

Turfgrass Disease Profiles

BP-125-W

Seasonal Activity of Turfgrass Pathogens in the Midwest

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Fortunately for those of us who worry over unhealthy turf, not all turfgrass pathogens are active at the same time. Pathogen activity is largely temperature dependent, and it seems as though each season has its own compliment of turf diseases.

An important part of this discussion is the distinction between *pathogen* and *disease*. The pathogen is (almost always) a fungus that is identified by a Latin binomial (such as *Sclerotinia homoeocarpa*). *S. homoeocarpa* causes the disease called dollar spot — and we are all familiar with the symptoms of this disease (Figure 1). The distinction between pathogen and disease is very important because effective treatment with fungicides must be targeted to pathogen activity rather than symptom expression.

In most cases, pathogen activity coincides with disease outbreaks. For example, mycelium of the Pythium blight pathogen appears when the disease is most active. However, in some cases (especially with root diseases) pathogen activity (infection and colonization of plant tissues) occurs long before recognizable symptoms appear.

Understanding when turf pathogens are active allows turf managers to anticipate disease outbreaks and schedule fungicide applications at the most appropriate times.

This publication provides estimates of when important turf pathogens are active in the lower Midwest. The lengths of the bars in Figure 2 (pg. 2) approximate the times of the year when individual turf pathogens are most



Figure 1. Dollar spot.

active. Thick bars define periods of greatest likelihood of pathogen activity. Thin bars identify periods of light activity.

More information about specific diseases (including descriptions of conditions that favor infections, symptoms, and control recommendations) are available in the *Turfgrass Disease Profiles* series from Purdue Extension (available at www.the-education-store.com or www.agry.purdue.edu/turf).

Anthracnose

There remains some uncertainty regarding the environmental conditions that favor anthracnose infection and development. The disease has two phases: a basal rot phase and a foliar phase. Both phases are caused by the same fungal pathogen (*Colletotrichum cereale*).

The foliar phase is evident on plants suffering from a variety of summer stresses. According to some studies, infection will occur during hot, humid conditions.

Botany and



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Turfgrass Disease Profiles

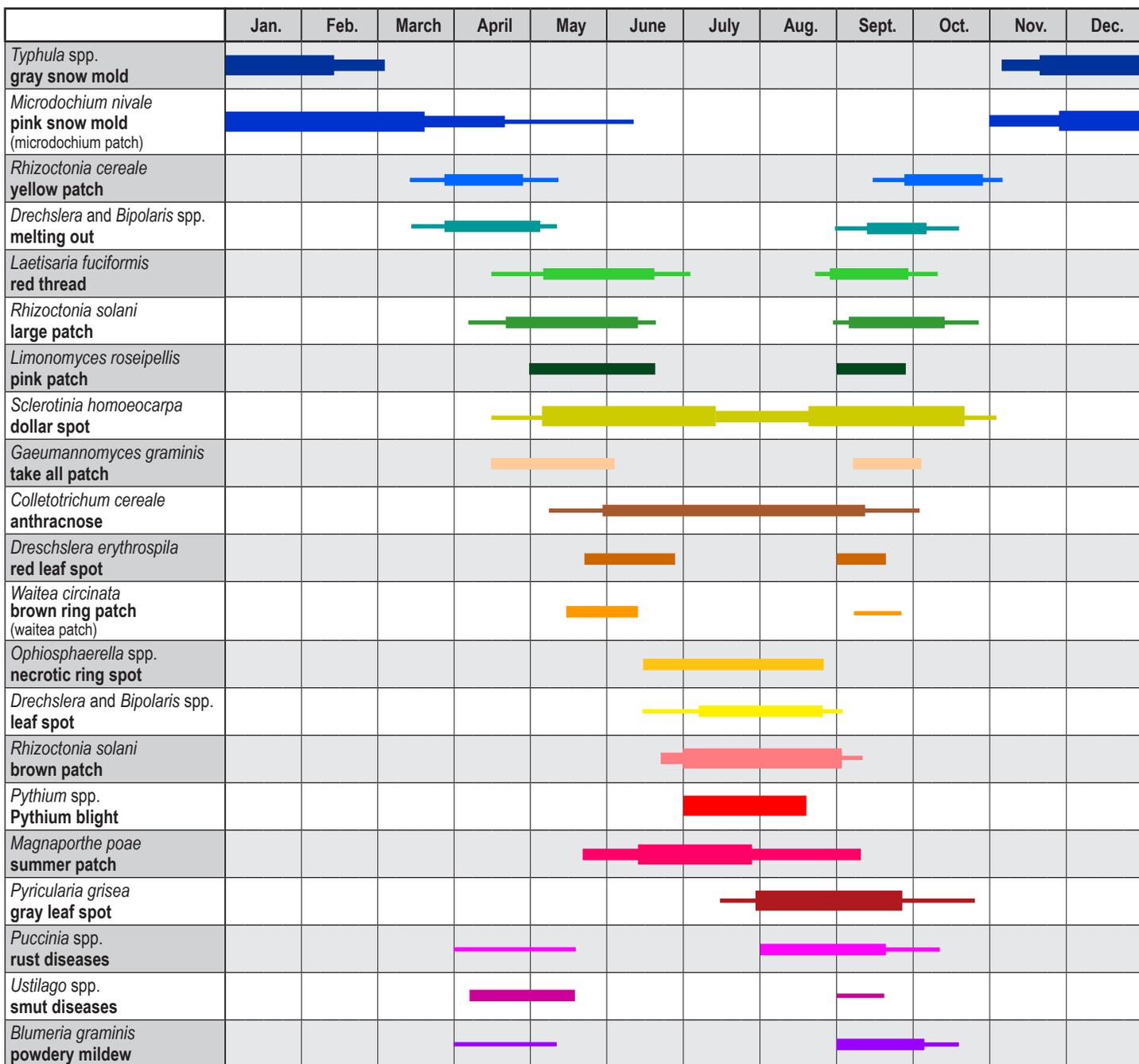


Figure 2. Seasonal activity of turfgrass pathogens in Indiana

This figure is intended to provide a graphic description of periods of pathogen activity. The thickness of the colored bars estimates the relative risk of outbreaks based on monthly environmental conditions. Thicker bars indicate high risk; narrower bars indicate low risk.

The basal rot phase has been identified during the cool, wet conditions of spring, as well as warm, wet conditions in summer. Plants under stress (putting greens maintained at dangerously low cut heights and low nitrogen fertilizer levels) are most prone to infection and damage associated with anthracnose.

Brown Patch

Brown patch is a summer disease. Extended dew periods (12 hours or more) and elevated temperatures

(average of 65°F or greater during the wet period), favor infection and spread of the pathogen (*Rhizoctonia solani*).

Brown Ring Patch

Brown ring patch is largely a disease of annual bluegrass putting greens (there are a few reports of symptoms on creeping bentgrass). Outbreaks usually coincide with periods of mild weather with ample precipitation in mid- to late spring.

Turfgrass Disease Profiles

Brown ring patch may be confused with yellow patch, a disease caused by a related fungal pathogen that occurs earlier in the spring. The brown ring patch pathogen was identified as *Waitea circinata* var. *circinata* in 2005. In some cases it is referred to as “Waitea patch.”

Dollar spot

The dollar spot fungus (*Sclerotinia homoeocarpa*) is active during extended dew periods when temperatures range from 50°F to 70°F. The dollar spot infection process occurs throughout the growing season, from early May through the end of October.

Gray Leaf Spot

Gray leaf spot outbreaks normally occur during mid-to late summer. Pathogen activity (*Pyricularia grisea*) is favored by long dew periods, warm evenings, and heavy rains (or frequent irrigation).

In southern Indiana, disease development has been confirmed as early as the first week in July. In northern Indiana, outbreaks have occurred as early as mid-August. Initial outbreaks often appear shortly after remnants of Gulf Coast hurricanes bring heavy rains into the Ohio Valley. Disease activity beyond the first few weeks of autumn is not unusual.

Gray Snow Mold (Typhula Blight)

The gray snow mold fungi (*Typhula* spp.) are active in a very narrow range of low temperatures (31°F-36°F). Also, like almost all pathogenic fungi, they require ample moisture for establishment and spread. That explains why the most severe outbreaks of gray snow mold occur during prolonged periods of snow cover.

Fungicide applications in late fall (after the turf goes dormant and before the first lasting snowfall) are essential on sites that have a history of the disease. Gray snow mold will not spread once snow melts in the spring.

Leaf Spot/Melting Out

Until the latter part of the 1900s, leaf spot and melting out were classified as a single disease and referred to as “Helminthosporium leaf spot.” Modern classification divides the Helminthosporium pathogens into numerous groups (genera) including *Bipolaris*, *Exserohilum*, *Drechslera*, and *Mariellottia*. They cause leaf spot diseases on various cool- and warm-season turf.

Melting out caused by *Drechslera* spp. typically appears in April and May during cold, rainy weather. Leaf spot diseases caused by *Bipolaris sorokiniana* (on cool season turf) and *Bipolaris cynodontis* (on bermudagrass) occur during summer and require long wet periods, elevated evening temperatures, and ample precipitation for establishment and spread.

Necrotic Ring Spot

Necrotic ring spot is a root disease caused by a pathogen (*Ophiosphaerella* spp.) that is active in warm, wet soils. Infection and colonization of roots normally occurs when soil temperatures range from 60°F to 75°F.

Field patterns (rings, frogeyes, or arcs) first become evident in midsummer, but they may also be apparent after dry periods in spring, when plants with infected roots grow slowly compared to healthy plants.

Pink Snow Mold/Microdochium Patch

Pink snow mold and Microdochium patch actually represent two different phases of the same disease, caused by the same pathogen: *Microdochium nivale*.

In the pink snow mold phase, the pathogen spreads by radial expansion of mycelium under snow cover. The symptoms resemble the well-defined circular patches associated with gray snow mold.

In the Microdochium patch phase, the pathogen produces similar patches, but also may spread (especially on putting greens) via conidia (spores) that are rain-splashed or carried with surface water to create new infections.

Temperatures that favor infection and spread can range from 32°F to 50°F. This pathogen often is very active through mid-spring.

Powdery Mildew

Powdery mildew infection occurs during mild weather (evening temperatures ranging from 40°F to 55°F) in areas with heavy to moderate shade. Frequent rains or extended dew periods are *not* essential for infection by the powdery mildew pathogen (*Blumeria graminis*).

Pythium Blight

Hot, wet weather is ideal for Pythium blight outbreaks. Long dew periods, elevated evening temperatures (daily minimum temperatures of 68°F or greater), and heavy rains during the heat of the summer favor Pythium development.

Red Leaf Spot

Red leaf spot is a disease that primarily occurs on creeping bentgrass putting greens. Damage caused by red leaf spot is largely cosmetic, but moderate to severe outbreaks may disturb the smoothness of affected playing surfaces.

The disease occurs most often on older varieties of creeping bentgrass. The pathogen *Drechslera erythrospila* is related to leaf spot and melting out pathogens and produces similar symptoms. Red leaf spot tends to occur in late spring, when evening temperatures range between

Turfgrass Disease Profiles

45°F and 55°F, and when long dew periods and ample precipitation are prevalent.

Red Thread and Pink Patch

These are similar diseases caused by closely related fungal pathogens (*Laetisaria fuciformis* for red thread and *Limonomyces roseipellis* for pink patch) that are active during the same environmental regimes. Infection occurs during rainy weather or after extended periods of leaf wetness (greater than 12 hours) when temperatures range from 45°F to 60°F. Symptoms are most often observed in mid- to late spring, but outbreaks occasionally occur in the fall.

Rhizoctonia Large Patch

Rhizoctonia large patch of zoysiagrass (also called zoysia patch) is the most significant infectious disease of the zoysiagrass (*Zoysia japonica* and *Z. matrella*) species.

Disease development is favored by moderate temperatures (50°-70°F) and long dew periods in spring and fall. Large patch symptoms are normally evident in fall and spring as zoysiagrass enters and emerges from winter dormancy. Rapidly growing turf during the summer heat can mask the effects of underlying infection and drastically diminish symptom expression. The pathogen has the same binomial (*Rhizoctonia solani*) as the brown patch pathogen.

Rust Diseases

Rust pathogens (*Puccinia* spp.) may be active over a broad range of temperatures. Disease development can occur from late summer through mid-autumn. Like many other fungal pathogens, long dew periods favor infection. Rust outbreaks normally occur on slow-growing turf. Rust development during spring may be evident in heavily shaded areas.

Smut Diseases

Smut infection occurs within a narrow range of temperatures (evening temperatures around 50°F) during spring. The pathogen (*Ustilago* spp.) remains with infected plants until the plants eventually die during periods of heat and drought stress.

Large amounts of black spores that erupt from infected plants during summer ensure the pathogen's over-winter survival, but do not create new infections. Infection spores (called basidiospores) are very fragile and infect

turf only when two different mating types are present in the spring. The highly specialized circumstances under which infections occur explain why smut diseases are not very common on turfgrasses.

Summer Patch

Summer patch is another important disease that affects roots of Kentucky bluegrass and annual bluegrass. The summer patch fungus (*Magnaporthe poae*) does not become active until soil temperatures (usually measured at the 3-inch depth during the heat of the day) remain above 65°F for several consecutive days. In north-central Indiana, this usually may occur from mid-May to early June.

The fungus is active throughout the summer. Symptom expression coincides with extended periods of hot, droughty weather, usually beginning in late July.

Take All Patch

Take all patch is caused by a root-infecting fungus (*Gaeumannomyces graminis* f.sp. *avenae*) that is active in cool (50°F-65°F), wet soils. In north-central Indiana, activity occurs mostly during April and May, with some additional activity as soil temperatures decline in September and October.

Symptoms may be expressed throughout the summer, especially in dry conditions, because infection-impaired roots are unable to support normal turf growth periods of drought stress.

Yellow Patch

This disease also is called "cool season brown patch" because it is caused by a species of *Rhizoctonia* (*Rhizoctonia cerealis*) that is very closely related to the fungus that causes the brown patch disease in midsummer. Extended dew periods with low temperatures (40°F-55°F) favor pathogen activity. Symptoms are most often observed in early to mid-spring, but also occur in October and November.

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All photos by Richard Latin.

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