



IPM strategies for warm-season turfgrasses

BY MARIA TOMASO-PETERSON

Bermudagrass (hybrid or common) is the primary warm season turfgrass used for athletic fields in both tropical and subtropical climates. This article focuses on integrated pest management (IPM) strategies for disease control in bermudagrass, but the same concepts can be applied to most warm season turfgrasses. IPM strategies for disease control include appropriate cultural management practices for healthy turfgrass, environmental stewardship, and minimal fungicide usage.

"A healthy plant is a happy plant," is an idea repeatedly expressed by Drs. Jeffrey Krans and Euel Coats, professors of agronomy and weed science, respectively, in turfgrass management at Mississippi State University. That concept is true for all aspects of turfgrass management, including disease control. Fertility, watering, mowing, thatch control, and aeration are key practices for healthy turfgrass. These cultural management practices interact to create a healthy plant, the first line of defense in disease management.

Environmental stewardship includes being acutely sensitive to subtle changes in turfgrass development. Any type of stress caused by environmental fluctuations, mechanical and/or pest damage, or physiological shifts in turfgrass development may result in predisposition to infection by fungal pathogens. Scouting for diseases is a second line of defense in disease management. To be successful, turf managers must be familiar with the dynamic processes of turf-

grass diseases. This article reviews the most common fungal diseases that impact bermudagrass managed as athletic turf.

The most predominant and unpredictable bermudagrass disease is commonly referred to as the Helminthosporium complex. Pathogenic fungi can be actively infecting bermudagrass throughout its continual growth cycle, but symptoms are inconspicuous until the plant becomes stressed and/or environmental conditions become conducive for vigorous infection and reproduction of the fungi.

Two fungal genera are commonly implicated in this disease complex. *Bipolaris* and *Curvularia* spp. involved in this disease complex may attack all plant parts, and symptoms may be observed as leaf spots, leaf blights, melting-out and/or crown and root necrosis.

Leaf spot symptoms may be observed on leaves and stems of bermudagrass as small, elliptical to circular spots (lesions), dark purplish-brown in color with a dark blackish-brown border (above). Frequently, a yellow (chlorotic) border may be observed. Lesions may enlarge, resulting in total death of the leaf. Older leaves will become symptomatic first, with a progression of lesion development to younger leaves.

Lesions are the result of asexual spores (conidia) landing on the leaf surface, germinating and penetrating leaf tissue, entering and parasitizing the bermuda-

grass plant. This dynamic process is referred to as infection. Conidia are produced by the fungal pathogen on infected tissues and disseminated by wind, rain, and mechanical transport (top).

Conidia may spread distances from an infective site and repeat the infection process in a healthy area of the athletic field. The pathogen is most active when environmental conditions are cool and wet. A moisture film, or "free water," on the leaf surface is necessary for infection. The microenvironment within the turf canopy must be cool (75 deg. F is optimum), and wet before leaf spots will develop. This disease is favored by prolonged periods of leaf wetness that result from cloudy, foggy, rainy days, or late afternoon irrigation. With the advent of warmer temperatures and sustained moisture in the turf canopy, these pathogens can migrate down the plant and infect crowns and roots. Dark brownish-black necrosis of crowns and roots can be observed on infected plants. The leaves will become yellow (older leaves first), then quickly turn brown and produce brownish-purple, irregular patches in the bermudagrass turf (below).

Melting-out symptoms initially develop on the leaf sheath progressing to the leaf as water-soaked lesions, dark reddish-purple to black in color. A chlorotic border fading into healthy green tissue often surrounds lesions. Colonization by the fungus becomes so extensive, the leaf is girdled and falls off. The leaf-dropping phase of the disease gives rise to the name "melting-out". Melting-out commonly occurs when air temperature is above 85 degrees F and relative humidity is greater than 85 percent.

Disease management

Symptoms associated with the *Helminthosporium* complex will occur when environmental conditions are conducive, and the bermudagrass is experiencing stress. Stress factors may include extended periods of low light that slows down plant metabolism, excessive nitrogen fertility, improper P and K levels, hormonal-type fungicide and herbicide applications, and drought stress. In addition, excessive thatch layers and leaf clippings provide nutritional food for fungal pathogens to grow saprophytically and produce conidia. These stress factors, and "environmentally friendly" microenvironments for persistent fungal pathogens, may be reduced through good cultural management practices. Plant resistance is a key factor in any IPM program. Unfortunately, bermudagrass varieties used for athletic fields lack resistance to *Bipolaris* or *Curvularia* spp.

A third line of defense in disease management is minimal fungicide input. Fungicides are most effective when used in a preventive manner with efficacy against the fungal pathogen inciting the disease. Leaf spot, leaf blight and melting-out, all foliar diseases, require a spray volume of 1.0 gal/1000 sq. ft. com-

pared to a spray volume for crown and root necrosis of at least 2.5 gal/1000 sq. ft. The higher spray volume for crown and root necrosis permits penetration of the fungicides to infected plant parts. It is recommended that fungicides used for controlling root diseases be watered into the root zone to a depth of 0.5 to 1.0 inch immediately following application.

Selecting a fungicide with a contact or penetrant mode of action should be considered to maximize effectiveness and minimize applications. Contact fungicides are active on plant surfaces, but may wash off, and usually have a short period of effectiveness. This may necessitate additional applications. However, contact fungicides typically have a broad biochemical mode of action, resulting in minimal development of fungicide resistance.

Penetrant fungicides have chemical activity within the plant. Penetrants may be localized (remain in the area of initial entry) or acropetal (translocated upwards in the plant from the point of entry); only one truly systemic (translocated both upwards and downwards in the plant) penetrant is commercially available.

Penetrants are most effective for bermudagrass root diseases because they can be watered into the root zone, absorbed by the roots and translocated up the plant for complete protection from fungal attack. Penetrant fungicides are absorbed into the plant and provide a longer period of effectiveness, which translates into minimal applications. Penetrant fungicides generally have a specific biochemical mode of action, resulting in selective fungal resistance. Fungal resistance to fungicides can be managed by explicitly following label recommendations and alternating modes of action and fungicide chemistry.

Environmental stewardship is also an integral part of IPM strategies for disease control. The turfgrass manager should maintain accurate records of disease outbreaks, when and where they occurred, and cultural management practices, and fungicides that were effective in controlling diseases. You should also know the disease profile, symptomatology, and environmental conditions favoring disease development is a key factor in successful IPM strategy for disease control.

Distance diagnostics (digital images of turfgrass symptoms), together with plant samples submitted to a plant diagnostic laboratory, can assist in development of an accurate diagnosis quickly.

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