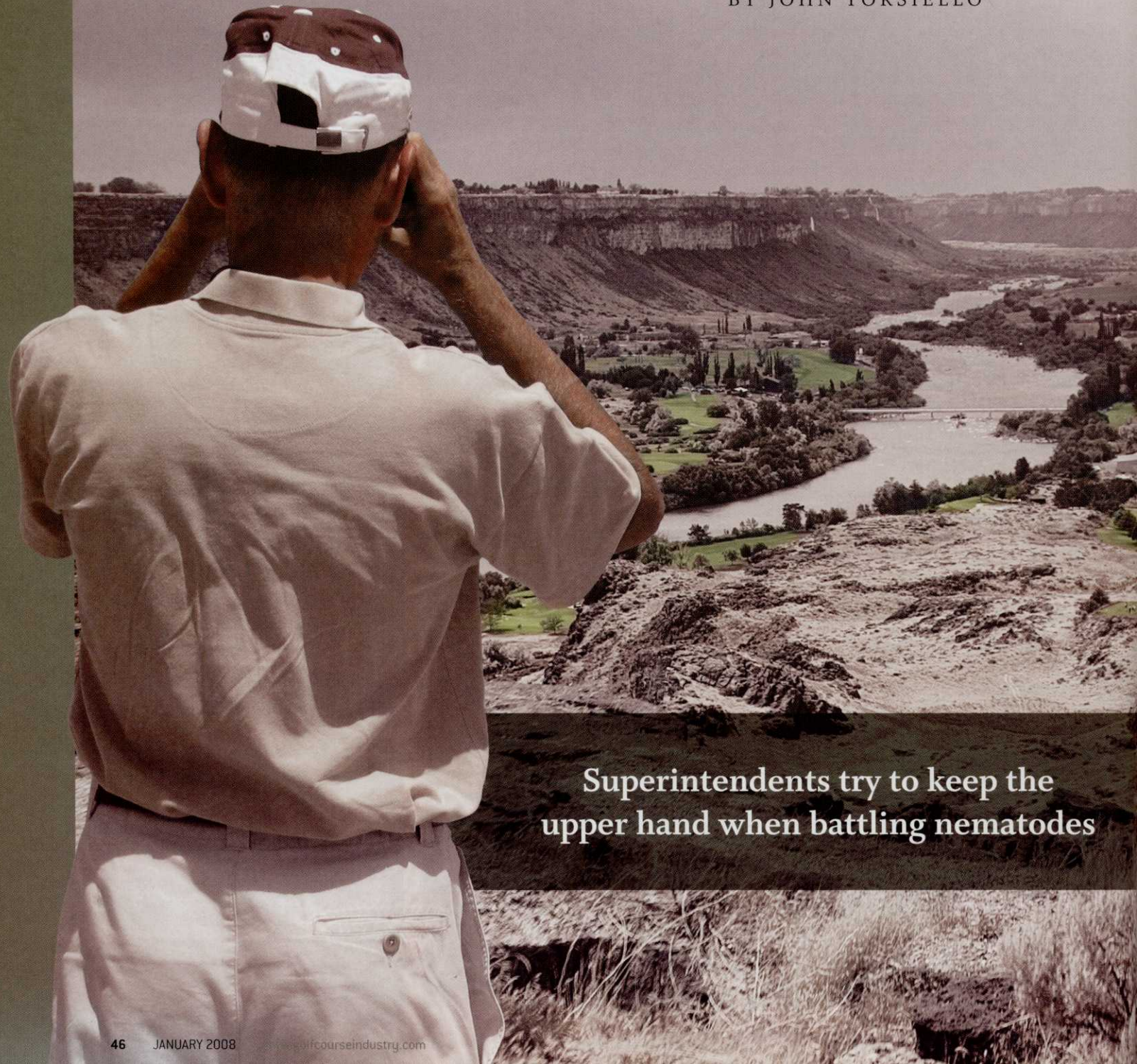
Remaining VIGILANT

BY JOHN TORSIELLO



Superintendents try to keep the upper hand when battling nematodes

They've been around almost since time began and certainly eons before the first golf course was laid out over the sandy soil of Scotland's linksland. Nematodes are wormlike creatures that live in the soil and munch on the roots of turfgrass superintendents so lovingly care for.

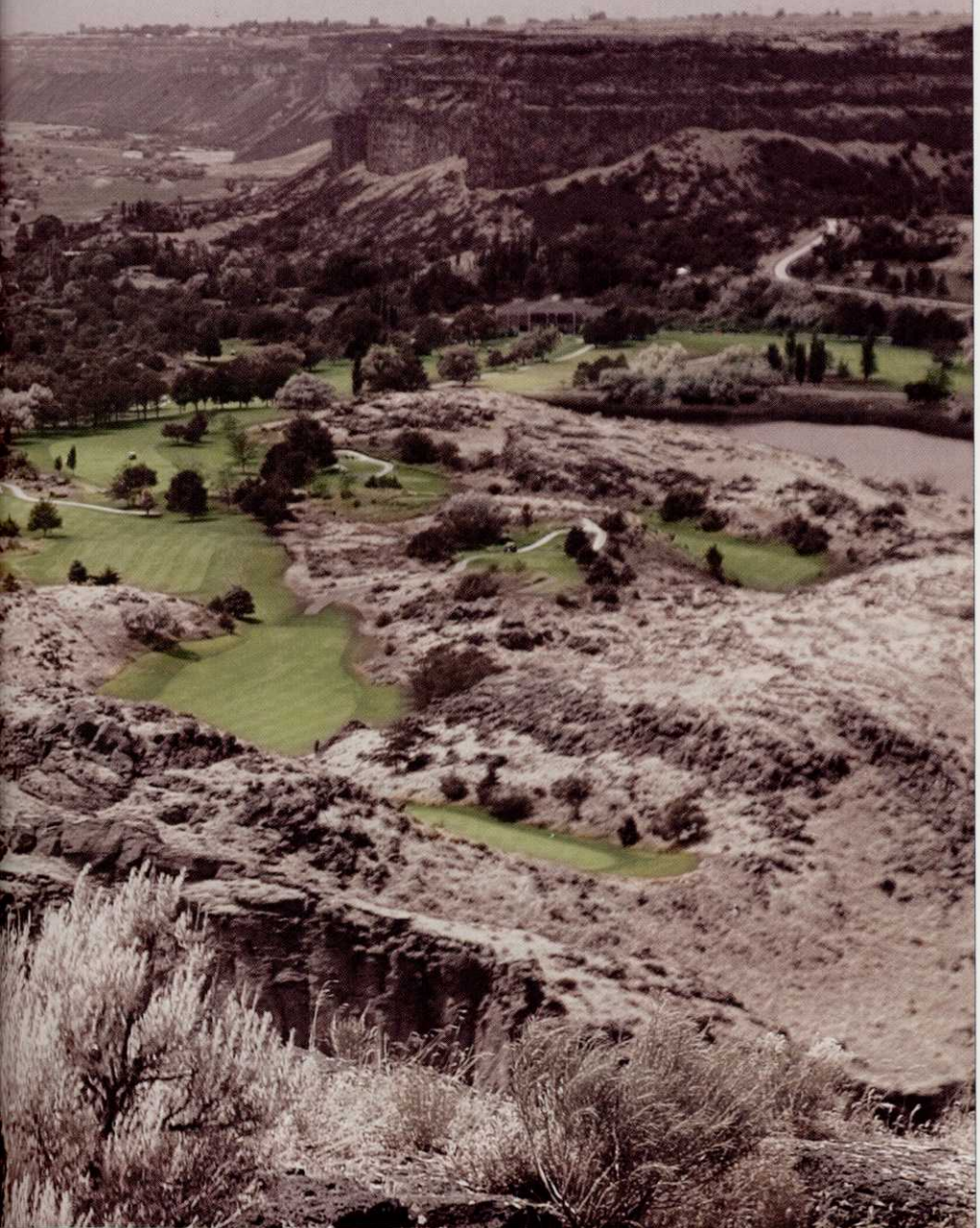
Nematodes, most of which are microscopic, are an ongoing pest management issue along a broad band that stretches from the Southeast to the Southwest and into California. While various forms of nematodes (there are thousands of species of the plant parasite) inhabit cooler northern climates, they're a more daunting problem in warmer weather and areas that have sandy soil. In Florida, for instance, superintendents must maintain strict vigilance of nematode populations, or they run the risk of losing their greens.

Northern superintendents, such as Rob Giampietro at Bulls Bridge Golf Club in Kent, Conn., are fortunate.

"We don't see many nematodes in our soil because of the cold weather," he says. "And any of the sand we've brought in is to USGA standards and arrives sterile."

Many aren't so lucky.

"Nematodes are one of our top nemeses here," says Jason Kubel, superintendent at the Tour-



Nematodes have the potential to destroy a new putting green in one season. Photo: Billy Crow, Ph.D.

nament Players Club of Tampa Bay in Florida. "They usually start becoming active in April when the weather warms up and last through October. We find them mostly on the Bermudagrass and on the greens. They're on the tees and fairways, too, but we don't spend as much time treating those areas."

ROOT DAMAGE

Nematodes feast on the roots of the turf until the grass is literally clinging with its figurative fingernails to the earth. A healthy Bermudagrass plant will have roots 6 inches deep, while grass attacked by nematodes can have as little as an inch or two of root depth.

Because many greens are constructed of as much as 90 percent sand, they present an ideal habitat for plant-parasitic nematodes. With greens that might be at a breaking point already because of low cutting heights, drought, and wear and tear, damage to the root system caused by nematodes can stress the turf to the breaking point. If left untreated, nematodes can put in motion a devastating cycle of decline that can lead to a complete breakdown in the turf's all important nutrient- and moisture-gathering processes and open it to disease and other pests.

An acceptable count of nematodes in a 100-cubic-centimeter sample of soil is between 20 and 40. When infestations occur, that number can rise well into the hundreds.

"It usually takes longer, but I've seen nematodes destroy a new putting green in one growing season," says Kevin Lavigne, president and owner of Southern Soils Turf Management, which chemically treats between 400 and 600 Florida golf courses annually for nematodes.

A study prepared by Billy Crow, Ph.D., a nematologist with the University of Florida in Gainesville, showed turfgrass roots suffering from nematode damage have impaired ability to take up water and nutrients from the soil, thereby requiring more frequent irrigation and fertilizer applications. This, in turn, leads to a waste of fresh water resources, which have been strapped in some areas of the country this year, particularly in the Southeast. The study showed turf affected by nematodes might necessitate increased fungicide use by creating conditions ideal to the outbreaks of fungal diseases. Nematode-affected turf also is less competitive with weeds and might require increased herbicide use. In the end, the turf can become so weak and chlorotic it can wilt, thin out and, in a worse case scenario, die.

While species are many (there are more than 20,000 identified and perhaps as many as a half million crawling around), those doing the most damage to golf courses are sting, stubby-root, stunt, ring, lance, root-knot and spiral nematodes. They feed and reproduce on plants while their bodies remain in the soil or enter the plant

to feed and reproduce. Contact nematacides have greater success on the former and systemic nematacides on the latter.

"The most damaging nematode is the sting, which is native to the sandy soils of Florida, the Carolinas and into the coastal areas of Louisiana and Alabama," Crow says. "The lance nematode is the second most damaging species, and it's found all the way from Florida to Canada and from the East Coast to the West Coast. It's the most common but not as damaging as the sting. You'll see root-knot nematodes in the Northeast, and spiral nematodes in the western states."

The farther north a golf course is located the less damage it likely faces from nematodes because growing periods are shorter and the pests have less time to reproduce, Crow says.

"In the South, especially Florida, the temperatures are warm for much longer periods of time, and there are more life cycles (generally around 21 days). About 50 percent of the courses surveyed in Florida had lance nematodes on the greens, and 50 percent to 60 percent had sting nematodes."

DOING BATTLE

Nematodes have always been a problem, but perhaps they're more noticeable now because of members' expectations that turf conditions be hard and fast, says Clayton Estes, superintendent at San Jose Country Club in Jacksonville, Fla. Lower mowing heights have direct correlation to the length of the roots, and shorter grass has less natural fight in it, Estes says.

For Dan Connolly, superintendent at Aberdeen Country Club in Longs, S.C., nematodes are normally an issue on the greens.

"It's important to have a sound turfgrass management program in place," he says. "The healthier the turf, the better the grass can withstand some feeding by most types of nematodes. We sample our greens monthly from March through October. If we have significant nematode damage that's confirmed by a nematode assay, we'll usually treat the damaged area with Nemacur. Taking the sample is fairly time consuming but well worth the effort."

Edward Ferreira, superintendent at Las Positas Golf Course in Livermore, Calif., has issues with spiral and ring nematodes. He also has his staff monitor nematode counts and attacks the problem when and where it occurs.

"Sand-based *Poa* greens that dry out quickly suffer the worst," he says. "Symptoms include spots on the greens about two to six inches in diameter. Our goal has been to build up the health and strength of the turf through fertilization and organic products and fungicides. Heavy handwatering and the use of wetting agents are time consuming but helpful on a short-term basis."

Most superintendents in areas susceptible to nematode attack opt for the use of chemicals in their fight against the pest. Two of the more popular products have been Nemacur from Bayer and Curfew from Dow AgroSciences. Both are injected into the soil and involve a somewhat costly and mildly invasive procedure that's often best handled by an outside company.

Lavigne's company charges $390 per acre for treatment of fairways, tees and rough and 8.5 cents per square foot for greens. There are various discounts offered. Usually, one treatment

Nematodes are one of the top nemeses at the TPC of Tampa Bay. They become active in April and stay that way until October. Photo: Jason Kubel

The sting nematode, which is native to the sandy soils of Florida, is the most damaging type of nematode, says Billy Crow, Ph.D., pictured here. Photo: Billy Crow, Ph.D.

per year is sufficient to control the nematode population to the point where it doesn't stress the turf's root system to any great degree. The treated areas must be closed for at least 24 hours after treatment.

"It is somewhat expensive, but when you consider it costs $12,000 to $14,000 to build a new green, and more if you want to do it to USGA specs, it's a cost-effective treatment," Lavigne says.

PESTICIDES PRODUCTS

While fumigants have proven effective, concerns about the nematacides leeching out of the treatment area and remaining in the soil for long periods of time have led to stringent environmental regulations. Thus, superintendents are losing some of the tools they can use in the fight against nematodes. Nemacur, which as been used for more than 30 years, is being phased out by the U.S. Environmental Protection Agency. Bayer has a large supply of the chemical in its distribution channels that has to be sold by May of this year, says Nate Royalty, insecticide technical development manager for Bayer Environmental Science.

"We recommend superintendents buy what they need for a two-year supply," adds Ben Cicora, herbicide business manager for Bayer. "Once the product is in the superintendent's hands it can be used indefinitely."

It's not an ideal situation for the superintendent, but Bayer is dedicated to finding a replacement as soon as possible for Nemacur, Royalty says.

Dow's Curfew product has been in use in the agriculture industry for a number of years and is used widely in the golf industry for nematode control. The company initiated a customized program were it sells the product to a customer and arranges for it to be applied by a third party.

"We did this for two main reasons: One is stewardship and ensuring the proper handling of the product, and the other is efficacy," says Dennis Lane, marketing specialist for Dow AgroSciences. "The performance of this particular product is very subject to its proper application."

Dow has updated the active ingredient in Curfew (1,3-dichloropropene) and made it better from an environmental-impact standpoint, Lane says.

"We had to go through a reregistration process, and it was one of the few fumigants to be recertified for use on golf courses," he says.

Crow and other university researchers are in the process of bringing new products to market to help control nematodes.

"There's some exciting stuff going on with biological organics and one specific bacterium that attacks sting nematodes," he says. "It can be more of a preventive measure if applied early when nematodes reproduce. Another bacterium works as more of a knockdown treatment. We are working with chemical companies on early stage screening for several products, while others are still some years out."

CONTROL MEASURES

There are many steps superintendents can take to safeguard their courses from nematodes. Crow advises taking samples early in the year to determine nematode counts.

"Usually when the soil warms up to 70 to 75 degrees, that's a good time to take samples," he says "Don't go out in July or August because at that point the grass has already been damaged and you won't be able to be proactive."

Keeping turf healthy through fertilization, watering and lowering mowing heights when possible will allow the plant to grow a stronger root system and help it defend itself from nematode attacks.

When hiring an outside firm to treat for nematodes, superintendents should prepare the course properly to allow crews to get in and out as fast as possible. Superintendents also should inform the customers/members well in advance why the course is being closed for a day. Golfers might be upset, but hopefully they'll appreciate the care superintendents take with the course.

After treatment, superintendents shouldn't be lulled into a false sense of security when they see thick, lush greens, tees and fairways. Nematodes are always present and thrive on optimum turf conditions. That's why it's important to take soil samples regularly.

"You will never eradicate nematodes," Crow says. "You can just control them." **GCI**