During the Field Tours Dr. John Cisar explains the results of Ultradwarf Management studies done on the FGCSA research green. Photo by Joel Jackson

Dr. George Snyder summarizes the environmental information learned from a decade of studying pesticide applications to USGA greens from Nemacur to MSMA. Photo by Joel Jackson.

Art Lewis of Lewis Equipment demonstrates a verticutting unit during the South Florida Turf Expo. Photo by Joel Jackson.

were watered and fertilized in an equal manner. Each test was conducted twice. Results were obtained through nematode assay of the soil and root length analysis.

All three nematode species reproduced on both turf species. Both species of stubby-root nematodes damaged bermudagrass roots, but *T. proximus* caused greater root reductions, equal to those caused by sting nematode (considered the most damaging nematode on turfgrasses). Bermudagrass root lengths were reduced 22% by *P. minor*, 41% by *T. proximus*, and 36% by sting nematode. Both stubby-root nematode species caused equal damage on the first trial on St. Augustinegrass, but *T. proximus* caused greater damage than *P. minor* in the second trial.

Sting nematodes did not damage Floratine St. Augustinegrass roots in either trial. The two stubby-root nematode species in this research are easily distinguished by a trained diagnostician. Based on these results and on field observation, the University of Florida Nematode Assay Lab has changed the damage thresholds used to diagnose nematode problems on turf. Separate thresholds are now used for each stubby-root nematode species.

Mole Crickets

Interactions between Mole Crickets and Insect-Parasitic Nematodes (*Steinernema scapterisci*, Nematac S)

Kathryn A. Barbara and Eileen A. Buss

Mole crickets (*Scapteriscus spp.*) are the most damaging insect pests of managed turfgrass and pastures in the southeastern United States. Although insecticides often provide effective short-term control, long-term suppression of mole cricket numbers is needed. We examined the establishment and spread of the insect-parasitic nematode *Steinernema scapterisci* on golf courses. We placed 20 linear pitfall traps on two mole cricket hot spots within 10 different fairways on two Gainesville golf courses (40 traps total). Within each fairway, one hot spot (1/10th of an acre) was treated with nematodes and the other was left untreated. The rate was 1 billion nematodes per acre.

The average percentage of infected mole crickets before the fall 2001 nematode application was 16.7 percent at Ironwood Golf Course and 20.4 percent at Gainesville Golf and Country Club. This showed that the nematode had persisted on these golf courses after earlier applications in 1988 and 1989.

Pesticides were commonly used on both courses. Post application infection to date is an average of 33.9 percent at Ironwood and 24.4 percent at Gainesville Golf and Country Club. However, over time, the percentage of infected mole crickets collected varies, often because of weather and mole cricket activity. Data also demonstrate that the nematode is moving into untreated areas of the golf courses.

Thus, use of *S. scapterisci* against pest mole crickets is a sustainable and low-risk IPM tool for turfgrass managers. The nematodes attack large nymphs and adults, reproduce inside their bodies within several days, and then disperse back out into the soil to infect other mole crickets. Our research, and that of Dr. Martin Adjei and Dr. J. Howard Frank, indicates that these nematodes work well over time where insecticides either cannot be used (e.g., pastures) or where insecticides have failed to control pest mole crickets.

Nematode populations persist for years and kill mole crickets in the soil, before they can lay more eggs in the fall and spring. We are continuing tests to evaluate the effect of these nematodes on mole cricket tunneling behavior and to see if soap flushes, which are currently monitoring methods, accurately indicate infection in mole crickets.

Integrated Pest Management of Pest Mole Crickets with Emphasis on the Southeast

J. Howard Frank and J. Pat Parkman

There are at least 70 species of mole crickets (*Orthoptera: Gryllotalpidae*). Some are rare, others are innocuous, and a few are important pests. These soil-dwelling pests damage underground parts of a long list of cultivated plants. Although tillage and flooding are used successfully in some situations to bring these pests to the soil surface and expose them to vertebrate and other predators, chemical pesticides are widely used.

Knowledge of their life history is used to time application of chemical treatments to save money, but is not used as widely as it might be. Classical biological control has been used against immigrant mole crickets in Hawaii, Puerto Rico, and the southern USA.

In Florida, three *Scapteriscus* species from South America cause major damage to pastures and turf and are targets of a classical biological control program. Population levels of two of the pest species have been reduced substantially in Florida by establishment of a tachinid fly (*Ormia depleta*) and a steinernematid nematode (*Steinernema scapterisci*) from South America. The nematode also functions as a biopesticide. Managers of pastures and turf in Florida have thus far derived benefits from these classical biological control agents without understanding their function: use of chemicals is reduced when mole cricket populations are lower due to action of these organisms.

Future enhancement of the action of *O. depleta* and of a sphecid wasp (*Larra bicolor*, which also was introduced from South America) probably will demand deliberate planting of nectar sources for adults of these biological control agents, and the advantage will be to managers who adopt such a strategy.

Chemical pesticide use is strongly promoted by a large chemical industry, whereas biopesticidal use has thus far been little promoted and sales have been few. Even managers who do not change their strategy of pesticide use in response to damage by mole crickets, and have no knowledge of the differing life cycles of the three Scapteriscus species or of the presence and action of the classical biological control agents, will derive benefit as these biological control agents (and a predatory beetle which has not yet been released) increase their distribution.

Soils and Water

Effect of Fertilizer Rates and Sources on Nitrate Leaching and Turfgrass Quality.

Subhrajit K. Saha, Laurie E. Trenholm, and J. Bryan Unruh

Due to increasing concerns over potential pollution of Florida's water resources from fertilization of home lawns, there are statewide research projects designed to verify different aspects of turfgrass Best Management Practices. The objectives of this study are to evaluate differences in quality and fertilizer leaching between turfgrass and landscape plants in response to different fertilizer formulations.