New York State Integrated Pest Management Program

Impact of Soil Moisture on the Reactivation Capacity of Entomopathogenic Nematodes

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BACKGROUND

Entomopathogenic nematodes are well adapted to infect larval insect pests living in soil, and have the potential to be important biological control agents in a variety of ornamental and crop production systems. In the mid 1980's, several species of entomopathogenic nematodes became commercially available for insect pest management. Initially, small-scale production and limited marketing resulted in these products being used mainly for home gardens, lawns and landscapes. More recently, a few large companies have attempted mainstream marketing aimed at the commercial turf, vegetable, and fruit industries, but acceptance has been hindered by variability in the success of the nematodes' ability to control target insects.

More consistent results have been achieved by educating users on better application techniques and appropriate selection of nematode species and strains for particular uses. However, the impact of the agronomic environment on nematode ecology must be better understood before nematodes can be a reliable pest management alternative. Because entomopathogenic nematodes need both high relative humidity to survive and a film of free water for movement, moisture conditions have been recognized as one of the most important factors in the soil environment affecting survival, infectivity and persistence of nematodes (Curran, 1993; Klein, 1990).

Our 1998 work, reported last year, examined the effects of soil moisture on entomopathogenic nematode infectivity under laboratory conditions. We concentrated on the ability of nematodes to be reactivated to infect insects after long periods of storage under unfavorable (low soil moisture) conditions. In 1999, we continued this project to look at reactivation capacity over an 18-month period. We also investigated the soil moisture contents at which entomopathogenic nematodes are deactivated and reactivated. These studies simulate the natural variation in soil moisture conditions that that occur in the field and explore their effects. The project has broad implications for managing soil dwelling insects with entomopathogenic nematodes in turf, ornamental and crop production systems.

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