UF/IFAS Turf Field Day and 16th Annual South Florida Turf EXPO

March Event Showcases Turf Research

Research and education programs beneficial to South Florida are part of a statewide program, with turfgrass scientists specialized in entomology, soil and water science, nematology, turfgrass breeding, plant pathology, weed science, and plant physiology. In combination with industry-generated funds, the effort depends on the support of tax revenues, which are allocated by the Florida legislature based on the importance of the turfgrass industry and its positive impact on Florida's economy and environment.

The brief summaries are intended to convey the diversity of what we are doing. This information is not presented to make recommendations for management decisions, including the use of particular products.

The South Florida Turf EXPO is co-sponsored by the South Florida Golf Course Superintendents Association. The EXPO has provided funds used to build and maintain the Otto Schmeisser Research Green.

Van Waddill, Professor and Center Director

I thank my colleagues for their enthusiastic response, and submission of these research summaries. The brief summaries are intended to convey the diversity of what we are doing. This information is not presented to make recommendations for management decisions, including the use of particular products. The information is made available to stimulate discussion and careful observation among turfgrass managers, product manufacturers and representatives, and others interested, regarding turfgrass research.

Philip Busey and Diane L. Johnston, Editors

Nematodes

Alternatives to Nemacur for Nematode Management on Golf Course Turf

William T. Crow

In 2002 12 products were evaluated on FloraDwarf bermudagrass for ability to decrease nematode populations or nematode damage, or increase tolerance to lance (*Hoplolaimus galeatus*) and stubby-root (*Trichodorus proximus*) nematodes. Each product was applied at the maximum rate monthly for six months. The treatments were evaluated for visual performance, nematode populations, and root lengths. Each treatment was compared with untreated and fenamiphos- (Nemacur-) treated plots. Turf and nematode evaluations were made monthly, two weeks after each treatment. Root lengths were measured once, 14 weeks after the initial treatment.

While some treatments had nematode population densities higher or lower than the untreated at one sampling date, there were no overall trends in nematode population reduction with any of the products. Visually, only CMP (an experimental mustard plant based product) and avermectin (a biologically-derived insecticide/nematicide) improved the turf consistently. These two products applied each month were generally as effective as two applications of Nemacur applied three months apart in enhancing turf performance. CMP in particular had consistently high visual performance compared to untreated, and outperformed Nemacur at most data-collection dates. No treatments had significantly greater root lengths than the untreated controls.

In 2003 we will be testing these same products, and perhaps a few additional ones. We will be moving to a site that is infested with sting nematodes as that nematode may be a better indicator species than lance and stubby-root nematodes. We will also be conducting the test on a different bermudagrass cultivar to see if root differences can be better quantified.

This study is funded by a grant from the Florida GCSA, GCSAA and the Bayer Corp.

Relationships between Nematode Damage and Nitrogen Use on Turf

John Eric Luc and William T. Crow

Can nematode management have a positive environmental impact? What if managing nematodes could reduce nitrogen use and nitrate leaching into groundwater? Plant-parasitic nematodes damage turf roots, making the turf less efficient at extracting water and nutrients from soil. To keep nematode-damaged turf looking acceptable often requires additional water and nitrogen . Where does the nitrogen go that is not taken up by the turf? These questions are being explored in the following experiments funded by the FGCSA and GCSAA.

Greenhouse studies are comparing nitrate leaching and nitrogen uptake by turf from sting-nematode-infested and non-infested lysimeters. Field experiments are being conducted on a fairway in north central Florida to quantify nitrogen requirements of nematicide-treated and untreated turf. The experiment will have untreated plots and plots treated with Curfew Soil Fumigant (1,3-dichloropropene). Each of those plots will be divided into four levels of fertility. Tissue nitrogen will be measured every two weeks, followed by a fertility treatment as appropriate. Differences in percent nitrogen, grams of dry matter collected, total nitrogen uptake, and root density will be compared between nematicide-treated and untreated plots.

Nematode management on turf could be linked to reduced nitrogen use and reduced risk of groundwater contamination, which could help stimulate development of new nematode-management strategies and aid the registration of new nematicides for turf.

Can Using Poor Quality Water Actually Help Your Nematode Situation?

Adam C. Hixson and William T. Crow

In many coastal areas in the southeastern United States water restrictions are causing a headache for golf course superintendents, sports turf managers, and homeowners. Seashore paspalum (*Paspalum vaginatum*) has great potential for use in these areas. Because of its tolerance to drought and salinity, use of this grass in coastal areas may aid in conservation of fresh water resources.

Plant-parasitic nematodes are damaging pests of turfgrasses in Florida, with sting (*Belonolaimus longicaudatus*) and lance (*Hoplolaimus galeatus*) nematodes being the most damaging. It is unknown how these or other plant-parasitic nematodes may impact seashore paspalum and how high-salinity irrigation will affect these and other plant parasitic nematode populations. Therefore, a salinity test was performed to examine the effects of high salinity irrigation on *Belonolaimus longicaudatus* and *Hoplolaimus galeatus*.

Treatments consisted of six different rates of salinity used to irrigate the grass on an as-needed basis. The irrigation treatments were formulated by concentrating deionized water to five salinity levels, (5, 10, 25, 40, and 55 ds/M) and deionized water to serve as a control.

This currently ongoing research has tentatively determined that at high salinity concentrations (25 ds/M and above), sting and lance nematode reproduction and feeding significantly decreases. Seashore paspalum has also shown to be susceptible to sting nematodes with a 30% to 40% root reduction when compared to uninoculated pots, but lance nematode data has proven to be inconclusive thus far.

Damage Potential of the Stubby Root Nematode Species *Paratrichodorus minor* and *Trichodorus proximus* on Bermuda and St. Augustine Turfgrasses

Johanna Welch and William T. Crow

Trichodorus proximus and *Paratrichodorus minor* are the most common species of stubby root nematodes found on turfgrasses in Florida. An experiment funded by the Florida Turfgrass Association compared the reproductive rates and root damage caused by these two stubby root nematode species on bermudagrass and St. Augustinegrass.

Twenty pots each of TifEagle bermudagrass and Floratine St. Augustine turfgrass were used for this experiment. Five pots each were inoculated with 400 T. *proximus*, 400 P. *minor*, or 100 *Belonolaimus longicaudatus* (sting nematode), and five pots were uninoculated controls. After inoculation, the plants were left for 100 days in a climate-controlled greenhouse during which all of the plants

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.