

TURFGRASS TRENDS

Volume 10, Issue 5 • May 2001

TURFGRASS PEST MANAGEMENT

Using Entomopathogenic Nematodes for Turfgrass Pest Management

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Entomopathogenic nematodes (*Steinernema* and *Heterorhabditis*) are microscopic roundworms that parasitize and kill insects in the soil. These nematodes have demonstrated potential for biological control of insect pests.

The entomopathogenic nematodes occur naturally in almost all soils and reproduce in dead hosts (see Fig. 1). The nematodes cause widespread mortality of insects in the soil and are often seen as crashes in insect populations or conspicuous epizootics. More than 30 of

these nematode species have been discovered worldwide. Due to the ease in nematode mass production, several nematode-based products have been developed for use as biological insecticides. Entomopathogenic nematodes are well suited for pest control in turfgrass because they attack a broad range of pests and can be easily mass-produced and applied using conventional spray equipment.

*Tests on home lawn turf have shown that *S. carpocapsae* is the most effective nematode species for the control of armyworms.*

Life cycle

Under suitable environmental conditions, the infective juvenile nematodes seek insect larvae and pupae in soil.

They penetrate host insects through natural body openings (mouth, anus, and spiracles) and release a bacterium that kills the insects within a day or two. Insects killed by the nematodes are flaccid, do not give off foul smell, and have conspicuous colors. For example, insects killed by *Steinernema carpocapsae* are yellow and those killed by *Heterorhabditis bacteriophora* are reddish brown.

After the death of the host, nematodes feed on the bacteria, and insect body contents, and reproduce. Within two to three weeks, hundreds of infective juveniles are released into the environment to seek out new insect hosts and continue their life cycle. For commercial uses, they are mass-produced either in live insects or in fermenters.

Species, strains and searching behavior

Nematode species and strains differ in their activity against different insect pests. These differences are due to the different search behaviors of nematodes, and also the type and number of bacteria carried by the infective juveniles. *Steinernema carpocapsae* will kill more mobile insects that live in the upper soil or thatch layer, such as billbugs, sod webworms,

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