TURFGRASS TRENDS

NIXING NEMATODES

Coping with Nematodes Sans Fenamiphos

By Nathaniel A. Mitkowski

Across the northeastern United States, superintendents continue to deal with damaging levels of plant-parasitic nematodes. Although every golf course has some level of plant-parasitic nematodes, not every course experiences extremely high populations or observes nematode-related damage. Those courses most at risk for nematode damage are built on silty native soils where *Poa annua* is the dominant turf species.

In general, creeping bentgrass produces much deeper root systems than *Poa annua* and is much more resistant to nematode damage, even at high nematode populations.

Until recently, superintendents who encountered nematode problems could use fenamiphos (Nemacur) to provide a quick and extremely effective nematode remedy. Unfortunately for professional turfgrass managers, Nemacur has now come to the end of its registration phase out. Bayer ceased all sales of Nemacur to national distributors on May 1. Distributors around the country will no longer be permitted to sell Nemacur to end users on May 1, 2008.

Currently, there is very little Nemacur left for purchase in national distribution chains. A number of companies had sold their last remaining stocks of the chemical as of November 2006. Many superintendents, aware of their own nematode issues and the loss of such a important tool, began hoarding it. Anecdotally, stories have surfaced of superintendents buying whole pallets. Although the chemical can no longer be sold as of May 1, it will still be legal to use remaining stocks until they have been depleted. Consequently, many superintendents consider whatever supplies they have left to be worth their weight in gold.

Fenamiphos was first registered in the United States in 1973 but was originally developed in the 1940s. As an organophosphate, it targets the nervous pathways of nematodes and insects and has a high level of mammalian toxicity. Additionally, it is considered one of the most toxic organophosphates to birds and aquatic life. As dangerous as the chemical is to so many animals, it's mode of action allows it to be extremely effective against nematodes. Upon exposure to the chemical, nematodes cease feeding and eventually starve to death. Mating, moving and most of their activities are disrupted.

The longer the chemical remains in the soil, the more nematode mortality that occurs. Some superintendents have reported getting a turfgrass response from Nemacur in as little as three days. Over the years, other superintendents have reported that their health-

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iest greens were those that had been annually treated with fenamiphos. This response was most notable on *Poa annua* greens.

With the loss of this important tool, superintendents will need to develop alternative ways to manage nematode problems in the Northeast. Unfortunately, alternative chemical controls have not been very successful. A spate of alternatives have recently been introduced and research data suggests that even the most successful products have only limited utility.

Sesame, mustard and walnut extracts have had sporadic success in improving turf quality in some experiments, but it is unclear how much of an impact these products have on reducing nematode populations. Some observations suggest these products can slow nematode population growth under certain circumstances, but studies showing any marked decline in nematode populations have not been forthcoming.

In general, none of the alternatives tested to date have shown results comparable to fenamiphos. These products might be useful in dealing with a particular nematode problem, but no fenamiphos alternative can be consistently and reliably recommended thus far.

Given the lack of chemical alternatives to nematode problems in the Northeast, superintendents must consider cultural practices as their primary defense. The most important step that can be taken on any Northeastern golf course to reduce the impact of plant-parasitic nematodes is to convert putting surfaces to creeping bentgrass. Our research indicates that *Poa annua* is a preferential host for plant-parasitic nematodes. In addition, *Poa annua* succumbs to summer stress more readily than creeping bentgrass and produces much shallower roots systems. Even at equally high populations of plant-parasitic nematodes, creeping bentgrass can often sustain minimal injury.

Over the past seven years, my lab has conducted hundreds of nematode assays on golf courses across the northern United States. In that time, few creeping bentgrass stands have been diagnosed with nematode-related decline. Although it can happen, it is far less common than nematode damage on *Poa annua*.

Obviously, conversion from *Poa annua* to creeping bentgrass is not an easy or inexpensive process. It often requires complete soil remediation, renovated drainage and irrigation systems and great affinity for a chain saw. However, the ability of creeping bentgrass to withstand nematode damage when compared to *Poa annua* has been quite well-demonstrated.

Additional measures that can mitigate the impact of high nematode populations on putting greens include raising the height of cut, increasing aeration and ensuring proper fertilization, paying particular attention to phosphorous levels. Because canopy height in turfgrasses is proportional to rooting depth, rooting depth is greatly increased by raising cutting heights (to at least 5/32 of an inch). When a plant has deeper roots, it can more easily withstand large nematode populations, and less nematode-related damage is observed. Frequent and diligent aeration serves the same purpose. By increasing the amount of oxygen in the soil and reducing the levels of compaction, roots can growth more aggressively and withstand nematode attack with fewer symptoms.

Often, fertilization is neglected when attempting to combat nematodes. This is a serious mistake, however, because a weak plant with low vigor is an easy target for plant-parasitic nematodes. A current trend in golf course management is to keep plants as lean as possible. With the combination of plant growth regulator applications, this allows for very fast greens. It also results in weak plants with shallow root systems. Such plants become the target of fungal, bacterial and nematode attack and recovery is often slow and laborious. For this reason, maintaining a minimally adequate fertilization program is extremely important. Ensuring that phosphorous levels and other micronutrients are adequate for root development is also critical.

Nathaniel Mitkowski earned his doctorate from the department of plant pathology at Cornell University in 2001. As an associate professor and turf pathologist at the University of Rhode Island, he is responsible for teaching diseases of turf and ornamentals, advanced turf management and power units. His research focuses primarily on stress-related diseases of amenity turfgrasses, and he oversees the direction of the University of Rhode Island's Turf Disease Diagnostic Laboratory. He can be reached at mitkowski@uri.edu.