

## in cool-season turfgrass

*The goal of every turfgrass manager should be to create a healthy turfgrass ecosystem. This can be a challenge since growing seasons in the northern latitudes are never the same.*

By JOHN E. WATKINS/  
Ph.D. University of Nebraska

**A**nyone that has ever taken a soil microbiology course comes away with a new appreciation of the abundance of microbes in the plant/soil rhizosphere.

The rhizosphere is that microenvironment in soil influenced by plant roots. One pound of soil and roots may contain over 900 billion organisms—bacteria, fungi, actinomycetes, nematodes, insects, etc. With that many organisms within the root zone of your turfgrass plants, you often wonder how anything survives. Fortunately for the turfgrass manager, only a few of the microbes in the rhizosphere cause disease; many benefit plant growth by keeping disease-causing microbes under control. There's a delicate coexistence between the good and the bad microbes in the turfgrass rhizosphere. When this balance is altered, disease can result.

Turfgrass diseases result from the complex interaction of pathogen, host and environment. Turfgrass management practices can affect all three, greatly influencing disease development. Those practices that favor vigorous, but not lush, grass growth and are detrimental to growth of the pathogen result in less disease injury to the turf. Good turfgrass management is an effective disease deterrent.

The goal of every turfgrass manager should be to create a healthy turfgrass ecosystem. This is a challenge since growing seasons in the northern latitudes are never

the same. In 1996 the Northern Plains were relatively cool and wet. 1997, however, was just the opposite—hot, dry and windy. Because each season is different and because the relationship of host, pathogen and environment are so ecologically interwoven, disease predictions are difficult.

Let's examine some of the more common and damaging diseases of cool-season turfgrasses.

**Leaf spot and melting out** are two fun-



**Dollar spot injury to ryegrass is most prevalent when days are warm, nights are cool.**

gal diseases within the old group known as "Helminthosporium" leaf, crown and root diseases. The leaf spot pathogen, *Bipolaris sorokiniana*, attacks bluegrasses, bentgrasses, ryegrasses and fescues. Melting out, caused by *Drechslera poae* is a serious disease of Kentucky bluegrass and also occurs on ryegrasses and fescues. Both diseases are favored by dry periods alternating with

prolonged cloudy wet weather. The range of pathogen activity is from 65°F to 85°F. Early disease symptoms are small dark brown spots on the leaf blade or leaf sheath. As the disease progresses, the spots enlarge causing the infected leaves to yellow and the affected turf to appear chlorotic and thin.

Widespread use of improved turfgrass cultivars with good resistance to leaf spot and melting out has significantly lessened the impact of these diseases on turfgrass quality. The dependency on rescue fungicide treatments can be drastically reduced through good cultural practices. These include a fertilization program that does not stimulate lush growth in May, thatch management and using a preventive fungicide program on susceptible turfs.

**Dollar spot**, caused by *Sclerotinia homeocarpa*, occurs when days are warm and nights are cool. The presence of dew and high humidity in the turf canopy are ideal conditions for dollar spot. On turfs maintained at 1 to 3 inches, symptoms are a mottled, light tan pattern made up of 4- to 6-inch patches of blighted turf. Individual leaf blades will develop a lesion that may be up to an inch long, is light tan with reddish-brown margins and often spans the width of the blade. If the turf looks as though it's covered with small cobwebs in the mornings, that's probably *S. homeocarpa* mycelium.

Dollar spot often can be prevented without the use of fungicides or with minimal fungicide application. Maintaining vigorous growth during the season helps the turf outgrow the infection and recover quickly when it is infected. If needed, a fungicide can be applied at the first appearance of dollar spot.

Two of the most destructive patch diseases of cool season turfs are **necrotic ring**

spot, caused by *Leptosphaeria korrae* and summer patch, caused by *Magnaporthe poae*. Necrotic ring spot generally occurs on Kentucky bluegrass during spring and fall, and summer patch during July and August. Summer patch devastated lawns in the central plains in 1997 because of record high temperatures and low rainfall. Distinguishing between the two diseases is difficult as both produce doughnut-like patches in affected turf. The dead grass is light tan and matted, and many of the patches will have a tuft of healthy grass in the center.

The key to effective management of these two persistent diseases is in promoting root health through timely fungicide treatment and minimizing stress dur-



Summer patch in Kentucky bluegrass

ing the hot periods of the summer. These diseases are like a bad headache. They go

away periodically but always return during periods of stress. On established turf, the key to prevention is to avoid management practices that promote rapid top growth at the expense of root development. Reduce thatch, fertilize properly and water more frequently when the disease is active. Apply a systemic fungicide with high volumes of water to drench the chemical into the root zone. Make the first application in May with a second one in June.

**Brown patch**, caused by *Rhizoctonia solani*, occurs on Kentucky bluegrass, tall fescue and perennial ryegrass during midsummer's heat and humidity. The disease is identified by the presence of patches of dead and dying grass. The

## PREVENTIVE AND CURATIVE FUNGICIDE PROGRAMS FOR MAJOR DISEASES OF COOL-SEASON TURFGRASSES

Disease	Preventive/ Curative	Initial application	Products
<b>Leaf spot/melting out</b>	P	May	chlorothalonil, iprodione, mancozeb, propiconazole, vinclozolin
<b>Stripe smut</b>	P	April or October	cyproconazole, fenarimol, flutolanil, propiconazole, thiophanate-methyl, triadimefon
<b>Necrotic ring spot</b>	P	When soil temperatures reach 60°F at 2" depth	azoxystrobin, cyproconazole, fenarimol, iprodione, thiophanate-methyl
<b>Fairy ring</b>	C	At first symptoms of green ring	flutolanil
<b>Dollar spot</b>	P/C	June for ryegrass and bentgrass	chlorothalonil, cyproconazole, iprodione, mancozeb, propiconazole, thiophanate-methyl, triadimefon, vinclozolin
<b>Brown patch</b>	P/C	June for ryegrass and bentgrass	azoxystrobin, chlorothalonil, cyproconazole, flutolanil, iprodione, propiconazole, thiophanate-methyl, triadimefon, vinclozolin
<b>Summer patch</b>	P	When soil temperatures reach 65°F at 2" depth	azoxystrobin, cyproconazole, fenarimol, propiconazole, thiophanate-methyl, triadimefon
<b>Pythium blight</b>	P	June	azoxystrobin, chloroneb, ethazol, fosetyl-Al, metalaxyl, propamocarb
<b>Rust</b>	P/C	July	chlorothalonil, cyproconazole, mancozeb, propiconazole, triadimefon
<b>Typhula blight</b>	P	October/November	chlorothalonil, cyproconazole, fenarimol, flutolanil, iprodione, PCNB, propiconazole, triadimefon, vinclozolin
<b>Microdochium patch</b>	P	October/November	azoxystrobin, chlorothalonil, cyproconazole, fenarimol, iprodione, PCNB, propiconazole, thiophanate-methyl, triadimefon, vinclozolin

This list is presented for information only and no endorsement is intended for products listed nor criticism meant for products not listed. Check with local specialists for specific recommendations and read and follow label instructions.

patches are roughly circular. Green plants within the diseased patches have leaf spots that are long, gray lesions surrounded by a dark brown margin.

### *The presence of dew and high humidity in the turf canopy are ideal conditions for dollar spot.*

Control thatch and maintain an adequate nitrogen fertility program during the growing season. Don't overdo it with the nitrogen, but don't starve the turf either. Apply a fungicide to susceptible turfs at the first appearance of brown patch symptoms.

**Pythium blight** is caused by several species of *Pythium* fungi. In turfgrass they survive in thatch and soil. All turfgrass species are susceptible to attack by these fungi. The two most important criteria for disease occurrence are poor surface drainage and a wet grass canopy. These along with high relative humidity and day temperatures above 90°F with warm nights, provide an ideal environment for an outbreak. Environmental conditions are key to this disease. When it's cool and dry, no disease, but when it's hot and humid, look out. Early symptoms are small brownish spots that suddenly appear, especially in drainage channels, within the turf. These many form into larger areas where the in-

## TURFGRASS FUNGICIDES GROUPED BY CHEMISTRY

Fungicide class	Common name	Examples of some trade names
Aromatic hydrocarbons	Etridazole	Koban
	Chloroneb	Teremec SP
	PCNB	Turficide
Benzimidazoles	Thiophanate-methyl	Cleary's 3336 Fungo Systec 1998
Carbamates	Mancozeb	Fore
	Propamocarb	Banol
	Thiram	Thiram
Carboximides	Flutolanil	ProStar
Dicarboximides	Iprodione	Chipco 26019
	Vinclozolin	Curlan, Vorlan
Nitriles	Chlorothalonil	Daconil 2787 Daconil Ultrex Daconil Weather Stik
Phenylamides	Metalaxyl	Subdue Maxx
Phosphonates	Fosetyl-Al	Aliette Prodigy Aliette Signature
Sterol biosynthesis inhibitors (DMIs)	Cyproconazole	Sentinel
	Propiconazole	Banner Maxx
	Triadimefon	Bayleton
	Myclobutanil	Eagle
Pyrimidine (DMI)	Fenarimol	Rubigan
B-methoxyacrylate	Azoxystrobin	Heritage

This list is presented for information only and no endorsement is intended for products listed nor criticism meant for products not listed. Check with local specialists for specific recommendations and read and follow label instructions.

dividual spots have merged. Infected leaves appear water-soaked and feel slimy to the touch. In the early morning hours, the turf may contain masses of fungal mycelium resembling a fluffy cotton ball. Sometimes the affected turf will give off a fishy odor. Place a plug of the affected turf in a sealed plastic bag overnight and then smell the results.

No single control measure will provide complete protection against an outbreak of Pythium blight. Turf managers must employ a combination of good management, early disease detection, and preventive fungicide treatment to avoid serious turf injury. Provide good surface and subsurface drainage and promote good air movement across blight-prone areas by pruning landscape plantings. The best fungicide strategy is one of prevention. When temperatures

and humidities are forecast to reach into the 90's with warm nights, it's time to treat.

**Rust** diseases, caused primarily by *Puccinia* spp., occur on all commonly grown turfgrasses. The severity of rust outbreaks varies from year to year. Kentucky bluegrass, perennial ryegrass and tall fescue are the cool season grasses most affected by rusts. In the Great Plains and Rocky Mountains, rust usually occurs from mid to late summer until early October. It becomes severe when lack of water, low fertility or soil compaction reduce turf growth. Warm days and moderate night temperatures along with long dew periods create optimal environmental conditions for rust.

Heavily rusted turfs appear yellow or orange when seen from a distance. If still in doubt, put on a pair of white shoes and walk across the turf. If it's rusty, they'll



Melting out of Kentucky bluegrass

turn orange. Close examination of rusted leaf blades reveals the presence of orange to brick-red pustules. Spores within these pustules rub off easily when touched. Each pustule is capable of producing over a million rust spores. Under ideal conditions turf can become heavily rusted about 40 days after initial infection.



Fairy ring injury to a home lawn. Rings most severe in sandy, low-fertility soils.

Rust management begins with the use of improved rust-resistant cultivars. Maintaining vigorous growth throughout the growing season by supplying a consistent source of nitrogen and alleviating compaction will lessen the rust severity. Fungicides may be needed in certain years with the initial application in early July followed by one or two additional treatments at three-week intervals.

The life cycle of fairy ring-forming mushrooms is similar to that of other common mushrooms. Fairy ring fungi survive as dormant spores or mycelium. This mycelium becomes active during moderate, wet weather; and the ring continues to grow outward each year. Following rains, mushrooms appear within the dark green ring or at the edge of the dead area. Fairy rings usually are most severe in sandy, low fertility soils low in moisture. The mushrooms grow on decaying organic matter such as a thick thatch. Typically, fairy rings

are found as circular patterns of thin or dead grass within a dark green ring of lush grass. The concentric ring of thin or dead grass is the result of drought stress caused by the dense mat of fungal mycelium present just below the ring.

In established turfs, symptoms are "masked" by lightly fertilizing, punching holes into the soil at 1-foot intervals within the ring and irrigating. This procedure should be repeated every two or three weeks during the growing season. A more drastic approach is to kill the turf in the infested area with a herbicide and rototill the entire area in three or four different directions to mix the mycelium from the different rings. The area can then be seeded or sodded. The fungicide flutolanil (ProStar) is registered for the suppression of certain fairy ring fungi. It could be used to spot treat problem fairy rings.

Principle snow molds of the central and northern plains are *Microdochium* patch

(pink snow mold) and *Typhula* blight (gray snow mold). *Microdochium* patch, caused by *Microdochium nivale*, can injure turf anytime from mid October to April during prolonged cool, wet weather. Infection most often occurs with temperatures between 32°F and 50°F, during cold fogs, or in a light drizzle.

Symptoms of pink snow mold are roughly circular rusty brown patches with a salmon-pink moldy growth visible at the edges of the patches. The scattered spots are easily detected, even in midwinter, because of the contrast in color between the diseased spots and dormant turf.

Unlike *Microdochium* patch, *Typhula* blight is strictly a cold-weather disease. Caused by *Typhula ishikariensis* or *T. incarnata*, this disease can seriously injure turf during periods of extended snow cover. Turf injury is aggravated when the snow is compacted by skiing, snowmobiling or sledging. Symptoms of gray snow mold are patches of rough, dead, bleached-tan areas up to a foot in size becoming visible as melting snow recedes from diseased areas. When wet they are covered by a whitish-gray moldy growth. Tiny orange to red to black fungal sclerotia are embedded in infected leaves can be seen with a hand lens. **LM**

## TURF DISEASE MANAGEMENT GUIDE

Disease	Resistant varieties	Proper fertilization	Thatch management	Aerification	Improved drainage	Improved air circulation	Snow fencing	Mowing until dormant	Proper irrigation	Preventive fungicides	Curative fungicides	Till the area
Leaf spot/melting out	x	x	x	x					x	x		
Dollar spot	x	x	x	x					x	x	x	
Brown patch	x	x	x	x		x			x	x	x	
Summer patch		x	x	x					x	x	x	
Necrotic ring spot		x	x	x					x	x	x	
Pythium blight		x	x	x	x	x				x	x	
Rusts	x	x						x	x	x		
Fairy rings		x	x	x							x	x
Snow molds		x	x	x			x	x		x		