Getting a Jump on Summer Disease Problems

By Dr. R.T. Kane and Dr. H.T. Wilkinson

Dr. H.T. Wilkinson examines necrotic ring spot on Kentucky bluegrass. Photos courtesy R.T. Kane.

Although spring is barely (if at all) underway, most northern turf managers should now start planning their control strategies for summer diseases. Of special interest are a number of important diseases that can be controlled more effectively if alternative management practices are utilized. Management decisions you make now can greatly affect your disease control success later.

Examples of important diseases that can be at least partially controlled by altering management practices include the root and crown rot "patch diseases," necrotic ring spot, summer patch and take-all patch. Also, common foliar diseases such as dollar spot, red thread, Pythium blight and Rhizoctonia brown patch respond well to changes in cultural and other management practices.

Summer patch in Kentucky bluegrass mowed at one inch.

Plant Health and Disease Management

Fungal pathogens that cause our most important turf diseases are ubiquitous in natural environments and cannot be readily eliminated. Intensive applications of fungicides in attempts to eradicate certain pathogens are usually futile (especially over the long term) and have adverse effects on the turf ecosystem as a whole. Examples are increased rates of thatch accumulation or increases in diseases not affected by a certain fungicide. Instead of eradication of pathogens, we should integrate all options for managing diseases (and the agents that cause them) at economically or aesthetically acceptable levels.

Many options for managing diseases become apparent when we examine a basic principle — the disease triangle. Plant diseases result from the complex and dynamic interaction between a susceptible host (the turf), a pathogenic agent (the fungus), and the ambient environment. In past, we have focused our efforts primarily on controlling pathogens with fungicides. Now we are identifying opportunities to reduce disease severity by improving the health and reducing external stresses on turf when possible.

Any specific actions you want to consider to alter pest populations, plant health or the environment should be based on past experience with disease problems on your managed turf areas. Certain sites may require changes in one direction while other sites may be improved by going in other directions. The management factors we emphasize in this article are fertility and pH; cutting height, thatch, aeration and compaction; irrigation and drainage; use of resistant cultivars or alternative species where adapted; and the timely use of pesticides.

Patch Diseases

Patch diseases are often grouped together because of the similar nature of the pathogens involved, their similar destructive action on the plant root sys-

tem, and their distinctive symptom patterns. Patch fungi all have a characteristic ectotrophic growth phase in which darkly pigmented "runner hyphae" grow along the surface of the root or stem base before penetrating into the vascular tissue of the plant. Because the early ectotrophic growth of the fungus is more accessible to control measures, it is important to take timely action if you suspect that a patch disease will be a problem.

Because of the root-rot nature of the patch diseases, cultural practices should be employed that reduce stress on the root systems or otherwise promote good root growth. Lower than recommended cutting heights, thatch accumulation, soil compaction and frequent light irrigation all contribute to patch disease development. Timely core cultivation to increase aeration and water penetration and reduce thatch can help alleviate stresses that contribute to patch diseases.

Nitrogen sources and their effect on the pH of the soil closely surrounding the root (rhizosphere) may be one avenue to gain control of patch diseases, especially take-all patch of bentgrass (caused by *Gaeumannomyces graminis*) and possibly summer patch of bluegrasses and fine leaf fescues (caused by *Magnaporthe poae*). Lowering the pH in the rhizosphere is thought to inhibit the ectotrophic phase of *G. graminis*, either directly or indirectly by stimulating antagonistic microflora. Although significant changes in overall soil pH are hard to achieve, minor changes in the rhizosphere pH can take place when acidifying fertilizers are used. Examples of such fertilizers are ammonium chloride (NH4Cl) and ammonium sulfate (NH4SO4). Applications of elemental sulfur have also shown some positive effects over longer periods of time. Reduction of patch disease severity may also occur following use of other elements, such as chlorine. Lime applications should be avoided where patch diseases occur and soil pH is high (greater than 7.5).

Summer patch and necrotic ring spot (caused by *Leptoshaeria korrae*) occur primarily on bluegrasses, including *Poa annua*, and to a lesser extent on fine leaf fescues. Among Kentucky bluegrass cultivars, there have been reports of moderate resistance or tolerance to summer patch and necrotic ring spot. Examples include Adelphi, Baron, Challenge, Eclipse, Midnight, Rugby, Sydsport and Victa Kentucky bluegrasses. Check with your state university extension personnel to determine which varieties are best adapted to your region.

Under severe disease pressure, you may want to consider planting a grass species that is not susceptible to patch diseases. Replacement of susceptible species of bluegrass or fescues with improved perennial ryegrass (Lolium) cultivars is an alternative, since perennial ryes have so far proven highly resistant to patch diseases. The removal of *Poa annua* from extensively managed turf and replacement with resistant species is the best solution to a patch disease problem with this species. Most bentgrass cultivars are susceptible to take-all patch, although some of the newest varieties appear to have some resistance.

Control of patch diseases using only systemic fungicides is not easily achieved. Their effectiveness can be maximized through proper application. Timing of the application(s) and delivery of the product to the appropriate site in the thatch-rhizosphere-soil system are thought to be critical. Fungicides should be applied when the fungi are first beginning to colonize the roots — fungicide applications made after symptoms first appear are too late and will usually provide no relief.

Monitoring soil temperatures is the best way to determine when patch fungi are likely to become active. For summer patch, preventative fungicide applications should be made when consistent midday soil temperatures in the 18-22 C (64-72 F) range are reached. If soils stay in this range for more than five to six weeks, multiple applications, two to four weeks apart, may be made. Necrotic ring spot and take-all patch appear to be active at cooler temperatures, so fungicides should probably be applied earlier in the spring than for summer patch. A fall application for patch disease control also may be prudent where disease has been severe and alternative controls are not available or helpful. Root regrowth that occurs in autumn would then have some protection.

Low Nitrogen Diseases: Dollar Spot and Red Thread

Dollar spot and red thread are caused by two different fungal pathogens. Dollar spot is caused by a "mysterious," sterile ascomycete that has been classified as

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Sclerotinia, Lanzia or *Moellerodiscus*. Red thread is caused by the basidiomycete *Laetisaria fuciformia*, once known as *Corticium fuciforme*. We are considering these diseases together because of the similarities in symptom expression (small circular patches), time of symptom appearance, and environmental and cultural factors that favor development. Also, most fungicides that control one disease also will control the other. Because of these similarities, we can develop disease management strategies that will help control both diseases.

Perhaps of greatest importance is the fact that both diseases are favored by nitrogen deficiencies. Maintaining optimum fertility, especially nitrogen, will promote adequate growth and stress resistance and will reduce the severity of these diseases. During the unusually cool 1992 season, we observed strong activity of both of these diseases, especially in the late summer and early fall. Dollar spot continues to be a problem on golf course fairways, primarily because of low fertility and other programs designed to reduce the competitiveness of *Poa annua*. Red thread was a problem in less intensively maintained bluegrass/perennial rye turf areas that also were poorly maintained.

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Both dollar spot and red thread are favored by "droughty" soil coupled with warm air temperatures and high relative humidity. Properly timed and adequate irrigation can enhance the overall health and vigor of the turf and reduce its susceptibility to both pathogens. Severe red thread almost always occurs on unirrigated sites, such as golf course roughs.

Most cool-season grass species are susceptible to these diseases, although moderately resistant cultivars are available within each species. Many Kentucky bluegrass, perennial rye and fine fescue varieties are available that have good levels of disease resistance, especially if managed at optimum fertility and soil moisture. Also, we have observed that newer, improved bentgrasses have good resistance to dollar spot, whereas older are more susceptible.

In a case where new resistant cultivars cannot easily be introduced, control with fungicides remains an important avenue, especially for dollar spot. However, fungicide sprays can be minimized and application rates lowered if chemical applications are combined with the previously mentioned cultural factors. We have field research data showing great benefit, both in disease management and plant health, from tank-mixing low rates (0.1-0.2 pounds per 1,000 square feet), urea or other soluble nitrogen sources with fungicides for dollar-spot control.

High Nitrogen Diseases: Pythium Blight and Brown Patch

Foliar blights caused by *Pythium* and *Rhizoctonia* species are most common on dense, well-watered, well-fertilized turf. Disease activity is enhanced during periods of high air temperature (80-85 F) and relatively high humidity (80 percent or more). Proper fertilization is again a key to limiting disease pressure. Over-applications on nitrogen or application of a quick-release form just before a warm, humid weather pattern can contribute to outbreaks of Pythium blight and brown patch. Dialing in nitrogen rates to control leaf growth and applying slower release formulations with adequate P and K and key management factors. Controlled irrigation and drainage improvements to limit the amount of free water also is important in limiting these pathogens.

Pythium blight attacks all species of cool-season grasses, but is most severe on bentgrasses, *Poa annua*, and perennial ryegrass grown under high-maintenance regimes. *No* Pythium-resistant cultivars are available at this time among cool-season grass species (some bermudagrasses exhibit resistance). Brown patch also attacks all cool-season species and is most severe on bentgrass, bluegrasses, and turf-type tall fescues. Some tall fescues are perennial ryegrass cultivars have moderate resistance to brown patch.

Fungicides are extensively used to protect fine turf areas from these pathogens. Several IPM techniques may reduce these amount of fungicides needed in certain situations. For example, turf managers should identify and frequently monitor warm, humid weather. Spot spraying only those hot spots on a preventive or early curative basis is much more efficient than blanket spraying. Disease outbreaks can also be forecast by using computer-controlled weather monitors and predictive computer models. These systems can optimize fungicide applications and reduce unnecessary spraying, saving dollars and reducing environmental impact.

Big Picture Critical

In general, turf managers need to have broad-based control strategies in mind when planning for summer diseases. Cultural factors such as balanced fertility, alleviation of soil compaction, appropriate irrigation and drainage, and use of host plant resistance where available should be integrated into an overall plant health management program. Strategic and targeted use of fungicides can and should be part of an overall integrated pest management program, but managing fungicide sprays should be just one aspect of an overall plant health management scheme. ❑

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