Nematode 101: The good, the bad, the indifferent

By SUZANNE WAINWRIGHT EVANS

When the word "nematode" is brought up with growers usually one of three reactions occur. Case one: What is a nematode? Case two: Nematodes... Those are bad for plants, there is no way I am going to apply them! And case three: We have used them before and love them!

To understand the basics of nematodes let's take a quick 'nematode 101.'

Nematodes are the most numerous multicellular animals on earth. In fact, there are many thousands of individual nematodes in every single handful of garden soil. They are microscopic, non-segmented worms that can be free-living, predaceous or parasitic. Or you could look at them as good, bad or indifferent. The bad nematodes can parasitize roots of plants, cause foliar damage, or even be parasites of mammals. These "plant parasitic" nematodes can be of great concern (to you and the state inspectors) if you are shipping plants with soil across state lines. Then there are the indifferent ones; they just hang out in the soil feeding on things like bacteria and fungi. Finally there are the good ones; these are the nematodes that are used in modern biological control to combat a wide variety of insect pests.

Using nematodes for biological control is not a recent development. Ever since the 17th Century, nematodes have been known to parasitise insects. In 1929, researchers Glaser and Fox identified and reared nematodes to potentially control grubs of the Japanese beetle. One would think this would have set off an era of biological control, but with the development of more economical insecticides, this research was to be put on hold. Fast-forward to today, and the labs are once again busy. Environmental contamination, the de-registration of many commonly used chemicals, and resistance management concerns are causing researchers to look at nematodes once again, with promising results.

On the commercial market today, there are several species of beneficial nematodes available. *Steinernema feltiae* is the most commonly used species for fly larva control. They cannot be seen with the naked eye, but with just a 10x hand lens, you can detect movement.

Application methods for nematodes are similar to those of conventional insecticides, with the

NEMATODE SPECIES

Nematode name	Controls	Comments
Heterorhabditis bacteriophora	Weevils and other beetle grubs that live in the soil including Japanese beetle, Masked chaffer, Black vine weevil, Strawberry root weevil, Flea Beetle and more	One of the oldest known and best of the insect parasitic nematodes
Heterorhabditis indica	Citrus root weevil group, May/June beetles, Banana moth, Mole Crickets, Masked chaffer	A species of nematode newly discovered in the U.S., particularly suited for use in subtropical soils and environments
Heterorhabditis marilatus	Weevils and other beetle grubs that live in the soil including Japanese beetle, Masked chaffer, Black vine weevil, Strawberry root weevil, Flea Beetle and more	Some what more cold tolerant than Heterorhabditis bacteriophora
Steinernema carpocapsae	Fleas, Armyworm, Cutworm, Fruit fly, Sod webworm, Beet armyworm	ambusher
Steinernema feltiae	Fungus gnats, Fruit flies, Tobacco cutworm, Shore flies, Onion maggot, and more	ambusher
Steinernema scapterisci	Mole Crickets	In 1985 S. scapterisci was brought from Uruguay to Florida

great advantage of a zero REI. Blow sprayers, drenching, chemigation, even syringes can be used to apply nematodes. Because nematodes are not insects, they are compatible with most of the commonly used insecticides.

Beneficial nematodes can be broken down into two ways in relation to how they hunt prey. There are the "ambushers" (which include the *Steinernema sp*). This group of nematodes will sit and

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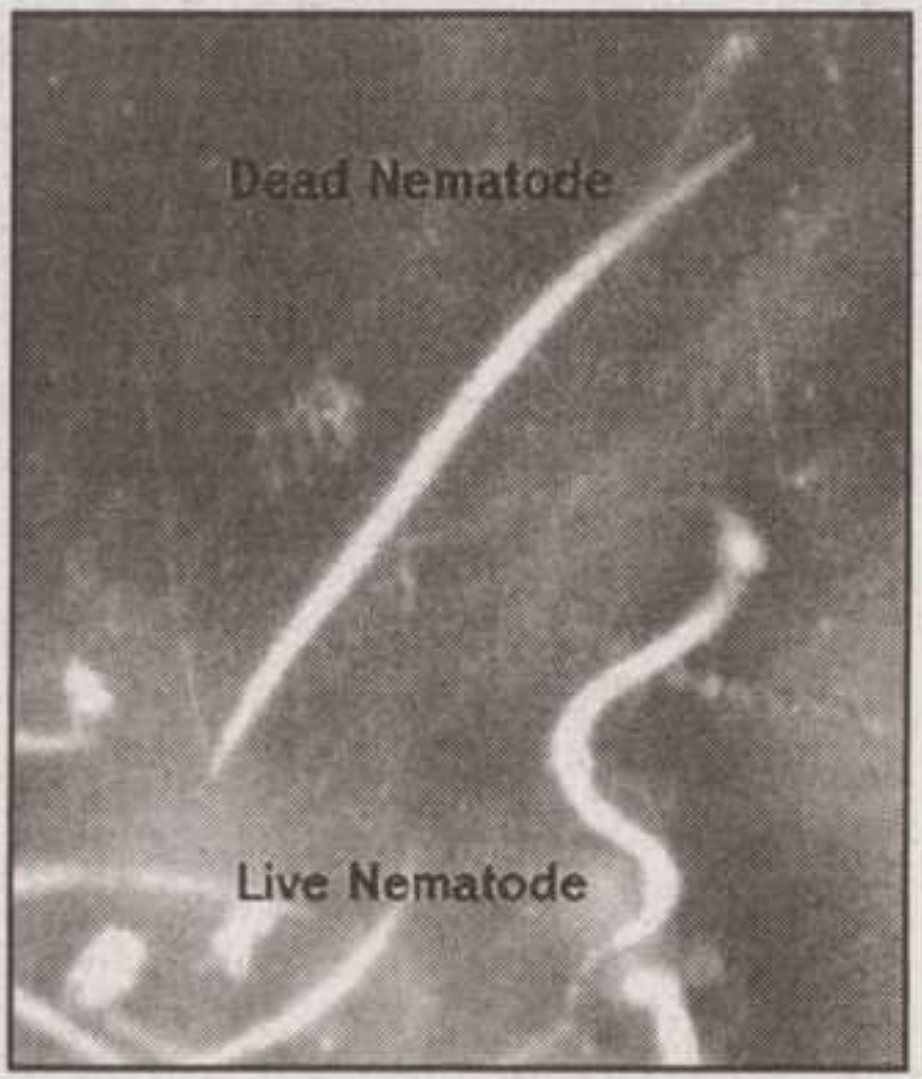

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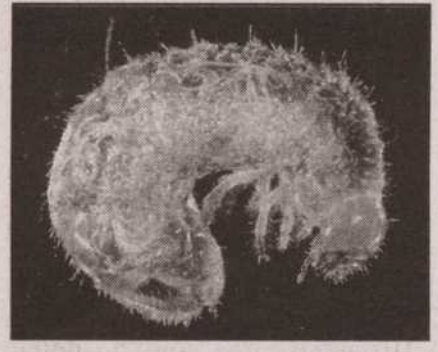
wait for an insect host to move by, and then move to force their way into the hosts' body. They are very effective against pests that are moving around on the soil surface, such as cutworms, fungus gnats and others.

On the other hand there are the "cruisers" that will move around actively searching for hosts. They are usually found deeper in the soil profile attacking many types of grubs. These are normally in the class *Heterorhabditis spp.*

How do I know what to buy?

Beneficial nematodes come packaged in water dispersible powder, paste formulation, jells and on moist sponges. There is an ongoing debate over application rates. This stems primarily from differences in methods of nematode production and application. Rates can range from 25 million to 1 billion per acre. Be sure to consult with your nematode supplier to get their recommended rates. Pricing can be comparable to conventional spray products, while providing longer residual as well as a zero REI.



A grub infected with beneficial nematodes. ***(Photo courtesy Integrated BioControl Systems)***

Hints for applying nematodes

- When nematodes arrive, follow storage direction on packaging. These are live creatures!
- Pre and post irrigate with application.
- After your nematodes arrive, you should conduct a quick check to see if they are viable. Ask your supplier.
- Avoid leaving nematodes in spray tank overnight.
- Avoid UV exposure.
- Do not exceed pump pressure of 300psi.

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Nematode suppliers

Company	Contact	Species
Hydro-Gardens Inc. P.O. Box 25845, Colorado Springs, Colo. 80936 www.hydro-gardens.com	Tel: 800-634-6362 719-495-2266 Fax: 800-634-6362 hgi@hydro-gardens.com	Steinernamatid Spp. Heterorhabditatid Spp
Integrated BioControl Systems, Inc. 100 Brown St, Suite 2 Greendale, Ind. 47025 www.GoodBug-Shop.com	Tel: 888-973-4227 812-537-8674 Fax: 812-537-8644 GoodBug@one.net	H. bacteriophora H. indica H. marelatus S. carpocapsae S. feltiae
IPM Laboratories Main Street Locke, N.Y. 13092	Tel: 315-497-2063 Fax: 315-497-3129 ipmlabs@baldcom.net	S. carpocapsae H. bacteriophora S. feltiae
Koppert Biological Systems Inc. 28465 Beverly Rd. Romulus, Mich. 48174, www.koppert.com	Tel: 734-641-3763 800-928-8827 Fax: 734-641-3799	S. feltiae H. bacteriophora
Becker Underwood 801 Dayton Avenue Ames, Iowa 50010	800-232-5907 515-232-5907 request@beckerunderwood.com	S. feltiae S. scapterisci