



# SMALL SOLDIERS

*Beneficial nematodes are a useful tool in pest management during plant propagation.*

BY STEPHEN KLOOSTERMAN

Greenhouse growers who propagate ornamentals know the importance of shielding delicate plants from all pests foreign and domestic.

Beneficial biologicals, and beneficial nematodes in specific, can be useful as growers look to combat fungus gnats and other insidious pests such as thrips. They are small — barely visible without magnification — but can be effective in closed environment systems, say industry experts.

## SCIENCE OF THE SYSTEM

Raymond A. Cloyd, a professor and Extension specialist in horticultural entomology/plant protection at Kansas State University, says beneficial nematodes are widely used in closed environments, where the sterile growing media and closed-off conditions protect beneficial nematodes from environmental conditions (e.g., temperature and sunlight) so they can do their job. After entering a fungus gnat larva through the anus, mouth, or breathing pores (spiracles) the nematodes release a bacteria that kills fungus gnat larvae.

“Outdoors, there are many other nematodes and organisms present that may feed on beneficial nematodes,” Cloyd says.

“In a greenhouse, when you’re using artificial growing media, you do not get those types of interactions. So, the use of beneficial nematodes in

greenhouses, interiorscapes, and conservatories, where artificial growing media may be peat moss or bark-based, the environment is more sterile than in most agricultural soils.”

Fungus gnats are of particular concern to greenhouse producers. The colorless, translucent larvae have distinct black heads, and adult females are about the size of mosquitos, Cloyd says.

“Beneficial nematodes are an effective and economical means of managing fungus gnat larval populations,” he says.

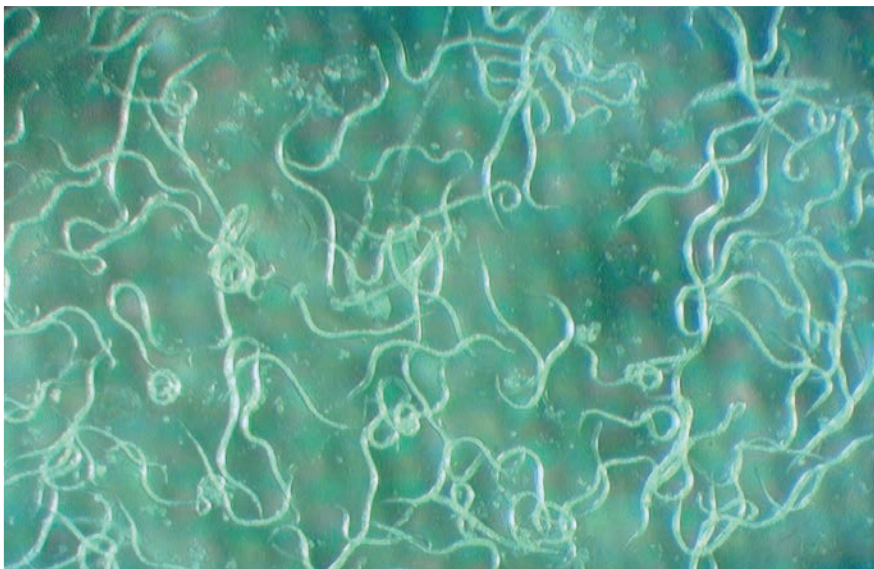
## NEW TO NEMATODES?

Jen Browning is the senior technical specialist for BASF and biologicals and insecticide lead. She has been with BASF for 11 years, and oversees the Nemasys product line, which BASF took on several years ago.

“You have different types of grower approaches to starting nematode applications,” Browning says. “You have folks who are really eager to use



**Fungus gnat larvae.**  
Photos: Raymond Cloyd,  
Kansas State University



Entomopathogenic nematodes (*Steinernema feltiae*).

biologicals, and they might be looking at certification for sustainability reasons: they are going to do whatever it takes to be successful.”

Others are more hesitant.

“Some of those folks, I think they’re easily discouraged, or they are naturally skeptical, and they don’t think (the biologicals) are going to work. One of the things we have found is that if you can get growers to try them, they discover how easy they are to use and they work. Really, you’re going to find they’re like chemistry. The main difference is that you’re going to keep them in the refrigerator before you use them and remember they are alive.”

“As living biologicals, beneficial nematodes come with their own set of instructions for storage and application.”

#### WHAT’S ON THE MARKET

The original Nemasys product, which is *Steinernema feltiae* beneficial nematodes, controls larval fungus gnats (*Bradysia sp.*), as well as soil and foliar stages of western flower thrips (*Frankliniella occidentalis*). BASF’s other products include Millenium (*Steinernema carpocapsae* beneficial nematodes) for controlling shore flies and wide-spectrum use, Nemasys L (*Steinernema kraussei*) for black vine weevils, and Nemasys G (*Heterorhabditis bacteriophora*) for beetle larvae.

“*Steinernema feltiae* has been the main species of beneficial nematode available to greenhouse producers,” Cloyd says. Although some of Cloyd’s experiments have dealt with Nemasys specifically, he said there are a number of commercially available beneficial nematodes on the market.

Joe Lara, who has marketed beneficial nematodes for many years, is director of marketing for BioWorks, which sells Nemashield (*Steinernema feltiae*) and Nemashield HB (*Heterorhabditis bacteriophora*) commercial brands.

Lara says the industry’s manufacturing processes have come a long way. Modern liquid fermentation processes replicate what beneficial nematodes need as a parasite inside a host insect’s body, allowing the nematodes to reproduce without hosts, and harvested in high volumes and with reliable consistency to perform as a commercial product.

“The commercial viability of this particular class of biologicals is so much more developed than it was 25 years ago,” he says. “Growers know they can turn to these supplier companies and get great support and education to control the target pests and experience success with these tools as part of their overall IPM programs.”

#### APPLICATION TIPS

As living biologicals, beneficial nematodes come with their own set of instructions for storage and application.

“They have to be applied early in production,” Cloyd says. “They cannot be applied later on when fungus gnats are present. Biological control is a proactive plant protection strategy. Once your cuttings are in the greenhouse and under propagation, you probably should apply beneficial nematodes.”

Nemasys is a “knock-down” application rather than an inoculative application. Browning says Nemasys is typically applied as a drench since larvae can be found in the top layer of soil. Some growers also apply them by hand wand or in irrigation by booms or drip emitters, she says. Some of the more common quality issues have involved shippers leaving boxes of nematodes out in the sun, someone mixing the nematodes with hot water on a summer day, or accidentally tank-mixing the nematodes with incompatible products.

Browning also says that Nemasys by itself can be applied without suiting up in full protective gear. Some growers have a habit of scheduling a “biologicals day” once a week, similar to an office allowing causal-dress Fridays.

As growers become more accustomed to using biologicals, they often transition to integrated pest management, taking a fresh look at improving their overall plans for pest control.

“We try to have nematodes be a good start for getting into biologicals,” Browning says. [gpn](#)

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