);

Chemical control of pests should be incorporated into IPM programs.

- *Exocarpus ophylla* (Leafless Ballart);
- *Crotolaria cunninghamii* (Bird Flower);
- *Myoporium montorum* Boobialla);
- *Spinifex longifolius* (Beach Spinifex);
- *Senna* sp. (Cassias);
- *Acacia ligulota* (Dune Wattle);
- *Acacia ampliceps* (Salt Wattle); and
- *Acacia stellaticeps* (Glistening Wattle).

Chemical control

In an IPM program chemical control is still used, but the decision of which chemicals to use and how they are used is based not only on the target pest but also the impact the chemical may have on beneficial insects. Preference is given, where possible, to products that are selective or soft on the biological control agents present in the crop. Chemical control of pests is only used in IPM programs to assist in situations where biological and cultural methods are found to be insufficient.

The decision on which chemicals to use and when to apply them is based on the results of monitoring pest and beneficial populations.

The role of pesticides is therefore to provide support to the biological and cultural methods as opposed to replacing them.

Developing an IPM strategy can reduce the dependence on chemicals which will assist with minimizing the risk and impacts of resistance in insect pest populations.

Currently very little is known about the impacts of specific pesticides on Australian beneficial insects, however, a number of new products that appear to be compatible with IPM programs have become available over recent years and will continue to emerge.

Such pesticides should be used as a replacement for broad spectrum pesticides which impact on all insects present. Another important consideration for chemical control practices to ensure that application frequencies and rates are consistent with the information generated from site observations and label recommendations. ■

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For more information on this and other projects in the Carnarvon region:

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