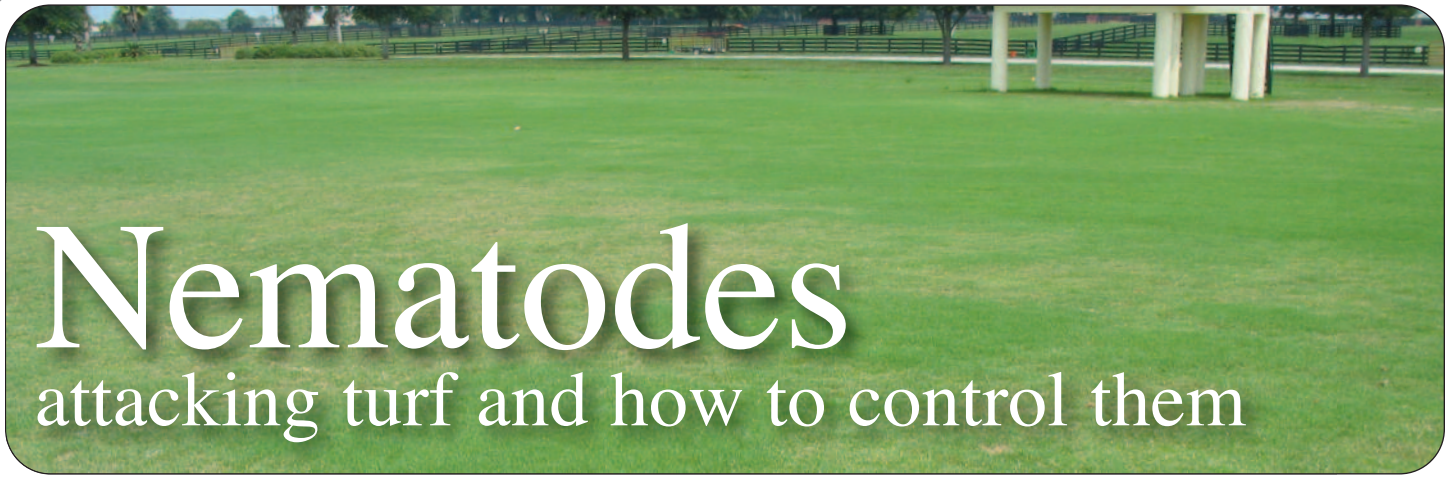


Nematodes
attacking turf and how to control them

>> THINNING BERMUDAGRASS and weeds resulting from sting nematode on a municipal athletic field.

PLANT-PARASITIC NEMATODES are microscopic worms that feed on plants. Because they cannot be seen with the naked eye and live underground it is easy to overlook them, but to do so is a mistake. These small animals can cause big problems for sports turf managers. While nematode problems are not confined exclusively to southern states, nematode problems are definitely more common the further south you go. This is due to soil and environmental conditions that favor population development of the more damaging nematodes.

Several nematode species are turfgrass parasites that can cause severe problems to sports turf by feeding on the turf roots. Certain nematodes cause the roots to turn brown and rot; others cause the roots to be short and stubby. Either way, a poorly developed root system is not a good thing. The effectiveness of nematode-damaged roots to carry out these functions is greatly impaired.

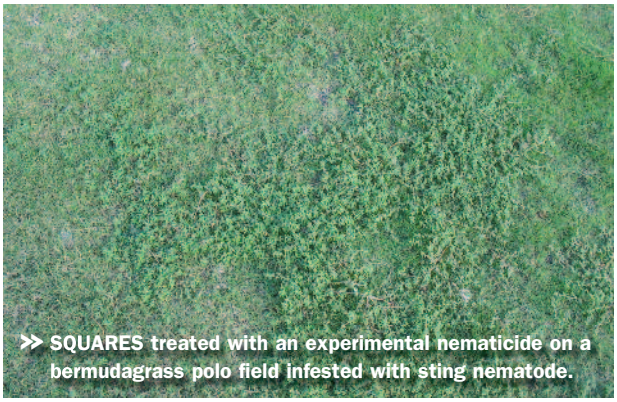
Many states are struggling to preserve their water resources. As water quantity is limited, many sports fields are restricted in the amount of water available for their use. This is particularly true of municipal and school athletic fields. Because nematode-damaged roots are shallow, they are not able to take advantage of moisture that would be available to healthy roots. If your roots are a half-inch deep they can not get to moisture one-inch deep. Therefore, the primary visual symptom of nematode damage is turf decline from drought stress caused by nematode-impaired roots. Our research has shown that with just moderate nematode populations, nematicide use can greatly increase drought tolerance of bermudagrass.

Because the nematodes that feed on turf roots do not feed on many weeds, the weeds have a competitive advantage in nematode-infested fields. This means that you are faced with increased herbicide costs to control the weeds and/or unsightly weeds that people will complain about.

Another issue that arises from nematode damage to athletic fields is player safety. A healthy root system prevents the turf from pulling up as players push and make sharp turns. At the University of Florida we pride ourselves on the speed and power of our football team. In order for our players to best perform their feats of athletic prowess they need their feet to stay under them. The last thing any of us wants to see is injuries due to poor footing. Florida Field ("The Swamp"), like many athletic fields in the southeast, is infested with sting nematode, the most damaging nematode to bermudagrass. Therefore, each year Florida Field is treated with a nematicide not only to preserve aesthetics, but to help the players fly.

Nematodes typically cause irregular-shaped patches of weedy, thinning, wilting, and declining grass. These symptoms could be caused by other factors than nematodes so it is important to get a cor-

rect diagnosis. The first step is to take a look at the roots of the turf. If the turf roots are stunted, rotten, or lumpy, nematodes might be a problem. Because other things can cause similar root symptoms, your detective work is not finished. Next you need to take samples to send to a credible nematode diagnostic lab to find out if nematodes are in fact a potential problem. Because the nematodes are so small they will have to be separated from the soil into water and then identified and counted with a microscope. Based on the number and kinds of nematodes in the sample, the lab staff will then determine if nematodes are a potential problem or not. In order for the lab to properly diagnose a nematode problem it is important that the samples are properly collected. So, what makes a good nematode sample?



>> SQUARES treated with an experimental nematicide on a bermudagrass polo field infested with sting nematode.

Nematodes occur in clumps, so you do not want to take a single plug. Rather, you need to collect about 16 to 20 cores from the field and combine them into a single sample. If symptoms are visible concentrate your sampling in the symptomatic areas. Stay away from dead areas as the nematodes you are looking for have to feed on live roots. You want to sample grass that is sick, but not dead. If there are no visual symptoms then sample in a zigzag pattern across the field. Your cores should go down about 3 to 4 inches deep.

Put your sample into a plastic bag and seal it up to prevent the nematodes from drying out. As soon as you take your sample get it out of the heat and into an air-conditioned room until you can ship it. You want to send the sample to the lab as soon as possible, the longer it sits around, the fewer nematodes will be recovered.

Once nematodes are identified as being a problem, how are they managed? Unfortunately, nematicide options for sports turf are limited at present. However, in the states of Florida, Georgia, South Carolina, North Carolina, Alabama, Mississippi, Louisiana, and Texas Curfew soil fumigant is an option. The active ingredient in Curfew is 1,3-dichloropropene or 1,3-D.

1,3-D is one of the most effective nematicides and has been used for nematode control on agricultural commodities for many years. It has been only recently that 1,3-D has been used for nematode control on established turf. Our research has found Curfew to be very effective against nematodes in soil, and certain turf insect pests as well. Research has shown that Curfew application to nematode-infested turf can improve drought tolerance and fertilizer use and consistently increase rooting and turf quality.

Being a fumigant, Curfew works very different from most other turfgrass pesticides. It may only be applied by custom application by a Dow Agrosciences-approved custom applicator. The nematicide is injected 5 to 6 inches deep in the soil by slit injection using specialized equipment. It is in a liquid state when it is injected, but then disperses through the soil as a gas. In Florida Curfew use on athletic fields has been increasing and it has been applied to fields used by professional and big-name college athletic programs, school ball fields, equestrian facilities, and municipal recreational facilities. Acre minimums apply so contact your Dow representative to discuss the practicality of an application.

There are number of other products being used for nematode control on turf. These include several botanical nematicides, microbial products and inoculants, and beneficial nematodes. While some of these might help in certain situations, most have either shown minimal, inconsistent, or no efficacy in research trials.

Last October highly touted University of Georgia running back Knowshon Moreno met the Florida Gators' linebacker Brandon Spikes, at that moment he also became very intimate with the playing surface of Jacksonville Municipal Stadium. This illustrates that there is a lot of opportunity for humans to be exposed to pesticides on sports fields. Additionally, many sports fields are used by children, the least tolerant of pesticide exposure. For use on athletic fields a nematicide needs to be both effective and safe for the humans and animals that will be coming in contact with the turf.

Recently our research has identified several new strategies that are looking very promising on turf in the field. We are looking for strategies that are consistently effective and reasonably safe. These include new reduced-risk synthetic nematicides, analogues of essential amino acids, and biopesticides. Based on our work with these I am hopeful that we will have several effective and safe nematode management options to use on sports turf in the next one to three years.

The use of nematode resistant or tolerant grasses should reduce the need for nematicides and be a foundation for nematode management. However, the relative susceptibility of turf cultivars to different nematode species is largely unknown. Also, there have been no major efforts to breed turfgrasses with improved nematode response. At the University of Florida we are studying the susceptibility of available bermudagrass and seashore paspalum cultivars to sting nematode. We have completed our first year of research and found some cultivars that were much less damaged by sting nematode than others. In the next couple of years we should be able to recommend grasses with fewer nematode. We also are screening bermudagrass and zoysiagrass germplasm in an attempt to breed future cultivars that have enhanced nematode response.

Plant-parasitic nematodes are important pests of sports turf, particularly bermudagrass in the southeast. Management of these nematodes can reduce water and fertilizer costs, use of herbicides, and the potential for player injuries. While currently there are few effective nematode management strategies, help is on the way. This help will include a combination of nematicides, biopesticides, and improved turf cultivars. ■

Dr. William T. Crow is associate professor of nematology and director of the University of Florida Nematode Assay Lab.