Disease control: lessons learned from last year

by JOHN WATKINS, Ph.D. / University of Nebraska

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Rare red thread damage was found on bentgrass greens and ryegrass fairways.

Twenty-one years as a plant pathologist cannot temper my high regard for the challenge of growing healthy turfgrass under the stressful, ever-changing environment of the American Great Plains.

The 1995 growing season was a prime example. For much of the nation—the East and Midwest in particular—the spring weather was cold and wet, followed by a sudden onset of hot, dry weather that lasted the rest of the growing season. Several areas of the country set records for days without measurable precipitation, making it difficult to maintain quality turf.

Putting greens were thinned and did not respond to cultural practices. Residential, commercial, sports and other turfs were stressed to the limit, and irrigation bills were out of sight. In addition, the heat, drought and humidity contributed to leaf spot, melting out, dollar spot, fairy ring, necrotic ring spot, summer patch and nematode injury.

Rare maladies

Turfgrass managers were confronted with diseases that previously had not been problems or had rarely occurred in an area.

Only once in the 21 years prior to 1995 had I seen red thread. Within a two-week period in May, half a dozen golf course superintendents called to report significant red thread damage to bentgrass greens and ryegrass fairways.

Drizzly days with cool temperatures slowed the turf's growth rate, allowing red thread to establish. Fortunately, once it was diagnosed, fungicide applications restricted further turf damage. Although red thread is not a drought-related disease, in 1995 it seemed to set the stage for the rest of the summer.

Also in 1995, many Nebraska superintendents observed a lack of response and recovery of the turf to fungicide applications, fertilization, aerification or increased irrigation. If brown patch was involved, the green usually responded to fungicide treat-

ment. But in many situations, disease was not the culprit.

With air temperatures in the 90s and soil temperatures at a two-inch depth in the low 100s, putting greens died merely because the turf did not have a sufficient root system to maintain transpiration and tolerate the heat.

Because of the cold, wet spring, root depths were shallow (two to three inches), and the roots could not supply sufficient water to compensate for water lost to hot, dry, windy conditions. Plants died from drought stress and the greens were thin in areas.

Other factors contributed to the demise of putting greens as well:

- low mowing height,
- nitrogen-starved turf, and
- rootzone layering.

Golf superintendents faced with similar problems this year could aerify and topdress with appropriate sand or mixes to overcome rootzone layering and support good root system development going into summer.

Providing a balanced fertility program to prevent starvation and raising the mowing height also would help. These practices may decrease putting speed, but rolling, topdressing, grooming, double-cutting or using plant growth regulators can help regain some speed. Light, frequent irrigation in the afternoon to keep the rootzone moist may inhibit root pathogens and root-feeding nematodes.

Drought strikes

Diseases and plant pathogenic nematodes also injure turf during drought periods.

The symptoms of leaf spot and melting out, which are fungal turf diseases, range from small oval spots on leaf blades to fading out of the turf, to extensive crown and root rotting. The leaf spot stage is most evident during wet weather with temperatures between 70° and 90° F.

At temperatures above 80° F, necrosis

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'Little worms' destroy golf course greens, home lawns

Some bentgrass golf greens and home lawns were injured by nematodes last summer in eastern Nebraska.

Nematodes are wormlike animals, one of the more abundant forms of animal life. Plant pathogenic nematodes that attack turfgrasses live in thin water films on soil particles. About 18 genera attack turfgrasses, which vary in their ability to support certain nematode species.

The nematode as a turfgrass pest often tends to be one of the last things you might consider when diagnosing a problem that doesn't respond to fertilizer, fungicides, irrigation or other cultural practices.

Such was the case last summer with one Nebraska golf course and several home lawns, when the turf continued to decline in spite of efforts to reverse the problem. No evidence of disease was found and the affected turf didn't respond to fungicide treatment. Symptoms were a non-descript yellowing and thinning of the bentgrass and a decline and death of the bluegrass.

After ruling out disease, we found high populations of the ring nematode in the golf green and the spiral nematode in bluegrass lawns. The added stress of the nematodes on top of heat, drought and traffic was more than the turf could tolerate.

Unfortunately, nematicides registered for turfgrass—fenamiphos and ethoprop—are highly toxic, restricted-use materials. The only option for residential turfs is a chitin-based product registered as an organic nematicide.

On golf greens, supers decided to rely on cultural practices and then re-sample the area in two or three weeks. As a general rule, nematodes do not tolerate soil temperatures above 90° F, and often, their numbers decline during mid-summer. A golf green sample three weeks later showed that the ring nematodes were below the damage threshold level. The decline was probably due to continued heat and drought that caused "lethal" temperatures.

Not all nematode species are equally damaging at a given level on a given host. Threshold levels will therefore vary for different nematodes and different grass hosts.

Sample!

The key to diagnosing nematode injury is in the sampling. Use a standard one-inch soil probe and take a composite sample of 20 cores per 1000 square feet. Make certain that the composite samples are collected from the affected area. It's a good idea to also collect a composite sample from a healthy, non-affected area as a basis for comparison.

The composite sample volume should be at least one pint. Label the sample and keep it in a cool site until it can be transported to a laboratory for nematode analysis. Proper sampling and interpretation of the results are important factors for managing the situation.

The two primary objectives in turfgrass management are to suppress the pathogen's growth and to alter the turf environment so that it favors the host and not the disease. These goals can be accomplished by:

- **raising the mowing height during the summer stress period,**
- **providing a balanced fertility program,**
- **promoting root growth through aerification,**
- **preventing drought stress,**
- **planting adapted and disease-resistant cultivars, and**
- **integrating a well thought-out fungicide treatment plan into the overall management design.**

The goal is to promote healthy turf. These general principles apply to a normal year and—with some modification—to a hot, dry year.

—Dr. Watkins

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of the entire leaf blade causes leaf blight. As leaf blighting progresses, the turf fades to brown. During hot, dry weather, leaf sheaths, crowns and roots become infected, causing thin, open areas in the turf. Plants with severe crown and root rot usually die from the heat and drought stress.

Symptoms on bentgrass differ from those of Kentucky bluegrass and fine fescues. When bentgrass golf greens are infected, they have a smoky blue cast that progresses to a yellowing and, finally, complete blighting of the leaves and thinning of the turf. Injury to the bentgrass usually is more severe when it is growing under soil moisture stress or when it has been overfertilized with nitrogen.

Summer patch may appear when wet weather is followed by hot, dry periods.

Nematode damage: a non-descript yellowing and thinning of bentgrass and a decline and death of bluegrass.

Unsightly nuisance

Last year produced many interesting challenges for turfgrass managers, like fairy ring on bentgrass greens—especially newly-constructed ones.

Because of the current trend in golf green management toward lower nitrogen rates, the darker green fairy rings were quite visible during May and June. They used the peat in the greens mix as a nutrient base and were abundant because of the extended cool, wet spring.

At that stage, fairy ring on the green is more an unsightly nuisance than a threat to the turf. The real problem comes from the fairy ring mushroom's mycelium that infiltrates the soil below the ring. It is hydrophobic and impervious to water, causing the grass immediately above the ring to die from lack of moisture during droughty periods. Aerifying the green and applying the fungicide flutolanil (ProStar) suppresses fairy ring and prevents turf loss.

Drought stress also can predispose even well-managed turf to dollar spot, which can affect its aesthetics or recreational use. Warm days, heavy dews, dry soils and nitrogen-deficient turf are ideal conditions for dollar spot. Persistent drought periods accentuate dollar spot injury and hinder recovery when control measures are implemented.

Dollar spot can often be managed with little or no fungicides. In a two-year field trial, we obtained satisfactory control of dollar spot on bentgrass with 4-6 lbs. of N/1000 sq./ft. The nitrogen was a slow-release fertilizer applied monthly from May through October. Although 6 lbs. of actual N per season is too high for a putting green, it is not too high for residential turfs. In this trial, dollar spot suppression at the 6-lb. N rate was comparable to that obtained by fungicides. This illustrates how a balanced fertility program can manage dollar spot.

Turf destroyers

Necrotic ring spot and summer patch are two of the most destructive, stress-re-

SYMPTOMS OF COOL-SEASON TURFGRASS DISEASES

Disease	Key symptoms	Control strategy
Leaf spot/ melting out	1) dark spots on leaves 2) yellow, thinning turf 3) brown roots and crowns	1) use resistant cultivars 2) fertilize properly 3) irrigate properly 4) apply fungicides
Dollar spot	1) bleached lesions on leaves; reddish-brown margins 2) four- to six-inch patches of straw-colored turf 3) silver dollar-sized, bleached spots on bentgrass greens	1) use resistant cultivars 2) increase the nitrogen level 3) irrigate properly 4) apply fungicides
Fairy ring	1) circles of dark green grass some with dead areas in the ring	1) remove infested sod and soil; replace with clean soil and reseed 2) aerify and irrigate 3) spot treat with flutolanil
Necrotic ring spot	1) pockmarked circular depressions in turf with healthy tufts of grass in centers 2) brown to black roots and crowns	1) use resistant cultivars 2) raise mowing height 3) use light, frequent irrigation 4) apply organic fertilizers 5) aerify 6) apply fungicides
Nematodes	1) yellow, wilted, thinning turf 2) reduced root system with brown lesions on roots	1) sample the affected area, obtain a nematode analysis 2) fertilize properly 3) irrigate properly 4) raise the mowing height 5) apply a non-fumigant nematicide, if available

SOURCE: DR. WATKINS

lated turf diseases. Necrotic ring spot destroys root systems during cool weather; summer patch destroys them when wet weather is followed by hot, dry periods.

Symptoms of either disease are virtually indistinguishable. Turf will show 6- to 12-inch circular or semi-circular patches, giving the area a pockmarked appearance. The dead grass is light tan and matted, and many of the patches will have a tuft of healthy grass in the center—the "frog-eye" symptom. Diseased roots will appear dark brown.

On established turfs, the most important control is to eliminate plant stresses that favor disease development. Avoid management practices that promote rapid top growth at the expense of root development, and keep adequate moisture in the rootzone by lightly and frequently irrigating.

Keep thatch and rootzones moist. Applying compost materials or organic fertilizers can increase microbial activity, and certain microbes partially inhibit fungus that causes necrotic ring spot or summer patch. Also, other naturally-occurring fungi that compete with the pathogens for food help keep diseases in check. During extended dry spells, beneficial microbe activity is slowed or even suppressed, giving the pathogen a distinct advantage. A moist rootzone helps to reduce the stress of dry spells.

When you scout for nematodes, take 20 core samples per 1000 square feet.

Other practices to control necrotic ring spot or summer patch include a balanced fertilizer program with slow-release nitrogen fertilizers and a fungicide program. Benzimidazole-type fungicides can be applied curatively. Other fungicides can be used preventively in early fall or mid-spring. Apply them with sufficient water to drench them into the rootzone.

If you're establishing new turf, avoid planting pure stands of susceptible Kentucky bluegrasses. Use a blend of improved drought-tolerant cultivars or mix in 15 to 20 percent, by weight, of the newer brown patch resistant turf-type perennial ryegrasses with the Kentucky bluegrass blend.

The improved drought-tolerant cultivars will be less prone to stress and thus, less prone to summer patch. Remember, blends or mixtures are only as good as their components, so choose your cultivars carefully. □