According to Billy Crow, associate professor of nematology at the University of Florida at Gainsville, there are two distinct types of plant-parasitic nematodes: ectoparasites, which live in the soil and feed on turf roots; and endoparasites, which penetrate the root and feed on the plant from within.

"The ectoparasites are easier to treat because they’re outside in the soil," Crow says, but there are few effective chemicals available for existing stands of grass, especially outside the Gulf Coast and Southern Atlantic states.

Crow, who also researches nematodes and runs the nematode diagnostic lab at the university, says all the species that affect turf adversely are microscopic and require soil collection and lab verification to determine what species of nematode is causing the problem.

"Your grass will decline. You’ll get yellow blotches with some nematodes, and others not," he says. Often, the grass will
simply not thrive because of the destruction of root systems, and during heat or other stress the plants will suddenly look sickly. Since the cropped or rotten roots that nematodes cause may also be due to something else, there is a definitive need for lab diagnostics.

The most common nematodes in turf across the country are the lance nematodes, genus *Hoplolaimus*, but the sting nematodes in the genus *Belonolaimus* are the most damaging, according to Crow. Root knot nematodes in the genus *Meloidogyne* can also be a problem, though he emphasizes that nematodes are endemic in American soils and are often not present in sufficient numbers to kill grass. They prefer sandy soils, such as in coastal states and localized in other regions. USGA-spec greens are a perfect habitat for most species.

Nematode problems in the cooler regions of the country occur in late summer, with warm southern states suffering damage year-round. Soil temperatures above 65 degrees encourage them, but certain species are more resistant to cold and will become active earlier in the North. Nematodes may be present for months, or years, and cause little or no damage; then the grass will decline when under stress.

Management consists largely of not moving nematodes around during equipment operations, Crow says. If a facility has nematode damage in patches, the manager should restrict their spread by cleaning equipment before moving on. When possible, work on uninfested areas first and infested areas last.

“If you’re resodding or sprigging, be aware that nematodes can move in the planting material.” Crow says the heaviest population increases in the South occur during overseeding. New ryegrass or Poa roots provide fresh food for the pests, and that boosts numbers. So, if it isn’t necessary, don’t overseed. If you do, nematodes may get an early start during the spring transition. To maintain quality turfgrass with infested grass, managers will have to apply more irrigation.
Smaller, more frequent fertilizer applications will help maintain turf health.

Chemical controls for existing turfgrass in the Southeast are primarily restricted to 1,3-dichloropropene (Curfew), Crow says, which is registered for use in turfgrass only in North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana and Texas. The rest of the country has nothing labeled that is as effective for ectoparasitic nematodes.

Curfew’s label restricts use to one application, so Crow emphasizes proper timing to maximize control. That is typically not in late summer when populations are highest, as is commonly thought. His studies, still in progress, indicate that the best time to hit nematodes may be in the spring when grass is coming out of dormancy and the worms are vigorous. They can be set back to the point where they are not a problem later in the summer. The crucial factor is that at this time, Curfew is most effective against both ectoparasites and endoparasites.

“Unfortunately, right now, it’s the only thing I can recommend,” Crow says. The old standby, Nemacur, was effective because it was a systemic product, but is no longer available. He says there are several other chemicals being touted as nematode treatments, but they have not been tested scientifically.

It’s another matter for soil fumigants. There are several options for preplant treatment for nematodes. The best is methyl bromide, under several brand names. The chemical is currently under a phaseout, but may be used as long as critical-use exemptions continue to be granted. Other chemicals that can be used preplant are dazomet (Basamid), metham sodium (several brand names) and 1,3-dichloropropene (Telone II). However, these are generally not as effective as
methyl bromide. The methyl bromide, 1,3-dichloropropene and metham sodium preplants are liquids that are injected into the soil, creating a toxic gas. These treatments require specialized equipment and can be dangerous, so they are typically applied by soil fumigation contractors. Basamid is a granular product that is broadcast and irrigated in.

Crow points out that control options in the central and western states with localized sandy soils are limited. There is one crown-feeding nematode of the genus *Anguina* in the San Francisco Bay area that may be reduced by use of neem oil insecticides because it lives out in the open.

Some turf managers have had limited success by applying neem oil products to control soil-dwelling nematodes, but he questions efficacy against these difficult-to-reach pests. There are also some promising new nematicides, many of which the University of Florida is testing. “We’re working with 14 or 15 different ones now. Most of them don’t work, either,” he says, but he has three new chemicals he is getting “decent” results from. These should become commercially available within one to three years.

There are also some new biocontrols that look promising, which are based on parasites of adult nematodes, parasites of nematode eggs and microorganisms that produce byproduct chemicals in the soil that are toxic to nematodes.

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