

Biological Controls Product Guide

2011

Non-Pesticide Alternatives

Terralink Horticulture offers a wide variety of biological pest controls. As more communities and municipalities implement bans on cosmetic pesticide use, biocontrols are becoming more relevant in combating common pests associated with turf, ornamentals and home flower and vegetable gardens. The days when we can simply reach in the cupboard for "the spray" when we have insect problems will soon be gone; a new approach to pest control is required.

Terralink Horticulture purchases biological control agents produced by the largest, most respected and innovative Insectary world-wide: Koppert Biological Systems in Berkel en Rodenrijs, The Netherlands.

Unlike chemical pest controls, which usually work within hours or a few days, biological control takes a bit more patience and timing because they are living organisms. Pesticides have been proven to repel and/or kill native predators and parasitoids (tiny wasps that lay their egg(s) in or on the host) so you have to keep on a beneficial release program, usually every one to two weeks. As well, improper or overuse of pesticides leads to the development of pesticide resistance. Biological controls on the other hand, usually only require 2 or 3 "releases" in and around the infested area. Again, patience is required, as it can take 2 – 4 weeks for the biological controls to become established. Once the natural and insectary-reared insects become established in the infested area(s), nothing more is required other than a once weekly inspection of the infested areas to assess the biological / pest populations. The occasional supplemental release should be considered to enhance the biocontrol population. Unlike chemicals, pests cannot develop resistance to biological controls.

Terralink supplies biological controls for:

Agriculture, Greenhouse and Ornamentals

- Aphids
- Mites
- Thrips
- Caterpillars
- Whitefly
- Mealybug
- Scale
- Leaf miner

Turf and Landscape

- Grub
- Leatherjacket
- Weevil

For Grub control in Turf and lawns, Terralink supplies the nematodes *Heterorhabditis bacteriophora*, *Steinernema feltiae* and *Steinernema carpocapsae*. These species of nematodes do not attack any part of a plant. Instead, when applied in a drench, they actively search out European Chafer Beetle and leather jacket grubs (Crane Flies) in turf and the Black Vine Weevil larvae in ornamental plantings. Grubs of these pests feed on the roots of grasses and plants. Feeding damage includes loss of vigour to the plant as well as opening wounds that allow the entrance of fungal and bacterial pathogens. European Chafer infestations usually result in secondary damage caused by crows and raccoons digging up patches of lawn in search of the rather robust grubs that can grow up to 2.5 cm in size.

Contact Terralink's Biological Specialist Cody Cruise for more information.

How to order Biological Controls (Beneficials) from TerraLink:

TerraLink orders beneficials every Thursday for delivery on the following Tuesday (except stat holidays). Order cut-off time is 12 PM (noon) Thursday.

Fly parasite orders are placed every other Thursday for delivery the following Wednesday.

Contact Cody for all your biological orders and assistance on how to chose the solutions right for you.

cody@tlhort.com
or **1-800-661-4559**


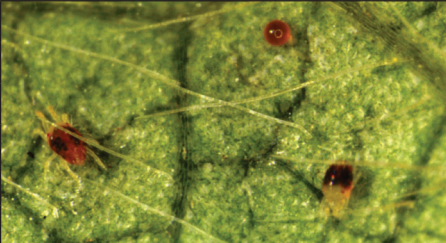









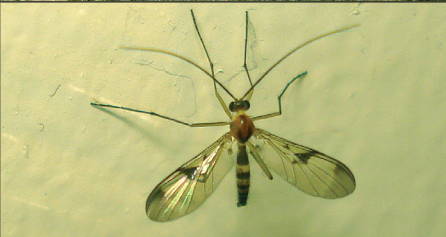





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TerraLink

Pest	ID Picture	Controls	Available Sizes
Agriculture, Greenhouse & Ornamental			
Aphid (Various species)		<i>Aphidoletes aphidimyza</i> (Predatory aphid midge)	1,000 pupae per bottle
		<i>Aphidius colemani</i> (Parasitic wasp for green peach and melon aphid)	500 per bottle
		<i>Aphidius ervi</i> (Parasitic wasp for foxglove and potato aphid)	250 per bottle
		<i>Aphelinus abdominalis</i> (Parasitic wasp for foxglove and potato aphid)	250 per bottle
		<i>Hippodamia convergens</i> (Ladybug beetles)	1/6th pint - 1,500
			1 pint (5,000)
			1/2 gallon (36,000)
<i>Chrysoperla</i> (Lacewing Predator)	1,000 larvae per bottle		
Spider Mite		<i>Phytoseiulus persimilis</i> (Predatory mite)	2,000 per bottle
			10,000 per bottle
		<i>Amblyseius californicus</i> (Predatory mite)	5,000 per bottle
			25,000 per bottle
		<i>Abyseius fallacis</i> (native; pesticide resistant)	2,000 per bottle
Thrips		<i>Feltiella acarisuga</i> (Predatory gall midge)	259 per tub
		<i>Amblyseius cucumeris</i> (Predatory mite)	50,000 per bottle
			100,000 per 5 L bucket
		<i>Amblyseius swirskii</i> (Predatory mite)	50,000 per bottle
			100 sachets of 250 per box
Thrips		<i>Orius insidiosus</i> (when available) (Minute pirate bug)	500 per bottle
			10,000 per bottle
		<i>Hypoaspis aculeifer</i> (Predatory mite)	100,000 per bucket
Caterpillar		<i>Steinernem carpocapse</i> (Nematodes)	50 million in gel
Whitefly		<i>Encarsia formosa</i> (Parasitic wasp)	Packs of 3000 (50 cards with 60 Encarsia per card)
		<i>Eretmocerus eremicus</i> (Parasitic wasp)	Packs of 3000 (50 cards with 60 Eretmocerus per card)
		<i>Delphastus catalinae</i> (Predatory beetle)	100 per vial
			1,000 per bottle
		<i>Amblyseius swirskii</i> (Predatory mite)	50,000 per bottle or 100 sachets x 250 per box
Mealybug		<i>Cryptolaemus montrouzieri</i> (Predatory ladybug beetle)	25 per bottle
			1000 per bottle
		<i>Leptomastix dactylopii</i> (Parasitic wasp)	100 pupae per bottle

Pest	ID Picture	Controls	Available Sizes
Leaf Miner		<i>Diglyphus isaea</i> (Parasitic wasp)	250 adults per bottle
		<i>Dacnusa sibirica</i> (Parasitic wasp)	250 adults per bottle
Potato Psyllid		<i>Tamarixia triozae</i> (Parasitic wasp)	250 adults per bottle
Fungus Gnat		<i>Steinernema feltiae</i> (Nematodes)	50 million in gel
			500 million in gel
		<i>Hypoaspis aculeifer</i> (Predatory mite)	10,000 in bottle
			100,000 in bucket
		<i>Hypoaspis miles</i> (Predatory mite)	10,000 in bottle
			100,000 in bucket
Shorefly		<i>Atheta coriaria</i> (‘Rove’ beetles)	1,000 per bottle
Barn/Housefly		Fly Parasites (Parasitic wasps: <i>Muscidifurax zaraptor</i> , <i>Muscidifurax raptorellus</i> , <i>Spalangia cameroni</i>)	5,000 per package
			15,000 per package
			25,000 per package
			Bulk (225,000)
Turf & Landscape			
Vine/Black Weevil		<i>Heterorhabditis bacteriophora</i> (Nematodes)	50 million in gel
			500 million in gel
		<i>Steinernema feltiae</i> (Nematodes)	50 million in gel
			500 million in gel
		<i>Steinernema carpocapse</i> (Nematodes)	50 million in gel
			500 million in gel
European Chafer Bug		<i>Heterorhabditis bacteriophora</i> (Nematodes)	50 million in gel
			500 million in gel
Crane Flies (Leatherjackets)		<i>Heterorhabditis bacteriophora</i> (Nematodes)	50 million in gel
			500 million in gel
Other Controls			
Flying Pests	Sticky traps for monitoring and trapping flying pests.		Various sizes depending on application method. Call for sizes and availability.

Fly Parasites

FLY SEASON is just around the corner! You may have just a few flies around now, but when the warmer weather of spring and summer kick in, the numbers will increase exponentially. One female fly can lay upwards of 900 eggs in a month. If you have 1000 flies laying 900 eggs, you'll have close to a million flies within a month, and it keeps going! Several studies have shown negative economic impacts on agricultural operations including lower meat, milk and egg production that are directly attributed to fly related stress on the livestock. As well, biting flies can transmit blood borne diseases and pathogens.



Fly control is a three step process: manure management, biological control and chemical control. Combined, these three components have proven to reduce fly populations to tolerable levels or lower.

Manure Management:

Female flies require moist manure to lay their eggs. If there is a 'crust', the fly will not lay eggs but instead, search for a more suitable location. Keeping your manure in a pile reduces the surface area for flies to breed and the internal heat forces the fly larvae to move towards the surface, exposing it to predation and parasitization. Another method is to spread the manure thinly over fields. The manure dries out quickly and, if no moisture, the flies cannot reproduce.

Biological Control:

Scheduled releases of fly parasites help to eliminate developing fly larvae. The reduction in emerging fly larvae is critical in breaking the reproduction cycle. The fewer

the number of adults that hatch out, the fewer adults to lay eggs, the fewer larvae to parasitize and your fly problem is greatly reduced. It is easier to prevent an increase in fly numbers than it is to get control of a well established fly population! The reason being: flies lay more eggs and have shorter life cycles than fly parasites. If the problem is attacked early, the fly parasites have fewer pupae to attack, therefore they do a better job and fewer adult flies hatch out and lay eggs.

Chemical Control:

Involves the use of fly baits and traps. Fly baits, as opposed to chemical sprays, are localized and target only flies and do not interfere with biological control programs. Chemical sprays and fogs will kill most flying insects and will have a negative impact on the fly parasites. As with all chemical treatments, the flies will become resistant to chemicals over time. Fly baits reduce the adult population, thus reducing the number of flies able to lay eggs and fewer larvae/pupae will develop. The fly parasites will now have fewer developing flies to control and the fly population will be reduced to acceptable levels. Again, the fly's reproductive cycle is interrupted.



Upon arrival, the fly parasites will be close to hatching from the fly pupae. Once hatched, they will immediately search for fresh fly pupae in which to lay eggs. The female fly parasite lays up to 50 eggs during her life that lasts, depending on climatic conditions, from 2-3 weeks. The parasite egg laid inside the fly pupae will hatch and the fly parasite larva will consume the developing fly, pupate and hatch out into an adult parasite and repeat the cycle.

The parasites are shipped still developing within the host and usually start hatching 2-5 days after, in temperatures around 26°C. Lower temperatures will slow down the development. **DO NOT** put the package in the refrigerator, this will kill them! It is better to cover

the entire fly breeding area, rather than in one spot. The fly parasites move around in a 100 yard radius in search of fly pupae and will even burrow into the breeding site. Do not release them in direct sunlight or out in the open where they will get wet if it rains. Release in and around manure and manure piles.

RELEASE RATES

Horses, Llamas, Sheep and Goats:

- 1-15 animals: 15K every 2 weeks
- 16-30 animals: 30K every 2 weeks
- 31-100 animals: 30-150K every 2 weeks.

Dairy cows, feedlot cattle:

- 500 parasitized pupae per large animal with 25K minimum shipped every 2 weeks
- 100 head of cattle – minimum of 50K every 2 weeks
- Operations of 500 animals or more can reduce fly parasite per animal ratio
- Small animal operations can use shipments every 2 weeks or every 4 weeks
- Minimum 25K per month

Calf hutches, swine operations:

- 500 parasitized pupae per animal
- 400 or more animals, may use 250 per animal ratio, every 2 weeks
- 20,000 or more animals, may reduce, depending on manure management, to 100 or as low as 20 per animal, every 2 weeks.

Manure:

25K every 2 weeks, per 0.3m³ or 10 sq. ft

Keep an eye on the fly population. As the numbers increase as the days get warmer, it is advised to also increase the release rates of the fly parasites. It is easier to stay on top of the pest, rather than try to play "Catch-up".

Remember, fly parasites are a long-term solution to fly problems, not a quick fix. They take time to establish, so don't wait until you're overrun with flies before you start!

Contact Cody at TerraLink Horticulture Inc. to discuss your fly control program for the upcoming season.