

# BIOLOGICAL CONTROL



The use of beneficial insects with careful use of a few selective insecticides as Integrated Crop Management (ICM) can result in excellent, sustainable pest management at minimal cost. Biological control with parasitoids, predators and pathogens is a vitally important element within a full Integrated Pest Management (IPM) programme. Cultural control, including good hygiene, the environment (as effected by temperature, humidity, ventilation, watering and spacing), use of ground cover materials, weed control, crop monitoring and recording from sticky traps should be the first step in an IPM programme.

Bio control agents invariably work better as a preventative measure or when introduced at the very first sign of pest damage. Selective IPM compatible pesticides that can be used to prevent pest damage are available for use within a complete programme.

**Note:** The use of broad-spectrum pesticides such as synthetic pyrethroids should be avoided if biological control is used, for up to 10 weeks before starting an IPM programme.

## Traps

Traps are used to monitor pest populations and some offer a means of pest control. They take various forms from coloured sticky traps to pheromone lure attractant traps. Some of the most popular types are listed below.

### Sticky Traps

#### How they work:

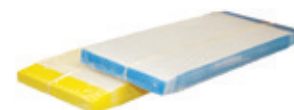
Used to detect pest populations early on, before they cause damage to the crop, to monitor the success of a control measure and to provide data on long-term pest problems. These traps have a dry glue covered surface with a paper sheet preventing traps sticking together in the pack.

Traps remain sticky until the surface is covered in dust or dead insects.

When monitoring, replace regularly – usually every 4 weeks.

#### Species Attracted:

Use yellow traps horizontally sticky side up for detecting activity of Leaf Miner and Sciarid Fly. Use yellow traps vertically for detecting Aphid, Leaf Hopper, Thrips and Whitefly. Use Blue traps for Western Flower Thrips. Sticky traps will not attract adult Vine Weevil.



**How to use:** Suspend traps about 20cm above the height of the crop.

**Rate of use:** Use one trap /200m<sup>2</sup>

<b>Yellow EasiStick Traps</b>	10cm x 24cm	Pack of 25	code	<b>TRAP</b>
-------------------------------	-------------	------------	------	-------------

Hang one trap /100m<sup>2</sup> at height of 15-20cm above crop.  
Adult Whitefly, Leaf Miner and Sciarid Fly detection.

<b>Blue EasiStick Traps</b>	10cm x 24cm	Pack of 25	code	<b>TRAP01</b>
-----------------------------	-------------	------------	------	---------------

Hang one trap /100m<sup>2</sup> at height of 15-20cm above crop.  
Western Flower Thrip detection.

<b>Pheromone Lure</b>	Pack of 10	code	<b>PHER01</b>
-----------------------	------------	------	---------------

Pheromone Lure specifically for Western Flower Thrips.



## Vine Weevil Control (*Otiorhynchus sulcatus*)

Black Vine Weevil is a major pest of nursery stock and pot plants. Leaf notches around the edge of leaves indicates damage by adult weevils, this is when egg laying begins. Adults are all female; approximately 10mm long, and can lay between 800 and 1000 eggs between June and October but over a longer period under protection. The larvae feed mainly on roots but they will also eat corms and soft fleshy stems. It takes several months to develop from egg to adult resulting in one cycle per year on outdoor crops but multiple generations may occur on indoor crops.



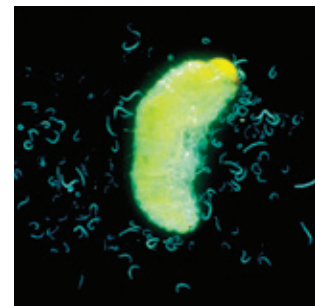
## Nemasys®L (*Steinernema kraussei*)

Nemasys®L controls Vine Weevil Larvae in a wide range of crops including ornamental trees and shrubs and perennial flowers. It contains a unique low temperature nematode (*Steinernema kraussei*) which provides superior performance in outdoor situations. No other insect parasitic nematode provides this benefit.



### Other Benefits Include:

- Curative control of vine weevil larvae.
- Active at low temp. (5°C - 15°C) providing control when pest is active.
- Simply applied as a drench or spray.
- No pest resistant issues.
- Compatible with many chemical pesticides / IPM systems.
- Natural product - safe to crops, users, consumers and environment.



### Type:

Microscopic nematodes.

### How it Works:

The nematode worms seek vine weevil larvae in moist soil and compost, larger weevil grubs are more easily located. Nematodes enter the weevil larvae and release a small pellet of bacteria that kills the host after a few days. The parasitic worms begin to reproduce, releasing several thousand more juvenile infective nematodes able to find and kill further weevil grubs.

### When to Use:

Autumn and spring are the main seasons for nematode application, although additional treatments may be needed for heated or protected crops. It is important that the soil or compost is kept moist (not water logged). Nemasys L will work as low as 5°C allowing applications to be made whenever the pest is active.

### How to Use:

Apply as a drench using a conventional sprayer, a Dosatron dilutor, watering can or through most irrigation lines. In all cases remove any fine filters and ensure water temperature is between 5°C and 15°C. If the nematode packs are not being used immediately, remove them from the transit box and place directly in a cold room/refrigerator at 2-5°C. Use before expiry date on package.

# BIOLOGICAL CONTROL



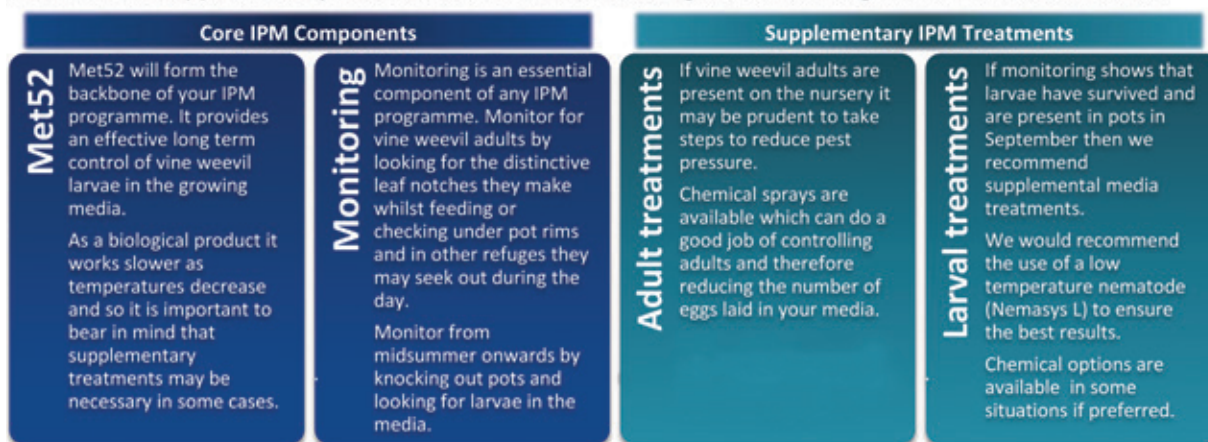
## Rate of Use:

Container Plant Treatment - 50 million treats up to 100m<sup>2</sup> and 250 million up to 500m<sup>2</sup>.  
 Open Ground Treatment - 50 million treats up to 50m<sup>2</sup> and 250 million up to 250m<sup>2</sup>.

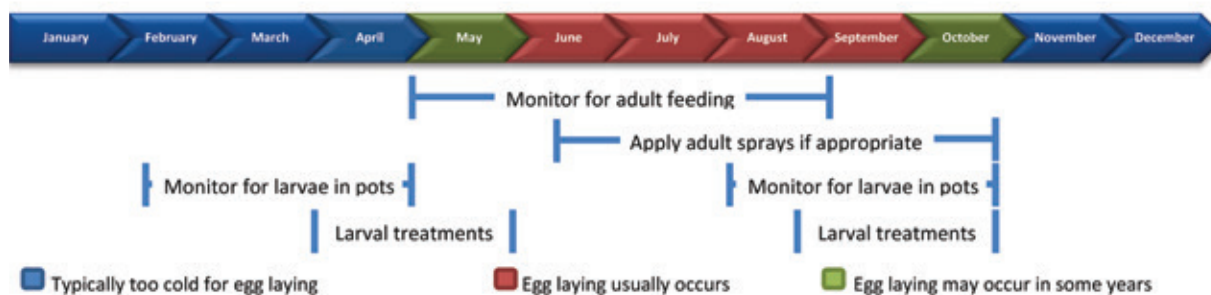
<b>Nemasys®L</b> pack size: 50 million	code	<b>NEMA05</b>
<b>Nemasys®L</b> pack size: 250 million	code	<b>NEMA07</b>

## Vine Weevil IPM: An Example Programme

The below example of an IPM programme includes four components. It will not always be necessary to resort to the supplementary adult and larval treatments, regular monitoring will inform that decision.



The timetable below highlights the key decision points in this programme.



<b>Met52</b>	1 kg	code	<b>MET501</b>
	10kg	code	<b>MET502</b>
Based on <i>Metarhizium anisopliae</i>	500g/m <sup>3</sup>		

Bio-insecticide for incorporation into growing media for Vine Weevil larvae control in protected and outdoor soft fruit, ornamentals, including trees.



# BIOLOGICAL CONTROL



## Whitefly Control (*Trialeurodes vaporariorum*)

Adults are usually found laying eggs on the underside of the youngest leaves. Newly hatch larvae are mobile for a few hours before settling as immobile 'scales' where they suck plant sap. High numbers of Whitefly produce large quantities of honeydew encouraging black sooty mould growth on plants.



## Encarsia F (*Encarsia formosa*)

**Type:** Parasitoid wasp.

### How it Works:

Adult wasps lay 60-100 eggs singly into Whitefly scales, which turn black as the parasite develops.



### Species Controlled:

Glasshouse Whitefly (*Trialeurodes vaporariorum*) and to a lesser extent Cotton Whitefly (*Bemisia tabaci*)

### How to Use:

Encarsia are introduced as parasitised scales attached to cards, which are hung in the crop from where they hatch out and attack the Whiteflies. Place or hang the cards in a shady position level with the lower leaves. Avoid contact with the growing medium. Distribute the cards uniformly throughout the crop.

### Rate of Use:

**Cool Grown Crops:** 3-5 wasps per 1m<sup>2</sup> until week 12 and then 1-2 wasp per 1m<sup>2</sup> per week.

**Heated Crops:** 1 wasp per 1m<sup>2</sup>. If Whitefly are present increase rate to 5 wasps per 1m<sup>2</sup> for 6 weeks.

**Poinsettias:** Preventative is 1 wasp per 3 plants per week; curative or where Cotton Whitefly (*Bemisia tabaci*) is suspected then 1 wasp per plant per week.

Alternatively see **Eretline E** (*Eretmocerus eremicus*).

<b>Encarsia</b>	pack size: 3,000 (50 cards x 60 black scales)	code	<b>ENCA07</b>
<b>Encarsia</b>	pack size: 6,000 (100 cards x 60 black scales)	code	<b>ENCA04</b>
<b>Encarsia</b>	pack size: 10,000 (loose)	code	<b>ENCA06</b>
<b>Encarsia</b>	pack size: 15,000 (250 cards x 60 black scales)	code	<b>ENCA08</b>

# BIOLOGICAL CONTROL



## Eretline E (*Eretmocerus eremicus*)

**Type:** Parasitoid wasp.

### How it Works:

Adult wasp lays 50-80 eggs singly, next to individual Whitefly scales, the egg hatches to produce a minute larva which eats into the young Whitefly scale eventually (5-10 days) it kills the Whitefly and pupae within the scale. Unlike *Encarsia formosa* the pupae stage remains creamy white and does not turn black, adult *Eretmocerus* are also active predators of Whitefly larvae scales and eat 1-2 each day, resulting in rapid pest control.

### Species Controlled:

Glasshouse Whitefly (*Trialeurodes vaporariorum*) and Cotton Whitefly (*Bemisia tabaci*)

### How to Use:

*Eretmocerus* can be introduced, in blister packs or loose scales either alone or mixed with *Encarsia formosa*.

### Rate of Use:

1-2 wasps per m<sup>2</sup> per fortnight for a light infestation up to 10 wasps per m<sup>2</sup> for 4-8 weeks as a curative, better under warm to hot conditions, ideal for herbs and Poinsettia.

### Size:

3,000 in bottle, 5,000 in blister pack, 10,000 mixed with *Encarsia* in blister pack.

<b>Eretmocerus</b>	pack size: 3,000 in bottle	code	<b>ERETO1</b>
<b>Eretmocerus</b>	pack size: 5,000 in blister pack	code	<b>ERETO2</b>
<b>Eretmocerus</b>	pack size: 10,000 in blister pack	code	<b>ERETO4</b>

### Orders for Biological Control:

All Biological products are 'Live products' and are supplied to special order. Please allow 10 working days. Cut off point for orders is Wednesday midday for delivery for the following week.

Tel: 01 8437808 (press 1 for Sales Team). All orders must be used immediately on receipt.

### Note:

The use of IPM (Integrated Pest Management) is now mandatory under SUD (Sustainable Use of Pesticides Directive) regulations.



## Spider Mite Control (*Tetranychus urticae*)

The Glasshouse Red Spider Mite or Two Spotted Spider Mite is a common pest of protected crops. Mobile stages suck the contents out of plant cells and produce characteristic leaf damage of white or silvery speckled patches.



### Phytoline (*Phytoseiulus persimilis*)

**Type:** Small orange /red predatory mite.

#### How it Works:

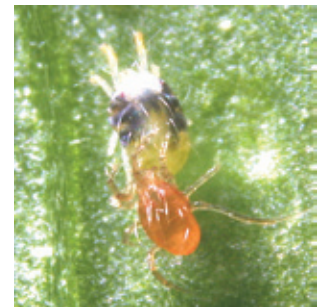
Predator actively hunts and attacks all stages of Spider Mites.

#### Species Controlled:

Two Spotted Spider Mite (*Tetranychus spp.*)

#### When to Use:

Phytoline cannot establish in the absence of Spider Mites (*Tetranychus spp.*) and performs best in warm, relatively humid conditions but may fail in very hot, dry conditions.



**Rate of Use:** 5-10 mites per m<sup>2</sup>

<b>Phytoseiulus</b>	pack size: 2,000 (200m <sup>2</sup> )	code	<b>PHYT01</b>
<b>Phytoseiulus</b>	pack size: 10,000 (1,000m <sup>2</sup> )	code	<b>PHYT02</b>

## Thrip Control

### Amblyseius

*Amblyseius spp.* is the predatory mite which controls the juvenile stages of the Thrip.

<b>Amblyseius</b>	100 sachet (250 bug per sachet). Use 1 sachet per 1-2m <sup>2</sup>	code	<b>AMBLO8</b>
<b>Amblyseius</b>	50,000 in 5L bag. Use 50-250 mites per m <sup>2</sup>	code	<b>AMBLO6</b>

### Hypoaspis

A soil borne predatory mite will predate Thrips pupae in the growing media. For more details please see **Hypoline M.**





## Sciariid Fly Control

The adult flies are commonly found making short hops over the compost surface. Adults can spread fungal diseases but most damage is caused by the larval stage feeding on the plant roots making them vulnerable to disease infections such as *Pythium spp.* and *Phytophthora spp.*

### Hypoline M (*Hypoaspis miles*)

#### Type:

Predatory Mite

#### How it Works:

A soil borne predatory mite which feeds on Sciariid Fly larvae and other 'soil' pests including Springtails, Thrip pupae and root Mealybug. At night they move a short distance up on to the plant foliage and will feed on Mealybug and other soft bodied prey. Mites are very mobile and soon distribute themselves throughout the crop. Adults are reported to live for several months and survive up to 50 days without food, making them ideal in situations of very low pest populations.

#### Species Controlled:

Sciariid Fly (*Bradysia spp.*) and other insect or mite pests.

#### When to Use:

Introduce into most growing media including rock wool.  
Use as a preventative or at first sign of Sciariid adults or larvae.

#### Rate of Use:

100 per m<sup>2</sup> usually as a single application.  
For permanently planted areas (interior landscapes, botanic gardens etc.) re-introduce every 10-12 weeks.



<b>Hypoaspis</b>	Pack 10,000 (100 m <sup>2</sup> ) in 0.5L tube	code	<b>HYP004</b>
<b>Hypoaspis</b>	Pack 25,000 (250 m <sup>2</sup> ) in 1L tube	code	<b>HYP002</b>
<b>Hypoaspis</b>	Pack 125,000 (1,000 m <sup>2</sup> ) in 5L bag	code	<b>HYP003</b>

### Nemasys® (*Steinernema feltiae*)

Nemasys® Biopesticide for the control of Glasshouse Sciariid Fly (fungus gnats), Western Flower Thrips and Leaf Miner in a range of cropping systems including, propagation and ornamentals. Nemasys® based on a unique strain of the insect pathogenic nematode (*Steinernema feltiae*), provides the ideal biological solution to the problem of Glasshouse Sciariids. Nemasys® contains nematodes in their vigorously infective stage. These nematodes attack Sciariid larvae by entering their natural body openings. Once inside, they release symbiotic bacteria that will quickly kill the host insect.

# BIOLOGICAL CONTROL



## Benefits:

- Quickly controls pest larvae at the time of application.
- Controls the problem before it appears.
- Persistent in the growing medium providing protection against pest larvae re-infection.
- Easy application using sprayers, overhead irrigation or sprinkler systems
- Compatible with a large range of chemical pesticides.
- No pest resistance problems.
- Natural product that is safe to users, consumers and the environment.

<b>Nemasys</b>	pack size: 50 million (100m <sup>2</sup> )	code	<b>NEMA08</b>
<b>Nemasys</b>	pack size: 5 x 50 million (500m <sup>2</sup> )	code	<b>NEMA12</b>
<b>Nemasys G Chafer Grub control</b>	pack size: 250 million	code	<b>NEMA14</b>

## Aphid Control

Most crops can be affected by Aphids. Damage is caused in 3 ways: sucking plant sap when feeding, excretion of honeydew leading to unsightly sooty mould growth on plants and some species can transmit plant viruses.



### **Aphidus colemani**

**Rate of Use:** 1 wasp per 2m<sup>2</sup> per week.

<b>Aphidus colemani</b>	pack size: 1000 Pack	code	<b>APHID06</b>
-------------------------	----------------------	------	----------------

### **ACE Mix**

A mixture of 3 types of parasitic wasps which reduces the need for accurate pest species identification, used for most aphid species. The mixture is ideal on mixed cropping ranges in Nurseries, Botanic Gardens, Conservatories and Plant Retail Outlets.

**Rate of Use:** 1 wasp per m<sup>2</sup> per fortnight



<b>ACE Mix</b>	pack size: 500	code	<b>ACEM</b>
----------------	----------------	------	-------------

### **MACE Mix**

Contains a mixture of 4 types of parasitic wasps to control a broad range of Aphid species.

**Rate of Use:** One pack of 240 treats 200m<sup>2</sup>

<b>MACE Mix</b>	pack size: 500	code	<b>MACE</b>
-----------------	----------------	------	-------------



# BIOLOGICAL CONTROL

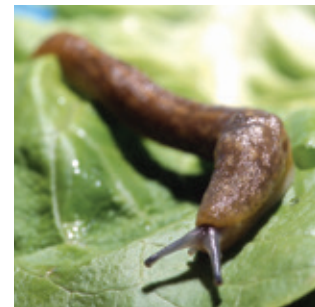


## Slug Control

Slugs are common pests of many horticultural crops, particularly soil grown plants and in nursery stock where small water snails are of equal importance.

### Nemaslug®

Nemaslug® provides superior control of slugs in protected and outdoor crops including ornamentals. Nemaslug® is unique in providing persistent uninterrupted activity that is unaffected by wet weather. Nemaslug® is based on the patent protected slug parasite nematode (*Phasmarhabditis hermaphrodita*). Applied as a spray drench, Nemaslug® is active in the soil where most slugs are active.



### How it Works:

Nematodes seek slugs and water snails; they enter the body and start to develop from infective juveniles to adults. In doing so a pellet of bacteria is released that begins to multiply spreading through the host body.

<b>Nemaslug</b>	pack size: 30 million	treats 100m <sup>2</sup>	code	<b>NEMA03</b>
<b>Nemaslug</b>	pack size: 250 million	treats 833m <sup>2</sup>	code	<b>NEMA11</b>

## Biological Control in Plant Protection

A Colour Handbook by Neil Helyer.

The book provides the Professionals with vital information on pest monitoring, setting up a biological control programme and how to make the programme work within the wider context of Integrated Pest Management (IPM).

This fully illustrated handbook includes 300 new photographs, chapters on the biology and lifecycles of major pests, parasitic and predatory insect controls and a greatly enlarged section describing beneficial pathogens. The chapters on 'cropping systems' and 'biological control in perspective' bring this handbook to life and reinforces the notion that biological control has come-of-age, with many growers increasingly seeing it as their first option in plant protection.



<b>Biological Control in Plant Protection</b>	code	<b>BOOK01</b>
---	------	---------------

### Orders for Biological Control:

All Biological products are 'Live products' and are supplied to special order. Please allow 10 working days. Cut off point for orders is Wednesday midday for delivery for the following week.

Tel: 01 8437808 (press 1 for Sales Team). All orders must be used immediately on receipt.

### Note:

The use of IPM (Integrated Pest Management) is now mandatory under SUD (Sustainable Use of Pesticides Directive) regulations.

# BIOLOGICAL CONTROL



## Bio-insecticides

### Lepinox Plus

1 kg

code **LEPI01**

Contains *Bacillus thuringiensis* subspecies *kurstaki*.  
Bio-insecticide for the control of lepidopteran pests.  
Highly selective and ideal for use as part of an Integrated Pest Management (IPM) programme. Approved for use on many crops including a range of top fruit, soft fruit, vegetables, salads, herbs and protected crops.



### Naturalis-L

1L

code **NATU01**

Naturalis-L is an oil dispersion formulation containing *Beauveria bassiana*.  
A bio-insecticide for the control of Whitefly including the Glasshouse Whitefly in all edible crops (protected) and ornamental plant production (protected).  
Will also provide a reduction in Thrips including Western Flower Thrips.



## Bio-fungicides

### Prestop

1 kg

code **PRES03**

Rate: See label for specifications

Wettable powder containing the microorganism *Gliocladium catenulatum*.  
A biological fungicide for the moderate control of *Didymella*, *Botrytis*, damping-off and root diseases caused by *Pythium*, *Phytophthora*, *Rhizoctonia* and *Fusarium* spp. on all edible crops (including strawberry) and all non-edible crops (protected) and outdoor strawberry.



### Serenade

10L

code **SERE02**

*Bacillus subtilis*

10L/ha

The chemical residue free solution for *Botrytis* Control on a range of crops, tomatoes, Nursery Stock, protected strawberries. Foliar Applied biological fungicide.  
Zero Harvest Interval. Ideal for use with Integrated Pest Management.

