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 affected 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

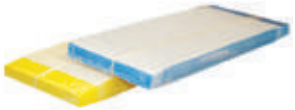
How they work:

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.

How to use: Suspend traps about 20cm above the height of the crop.
Rate of use: Use one trap /200m²



YELLOW EASISTICK TRAPS			
	10cm x 25cm	Pack of 10	code TRAP14
		Box of 1000	code TRAP13
	20cm x 25cm	Box of 500	code TRAP15

Hang one trap /100m² at height of 15–20cm above crop.
Adult Whitefly, Leaf Miner and Sciarid Fly detection.

BLUE EASISTICK TRAPS			
	10cm x 24cm	Pack of 25	code TRAP01
	10cm x 25cm	Box of 1000	code TRAP03

Hang one trap /100m² at height of 15–20cm above crop.
Western Flower Thrip detection.

PHEROMONE LURE			
		Pack of 10	code PHER01

Pheromone Lure specifically for Western Flower Thrips.

BIOLOGICAL CONTROL

OPTIROLL FOR APHID, WHITEFLY AND THRIP CONTROL

Whitefly, Aphids and Thrips are pests of major economic concern for greenhouse growers in the agricultural and horticultural industry. Russell IPM have developed the Optiroll series of products which provides the most advanced form of mass trapping available on the market today. The Optiroll range is a biorational, non-toxic and easy-to-use solution for controlling the three key pests.
Optiroll glue traps provide a simple and cost-effective solution for Whitefly, Aphid and Thrip control in glasshouses and polytunnels. The sticky traps, when used as part of an Integrated Pest Management programme, can significantly reduce crop damage and improve product quality.

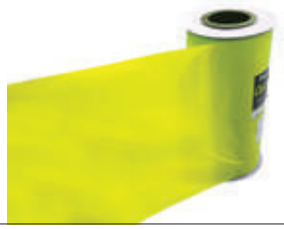
OPTIROLL APHID AND WHITEFLY CONTROL STICKY TRAPS

The damage caused by Whitefly and Aphid larvae can result in stunted growth and poor fruit development. The Optiroll Yellow range of sticky roll traps have been optimised for use in Whitefly and Aphid control following large scale trials to determine the specific wavelength of colour most attractive to the insect pests.

OPTIROLL YELLOW

15cm x 100m **code TRAP12**

- The specific colour matrix of Optiroll Yellow is highly attractive to Whitefly and Aphids.
- Scientifically optimised colour matrix to maximise pest catch rate whilst reducing attraction to beneficial insects.
- High tack adhesive layer.
- Complements biorational Integrated Pest Management programmes.
- Leaves 0% residue on fresh produce.
- Target Pests: Whitefly and Aphids.



OPTIROLL THRIPS CONTROL STICKY TRAPS

Thrips such as Western Flower Thrips *(Frankliniella occidentalis)* can cause severe damage in a range of crops. Understanding the biology of Thrips and how they respond to environmental cues such as colour wavelengths has enabled Russell IPM to develop the Optiroll Blue series of sticky roller traps.

OPTIROLL BLUE

15cm x 100m **code TRAP17**

- The specific colour matrix of Optiroll Blue is highly attractive to Thrips.
- Scientifically optimised colour matrix to maximise pest catch rate whilst reducing attraction to beneficial insects.
- High tack adhesive layer.
- Complements biorational Integrated Pest Management programmes such as those utilising predatory mites to significantly enhance success rate.
- Leaves 0% residue on fresh produce.
- Target Pest: broad range of Thrip species inc. Western Flower Thrip.

OPTIROLL BLUE SUPER PLUS

30cm x 100m **code TRAP19**

In certain greenhouse environments a third layer of attraction can greatly enhance the effect of the specific wavelength of colour and patented design of Optiroll.
In some conditions the addition of a Western Flower Thrip pheromone significantly enhanced trap catch.

- Optimised wavelength of blue colour to maximise pest catch rate whilst reducing attraction to beneficial insects.
- Glue infused with Western Flower Thrip pheromone.
- Contrasting patterns of patented design to enhance catch rate.
- High tack adhesive layer.
- Complements biorational Integrated Pest Management programmes.
- Leaves 0% residue on fresh produce.
- Target Pest: Broad range of Thrip species including Western Flower Thrip.

SWD (SPOTTED WING DROSOPHILA) – FRUIT FLY TRAP

code TRAP18

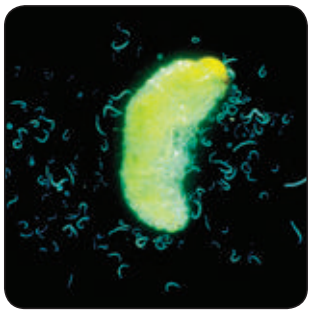
Bait trap suitable for mass capture and monitoring of Fruit Flies.

- Sustainable and refillable
- For wide area application
- Simply plug it together, fill it, hang it up
- Affordable, 100% recyclable

All parts are made of weather-resistant polypropylene. The user can assemble the trap very easily and place it directly in the right place. The holes on the lid edge are designed in such a way that no larger insects are caught. The bright red cover colour attracts the Fruit Fly. It is easy to monitor the trap through the transparent cup without opening it.

- The SWD trap can be used several times and is recyclable.
- The trap is filled with approximately 75mls of bait liquid.
- It can simply be emptied, cleaned and refilled.
- The bait liquid is also available in 5L drums. **code TRAP20**

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 *(Steinemema 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°-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.

Rate of use:

Container Plant Treatment - 50 million treats up to 100m² and 250 million up to 500m².
Open Ground Treatment - 50 million treats up to 50m² and 250 million up to 250m².

NEMASYS L

pack size: 50 million — code NEMA05

pack size: 250 million — code NEMA07

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.

Core IPM Components

Met52

Met52 will form the backbone of your IPM programme. It provides an effective long term control of vine weevil larvae in the growing media.

As a biological product it works slower as temperatures decrease and so it is important to bear in mind that supplementary treatments may be necessary in some cases.

Monitoring

Monitoring is an essential component of any IPM programme. Monitor for vine weevil adults by looking for the distinctive leaf notches they make whilst feeding or checking under pot rims and in other refuges they may seek out during the day.

Monitor from midsummer onwards by knocking out pots and looking for larvae in the media.

Supplementary IPM Treatments

Adult treatments

If vine weevil adults are present on the nursery it may be prudent to take steps to reduce pest pressure.

Chemical sprays are available which can do a good job of controlling adults and therefore reducing the number of eggs laid in your media.

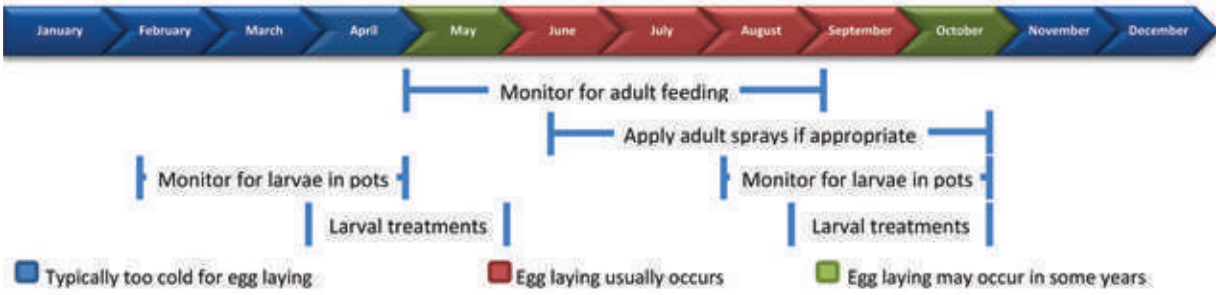
Larval treatments

If monitoring shows that larvae have survived and are present in pots in September then we recommend supplemental media treatments.

We would recommend the use of a low temperature nematode (Nemasys L) to ensure the best results.

Chemical options are available in some situations if preferred.

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



MET52 (IPM)

2.5kg — code MET503
10kg — code MET502
500g/m³

Based on *Metarhizium anisopliae*

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

WHITEFLY CONTROL *(Trialeurodes vaporariorum)*

Adults are usually found laying eggs on the underside of the youngest leaves. Newly hatched 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.

ENCARLINE 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 1m² until week 12 and then 1-2 wasp per 1m² per week.
Heated Crops: 1 wasp per 1m². If Whitefly are present increase rate to 5 wasps per 1m² 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)*.

ENCARSIA

Encarsia pack size: 3,000	**50 cards x 60 black scales**	**code ENCA07**
Encarsia pack size: 6,000	**100 cards x 60 black scales**	**code ENCA04**
Encarsia pack size: 10,000	**loose**	**code ENCA06**
Encarsia pack size: 15,000	**250 cards x 60 black scales**	**code ENCA08**

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 pupaes within the scale. Unlike *Encarsia formosa* the pupal 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 m² per fortnight for a light infestation; up to 10 wasps per m² for 4-8 weeks as a curative. Better under warm to hot conditions, ideal for herbs and Poinsettia.

ERETMOCERUS

Eretmocerus pack size: 3,000	**50 cards x 60 per card**	**code ERET03**
Eretmocerus pack size: 10,000	**200 cards x 50 per card**	**code ERET04**
Eretmocerus pack size: 15,000	**250 cards x 60 per card**	**code ERET06**

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

SPIDER MITE CONTROL *(Tetranychus urticae)*

The Glasshouse Red Spider Mite, also known as 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 and performs best in warm, relatively humid conditions but may fail in very hot, dry conditions.

Rate of use: 5 -10 mites per m^2

PHYTOSEIULUS

Phytoseiulus pack size: 2,000 (200m^2)	**code PHYT01**
Phytoseiulus pack size: 10,000 (1,000m^2)	**code PHYT02**

THRIP CONTROL

AMBLYSEIUS

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

AMBLYSEIUS

Amblyseius 100 sachet (250 bug per sachet). Use 1 sachet per 1-2m^2	**code AMBL08**
Amblyseius 50,000 in 5L bag. Use 50-250 mites per m^2	**code AMBL06**

HYPOASPIS

A soil borne predatory mite will predate Thrip pupae in the growing media. For more details please see Hypoline M, page 83.

NAD

Graphics supplied by Syngenta Bioline

SCIARID FLY CONTROL

The adult flies (generally known as Fungus Gnats) 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 and other Damping-off diseases.

HYPOLINE M *(Hypoaspis miles)*

Type:

Predatory Mite

How it Works:

A soil borne predatory mite which feeds on Sciarid 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:

Sciarid 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 Sciarid adults or larvae.

Rate of use:

100 per m² usually as a single application. For permanently planted areas (interior landscapes, botanic gardens etc.) re-introduce every 10-12 weeks.

HYPOASPIS

Hypoaspis pack 10,000 (100 m²) in 0.5L tube	**code HYP004**
Hypoaspis pack 25,000 (250 m²) in 1L tube	**code HYP002**
Hypoaspis pack 125,000 (1,000 m²) in 5L bag	**code HYP003**

NEMASYS *(Steinernema feltiae)*

Nemasys Biopesticide provide control of Glasshouse Sciarid Fly (fungus gnats), Western Flower Thrip and Leaf Miner in a range of cropping systems including propagation and ornamentals. Nemasys is based on a unique strain of the insect pathogenic nematode *(Steinernema feltiae)* and provides the ideal biological solution to the problem of Glasshouse Sciarids. (Nemasys contains nematodes in their vigorously infective stage). These nematodes attack Sciarid larvae by entering their natural body openings. Once inside, they release 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.

NEMASYS

Nemasys pack size: 50 million (100m²) **code NEMA08**
Nemasys pack size: 5 x 50 million (500m²) **code NEMA12**

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.

APHIDIUS COLEMANI

Rate of use: 1 wasp per 2m² per week.

APHIDIUS COLEMANI

Aphidius colemani pack size: 1000 Pack **code APHID06**

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 m² per fortnight

ACE MIX

ACE Mix pack size: 500 **code ACEM**

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 200m²

MACE MIX

MACE Mix pack size: 240 **code MACE**

BIOLOGICAL CONTROL

MEALYBUG CONTROL

Mealybugs are related to Aphids and feed by sucking plant sap, causing direct feeding damage by production of honeydew and associated sooty moulds. Several species are found, all have the appearance of being covered in a white waxy layer. They are serious pests in botanic gardens, interior landscapes and in commercial ornamental and edible crops.

CRYPTOLINE *(Cryptolaemus montrouzieri)*

Small (4-5mm) Australian ladybird. The larvae looks like a large segmented Mealybug and may be seen walking over plants.

How it works: Adults lay eggs into Mealybug egg masses, larvae develop and are predatory on all stages of the Mealybug.

Species controlled: The larvae feed on all Mealybug species but adults need egg producing species for egg laying.

Rate of use: 2-3 ladybirds per 1m2 on infested plants, repeat at 2 week intervals until predators are established.

When to use: Apply at first signs of infestation.

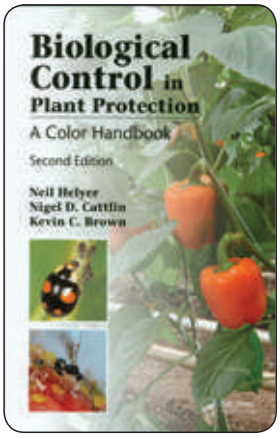
CRYPTOLAEMUS

Cryptoline Fightameal A	**Tube of 500 adults**	**code CRYP04**

BIOLOGICAL CONTROL IN PLANT PROTECTION

code BOOK01

A colour handbook by Neil Helyer.



Biological control has come-of-age, with many growers increasingly seeing it as their first option in plant protection. This 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.

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