

# Southern Turf Managers Face Pest Management Challenges

Nematodes, mole crickets among problems

By David Held and Alan Henn

**T**urfgrass managers in the southern United States and especially the Gulf Coast region are faced with new and old challenges in pest management. Disease and insect pests exploit the high-quality, high-maintenance turfgrass on golf courses. This article highlights the pest management challenges facing Southern superintendents and the progress being made toward solving those problems.

## Pathology challenges

Turf nematodes are worm-like animals that are less than one-eighth of an inch long. Because they can't be seen by eye or hand lens, live hidden in the soil and cause no specific symptoms in turfgrasses, nematode damage goes unnoticed or is explained away to other problems, such as poor fertility, soil compaction, watering or diseases.

The first symptom of nematode damage is wilting of the turf during the heat of the day and its recovery during the night. The turf may turn off-color, often a lighter shade of green or

slightly tinged with yellow (Figure 1).

As the nematodes increase, the number of turf roots often decrease, causing the turf to thin out. Nematode-weakened turf can't compete well with weeds and many weeds are not as favored a food for nematodes. Thus, weedy turf sometimes indicates a nematode problem. Sedges and sporges are common invaders in warm-season turf grasses damaged by nematodes.

The roots of nematode-damaged turf may not show symptoms. If they do, damaged roots are usually dark or have dark lesions on them. They are usually short, often with few lateral roots. Root rot is often present. Turf root systems attacked by ring nematodes may appear as if a dinitroaniline (DNA) type herbicide had been applied; they will be short and stunted with a slight swelling at the root ends. Turf attacked by root-knot nematodes may have short, twisted roots with small swellings.

Diagnosis of nematode problems must be confirmed by counting the number and type of nematodes extracted in a soil sample. The handling of the soil sample can greatly influence the quality of your results. For example, soil cores should be pulled, mixed, and immediately placed in a plastic bag out of the heat and sun. They should be shipped overnight to ensure that nematodes are still alive when they arrive. Nematodes samples can be processed by extension service personnel located at most state land grant institutions. They use state or regional threshold levels to aid superintendents in making a decision to treat with a nematicide.

Proper diagnosis, however, is only the starting point to management. Limited treatment options make nematode management a challenge. Nematicur (fenamiphos) is being phased out by the U.S. Environmental Protection Agency. Curfew (dichloropropene), an alternative to Nematicur, is available in several Southern states (Alabama, South Carolina,

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**FIGURE 1**



*The turf sample taken from this green confirmed the yellowing seen here was caused by nematodes. Ring and sting nematodes were above the threshold for this green (2002 ring nematodes and 126 sting nematodes per pint of soil).*

To see the full text of this article plus a chart comparing the efficacy of fipronil to shorter residual insecticides, please go to:

[turfgrasstrends.com](http://turfgrasstrends.com)

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Georgia, and Florida) via custom applicator. In these states, superintendents using Curfew can indirectly control mole crickets when using the high label rate (5 gallons of product per acre). Superintendents that can't use these products because of label restrictions or economics are then faced with reducing the stress on their greens, which can be difficult during June through August in the South.

### Entomology challenges

Before and after nematode season, Southern turf is ravaged by the burrowing of earthworms and mole crickets. Most superintendents realize the benefits that earthworms provide, including the breakdown of thatch and soil aeration. On green and tees, however, hundreds of mounds (called castings) produced by these beneficials can cause trouble (Figure 2).

Superintendents are forced to knock down the castings before mowing; otherwise flattened castings will smother the grass, turning a green into a muddy mess. The roller and bed knife on a greens mower often require additional maintenance because castings cake the roller and dull the blade.

Books, research articles, and even an entire discipline of biology called vermiculture are dedicated to the biology and ecology of earthworms and their castings. Despite this, data on managing castings and earthworms in close-mown turfgrass are few. Most of what is presently known about earthworms in golf turf originates from observations and studies on the indirect effect of pesticide. Fortunately, the USGA and other industry groups have identified earthworms as a priority and have funded research on earthworm management.

Based on research and observations, what can be done to manage earthworms? First, castings appear to be more problematic on push-up greens, especially during the spring and fall.

About 20 years ago research was conducted to raise awareness about the impact of turfgrass pesticides on earthworms. This work has inadvertently become the basis for superintendents to manage earthworms on greens. Rightly so, no pesticide is labeled for control of earthworms. However, some pesticides that were found to be most toxic to earthworms in that study (namely, thiophanate-methyl and carbaryl) are now being applied for labeled

**FIGURE 2**



*A common sight for the greens crew in the spring and fall: hundreds, if not thousands, of surface castings left by earthworms.*

pests, with the intention of indirectly suppressing or eliminating castings.

Fortunately, a recent study suggests that off-label use of pesticides may not be the only way to manage earthworms on golf courses. Use of irritants or abrasives applied during the spring or fall may reduce castings on greens. Angular aggregates such as crushed coal slag have been shown to provide short-term reductions in surface castings. These results suggest that angular materials may irritate the worms enough to drive them out of the greens. This is not surprising considering that diatomaceous earth, which works to abrade the cuticle of insects, has been a favorite tool of organic gardeners for years. Although progress is being made, preserving the benefits of earthworms while reducing or eliminating castings remains an arduous challenge.

Mole cricket management may not be as complex an issue as earthworms, partly because of ChipcoChoice (fipronil). The challenge that presents itself is more an economic and not an entomological one. In light of a recovery economy and reduced pesticide budgets, municipal courses and some private courses simply cannot afford to use fipronil. One solution that Mississippi superintendents have adopted is to just treat greens and tees,

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leaving fairways to chance.

There are alternative insecticides to fipronil. These are shorter residual insecticides or synthetic pyrethroids (Talstar). How do they perform relative to Choice, the unofficial industry standard? From 2001 to 2003, two experiments were published in the journal *Arthropod Management Test Reports* that can help to answer that question. The journal, published by the Entomological Society of American, serves as one of the primary places to publish the results of insecticide control studies on agricultural and horticultural pests. In these tests, treated turf is rated on a scale from 0 to 9. A rating of 0 corresponds to no damage, whereas a rating of 9 indicates turf was severely damaged. In these controlled studies, plots are typically 200 square feet or more and ratings are taken from several 10-square-foot areas within each plot.

The first test, conducted in North Carolina, had severe damage to untreated plots of grass indicated by ratings as high as 7.25. The results of the test suggest that a single application of Orthene may not perform as well as one application of granular fipronil under heavy insect pressure.

Other tests published in the same journal suggest that under light-to-moderate insect pressure, a single application of Orthene can significantly reduce the amount of damage relative to untreated plots. Statistical significance, however, does not tell whether the degree of control was acceptable.

The second test, conducted in Florida, evaluated two formulations of Talstar against fipronil. Damage from mole crickets in untreated turf appeared to be less, given the low to moderate damage ratings in those plots. Damage ratings from plots treated with either fipronil or Talstar were never greater than 1, indicating little damage. Other studies published in the journal suggest that other pyrethroids such as DeltaGard and Scimitar provide similar control.

Factors that could reduce the effectiveness of pyrethroids against mole crickets are late application date (August) or a more severe infestation level at the time of treatment. Under these circumstances, a single application may not be adequate to reduce damage.

It is clear that there are effective alternatives to fipronil for mole cricket control. For

## ANOTHER CHALLENGE

The good news is that these pest management challenges provide great opportunities for state extension specialists to do applied research on golf courses. However, as land grant universities are forced to cut entomology and pathology programs and shift their pest management focus away from applied research, who will do this applied research? This may be the greatest challenge yet to be resolved.

Extension specialists will continue to serve the turfgrass industry as best they can, but some states have lost these positions through retirement, perhaps never to refill them. The turf industry and state associations should reach out to their legislators and make them aware of their needs. Progress can easily be made in this area by taking every opportunity to educate and inform state and federal legislators about the positive impact of turfgrass and golf on the economy. This could be as simple as inviting them to field days or asking them to provide a keynote address at a state or regional conference. This challenge is indeed different from others but equally as important.

superintendents with limited budgets, these products may be their only option for mole cricket management.

There also appears to be an increased interest in biological controls of mole crickets among professional turf managers. For example, this spring Becker-Underwood, the company that manufactures Nematac-S, sold out of the product because of increased demand from the golf industry. Nematac-S is a commercial product that contains the entomopathogenic nematode *Steinernema scapterisci*. Control or damage reduction following application of Nematac is measurable. However, consistent control is often not comparable to that of common soil insecticides, especially fipronil.

Nematac-S occupies a niche because it is perceived as a self-perpetuating or sustainable control. Once applied to a site, it can remain active in that population and disperse to new areas on the course in infected crickets during the mating flight.

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