Long-term mole cricket control on horizon

A nematode product patented for use by the University of Florida to provide long-term biological control of turf-damaging mole crickets will be available next year from Becker Underwood. This product, known as Nematac S, will be cost-effective and highly beneficial for a wide range of consumers, from golf-course managers to ranchers.

By Angela Brammer
UF graduate student

The parasitic nematode *Steinernema scapterisci* attacks only foreign mole crickets — those that are most damaging to turfgrasses in the Southeast. The nematodes live in the soil and enter the mole cricket through openings in the body, such as the mouth or spiracles. Once inside, they release bacteria that feed on the mole cricket, usually killing it within 48 hours. The nematodes feed on the bacteria and reproduce inside the mole cricket, and the next generation emerges to search for another host once it dies.

Steinernema scapterisci spreads slowly on its own, mostly relying on its host for dispersal. After infection, a mole cricket may fly up to a mile, taking its parasitic nematodes along for the ride. Nematodes then emerge into the new location once the host cricket dies. Because of this, it may be possible to effectively cover an area of mole cricket infestation by applying the nematodes to the "hot spots," those places with the highest concentrations of mole crickets. The mole crickets themselves do the work of spreading the later generations of nematodes throughout the site.

Of the three species of *Scapteriscus* spp. mole crickets that immigrated here from their native South America about 100 years ago, the tawny and southern mole crickets cause the most damage in Florida. With no native natural enemies in the U.S., they multiplied and thrived. Now, the two species cause millions of dollars of damage each year to Bahia, Bermuda, Centipede and St. Augustine grasses. Additional millions are spent each year on insecticides to prevent such damage.

University of Florida/Dr. K.B. Nguyen

***Steinernema scapterisci* nematodes emerge from the body of a dead tawny mole cricket.**

In the 1980s, University of Florida scientists imported the mole cricket nematode from South America. The species was formally described in 1990 by UF nematologists Dr. Grover Smart and Dr. K.B. Nguyen. Experiments showed that the nematode killed 100 percent of tawny and southern mole crickets and at least 75 percent of short-winged mole crickets without adversely affecting other insects. It is an effective, permanent method of controlling all three *Scapteriscus* spp. mole crickets.

Ease of Use

Application of the nematodes is simple. Mixed with water, they can be sprayed on the surface or injected into the sod under low pressure. Applying them just beneath the surface provides some protection from desiccation and ultraviolet light. Surface distribution should be followed by irrigation to help the nematodes into the soil. It may be possible to apply the nematodes through existing irrigation systems as well.

Golf courses may require higher concentrations per acre, but in pastures, fields or areas with large numbers of mole cricket populations, the cost per acre can be reduced by applying the nematodes in strips. UF research has shown that a swath of nematodes as small as 1/8 acre, given time, can control an acre's worth of mole crickets. In an experiment on 24 acres of ranchland in Polk County, nematodes applied in proportions varying from none to half of the treated area appeared to spread throughout the 24-acre site in less than a year.

The nematodes naturally have greater effect on large nymphs and adult mole crickets, as it is easier for them to find their way into the mouths and spiracles of the larger insects. Thus, it makes sense that they would be most effective in the early fall or late spring just before adult mole cricket populations reach their peak.

Benefits of Biological Control

Chemical control of insect pests is costly. Insecticides are immediately effective but must be reapplied often — at considerable cost —to maintain control of a mole cricket population over time. Mole cricket nematodes, on the other hand, have a residual effect on mole cricket populations that lasts long after the initial application. The nematodes reproduce inside the mole crickets. Each infested mole cricket can harbor as many as 50,000 new nematodes. Those 50,000 will emerge once the mole cricket dies to seek new host mole crickets. This reduces the need for further application. Because of this, controlling mole crickets with these nematodes costs less than using pesticides.

Nematodes should be used as a preferred tactic in the integrated pest management of *Scapteriscus* spp. mole crickets. Chemical insecticides can be effective in controlling outbreaks and reducing heavy infestations of mole crickets; however, most situations call for prevention or suppression through turf management, biological control, use of resistant turf and other more sustainable tactics. *Steinernema scapterisci* parasitizes only the three South American species in the genus *Scapteriscus*. Even native mole crickets are not at risk. With chemical pesticide use, not only are other, potentially beneficial, insects at risk, but so are humans, pets and wildlife. This is not the case with nematodes. With nematode applications, golf courses do not have to keep the public away for a time as they do with pesticides.

Nematodes are environmentally friendly as well. There is no danger of contamination of nearby water sources or other negative environmental impacts, which means there won't be any cleanup bills. In addition, the public looks kindly upon biological controls. The use of harsh pesticides is a growing public concern, and minimizing their use when alternatives are available can contribute to a positive public image.

Cost and Availability

The University of Florida has issued an exclusive license to produce the nematodes to the U.K. company MicroBio, owned by Becker Underwood of Ames, Iowa. MicroBio will sell the product under the name Nematac S. It will be available in units of 500 million for about $100 a unit. The total cost per acre will vary with the type of land and need for fast results. A higher initial concentration of nematodes will eliminate mole crickets more quickly and may be the best solution in a situation where speed is key.

A general recommendation is to use 800 million to 1 billion nematodes per acre. Partial-acre treatments should use a proportional amount of nematodes: 400 million to 500 million for a ½acre strip, 200 million to 250 million for a ¼ acre strip, etc. This brings the cost for those who treat their pastures in 1/8-acre strips down to about $25/acre for the product, plus $5-$10 for application.

Demonstration and Research Sites

The Florida Legislature awarded $300,000 in state funds to the mole cricket nematode program this year. The money will enable the Mole Cricket Task Force to establish research and demonstration sites around the state to test the effectiveness of the nematode product on various types of land with different amounts and methods of application.

The Mole Cricket Task Force includes University of Florida and Florida Department of Agriculture and Consumer Services, Division of Plant Industry researchers; county extension agents; product development specialists from MicroBio; and members of the affected industries.

The nematodes will be applied during September and October, at various sites around the state, including golf courses, pastures, ranchland, sod farms, and city parks and playgrounds. Different methods of application (slit injection, liquid injection and spraying) will be tested and demonstrated. The results of this work will be presented at field days or workshops in areas of the state that are heavily infested with mole crickets.

For more information about the Mole Cricket State Program, please contact Dr. Norm Leppla, UF, co-chair of the Mole Cricket Task Force, at 352-391-1901, ext. 120, or ncl@gnv.ifas.ufl.edu.

For more details, please visit Tom Fasulo at the University of Florida Entomology and Nematology trade show booth or Tom Hinks at the Becker Underwood booth. For information on how to become a distributor for Nematac S, please contact Tom Hinks, MicroBio, at 519-767-3188 or thinks@netcom.ca.

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