

crown rot, (ABSCR) to distinguish it from the foliar blight.

Over the past 10 years, this disease has occurred more frequently on putting greens in several northeastern states. Symptoms of ABSCR on close-cut turf appear as yellow or orange-colored irregular patterns.

Poa annua is more frequently affected than bentgrasses:

1. Individual grass tillers turn yellow or orange at the leaf tips.

2. The entire leaf blade and sheath turn yellow and eventually a tan color.

3. The most distinct symptom of this disease is the black, rotted appearance of the crowns and stem bases.

4. The entire shoot can easily be removed from the plant crown.

5. Tiny, pincushion-like structures called acervuli may sometimes be observed on the stems and sheaths with a hand lens.

In Pennsylvania, we have observed the disease in early spring, mid-summer and late fall. In nearly every instance, the soils have been wet or saturated. The disease also appears to be more severe on compacted soils and under low mowing heights. Cultural practices such as aeration, light, frequent applications of nitro-

Cool-season disease chart, page 62

gen fertilizers and high mowing heights may reduce some disease damage.

Some golf course managers report acceptable control when systemic fungicides are applied on a preventative schedule. The challenge in designing a preventive fungicide program for this disease lies in determining when it will occur.

Pyricularia blight—Last September, from New Jersey to Kentucky, many ryegrass fairways turned yellow and thin. At overseeded golf courses it was found that many of the new seedlings succumbed to rapid blighting and death. Weather conditions in many of these locations were very hot and humid over a period of several days. (It is important to realize that widespread problems such as this may be varied in cause and each situation must be considered on a case by case basis before making general conclusions.)

Pyricularia grisea was the primary culprit. This fungus is not well known above the transition zone, but is the cause of gray leaf spot on St. Augustinegrass and annual ryegrass in southern states.

On mature perennial ryegrass infected with *P. grisea*, early symptoms included:

● small, brown lesions or spots with dark brown borders;

● a zone of chlorotic tissue developed around the spots, eventually enveloping the entire leaf; and/or

● leaves often became tan in color and appeared shriveled.

In most cases, the crowns were not damaged and new leaf material was produced soon after cooler temperatures returned. Infected seedling plants appeared water-soaked and blue-gray in color. Many affected seedling plants collapsed within four or five days after symptoms first appeared.

It is unknown if resident populations of *P. grisea* were responsible for the occurrence of *Pyricularia* blight in southeastern Pennsylvania or if spores were carried from the South by a tropical storm that passed near this area immediately prior to disease outbreak. Plant pathologists will be monitoring this disease in the future to determine if this may be a disease we will have to contend with on a regular basis in the future.

—Dr. Landschoot is associate professor of turfgrass pathology at Penn State Univ.

New diseases greet turfgrass managers in warm-season areas

Two new diseases have been detected in certain southern turf areas, attacking St. Augustinegrass and bermuda.

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■ *Gaeumannomyces*-like fungi are ever-present. They cause root rot diseases on both cool- and warm-season turfgrasses throughout the world. Common diseases on cool-season turf include summer patch and necrotic ring spot on bluegrass species and take-all patch on bentgrass.

Until recently, spring dead spot was the only disease on warm-season turf caused

by *Gaeumannomyces*-like fungi. This disease occurs on bermudagrass in locations where the bermudagrass becomes dormant due to cold temperatures. It is known to be caused by three different fungi in the US:

● *Gaeumannomyces graminis* var. *graminis* (*G.g. graminis*);

● *Leptosphaeria korrae* and

● *Ophiospherella herpotricha*.

Exactly which pathogen is causing the
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Take-all patch of St. Augustinegrass: yellow, thinning turf in irregular patches.



Bermudagrass decline has been observed exclusively on putting greens.

problem seems to depend on the geographic location of the bermudagrass.

Two new diseases can now be added to the list. One is take-all patch of St. Augustinegrass (the proposed name), caused by *G.g. graminis*. This same fungus causes bermudagrass decline, a disease observed exclusively on golf course putting greens.

Both diseases primarily occur during the summer and early fall, when the weather is typically hot and humid throughout the Southeast. It is suspected that the root rot observed on zoysiagrass is also caused by *Gaeumannomyces*-like fungi, probably *G.g. graminis*.

Disease symptoms of St. Augustinegrass take-all patch when viewed above ground in sod production fields consist of yellow, thinning turf in irregular patches more than 10 feet in diameter. Roots of plants in these patches are short and rotted, and stolons are easily lifted from the ground. Nodes are often rooted, and black lesions may be observed on the stolons.

Similar symptoms have been observed on residential lawns, except affected areas are circular to irregular in shape and vary in diameter from less than one foot to more than 10 feet. In some cases, the grass will die and "thin out," exposing bare soil; or the grass will appear drought stressed. However, in all cases, the roots are short and rotted, resulting in distinctive black roots.

Stress reduction a key—The disease has been identified in Florida, Alabama and Texas. Since this is a new disease, cultural and chemical control methods have not been determined, but any practice that alleviates stress will be useful.

The symptoms common to take-all patch are similar bermudagrass decline.

Usually, symptoms will first develop on the "clean-up pass" of the putting green, but it can spread across the entire green.

Irregular yellow patches develop first, and, if not treated, plants will die and the turf will gradually "thin out" to bare ground. Again, the roots are short and rotted. The disease may appear similar to nematode damage or pythium root rot. Therefore, it is important to have the cause of the symptoms diagnosed by a pro-

Disease symptoms of St. Augustinegrass take-all patch when viewed above ground in sod production fields consist of yellow, thinning turf in irregular patches more than 10 feet in diameter.

fessional. Preliminary evidence indicates that the best curative or preventive treatment is to maintain a higher height of cut than is normally maintained in the summer months.

Some *Gaeumannomyces*-like fungi cause more than one disease, and some diseases are caused by more than one pathogen. However, the pathogens and the diseases they cause are actually very similar in nature. All of these pathogens are commonly associated with grass roots. Therefore, the potential for disease development is very high. However, the actual disease will depend on the stresses placed on the turf host.

Warm-season disease chart, page 64

Attacks root system—The *Gaeumannomyces*-like fungi live on the outer root surface. The initial root penetration by these fungi may be unnoticeable or, at the most, result in a general discoloration of the root. If conditions are favorable, these fungi penetrate and occupy the vascular tissue of the root, which consists of water-conducting tissue (xylem) and carbohydrate-conducting tissue (phloem). Above-ground symptoms still may not be evident at this time. However, a plant with a damaged root system is more susceptible to stress than a healthy plant, because it has to work harder to obtain nutrients and water from the soil and is not able to store carbohydrates produced by the leaf tissue.

Whether the disease progresses or not depends upon accompanying plant stress. Lower stress will result in a patch that shows no symptoms above ground, despite having an infected root system. A high-stress situation, if not alleviated, will kill the plant.

Under high stress, the root, stolons and rhizomes continue to rot and become dysfunctional, resulting in the characteristic "patches" of dead or damaged turf associated with the diseases caused by *Gaeumannomyces*-like fungi. Because these pathogens move slowly through the root system and not the leaves, these patches often appear yearly in the same location.

The three components required for any disease are:

- a susceptible host;
- a virulent pathogen; and
- a conducive environment.

With patch diseases, once the *Gaeumannomyces*-like fungi and turf host are established on the site, the only thing that changes is the environment, usually the micro-environment surrounding each turf plant or group of plants. Thus, cultural control methods are the best control methods for patch diseases because they are usually aimed at affecting a change in the turf environment. Most evidence indicates that systemic fungicides are effective only as preventive medicine. In other words, the fungicide must be applied before severe symptoms develop.

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Diagnostic Features of Prevalent Warm-Season Turfgrass Diseases

Disease	Causal agent(s)	Symptoms/signs	Susceptible grasses
Bermudagrass decline	<i>Gaeumannomyces</i> spp. or similar fungi as yet undetermined.	Begins as small, irregular, yellow patches which expand and thin-out as grass dies. Roots are short, thin and rotted, usually observed first at edges of putting greens.	bermudagrass*
Brown patch (Rhizoctonia blight); Rhizoctonia leaf and sheath spot	<i>Rhizoctonia solani</i> , <i>R. zeae</i> , <i>R. oryzae</i>	Begins as small, circular light green patches that turn yellow and then brown or straw-colored. Patches expand to several feet in diameter. Turf at outer margin of patch may be dark and wilted (smoke ring). Whole leaf facsimiles pull up easily due to basal rot of leaf sheath. Aerial blight common with centipedegrass and St. Augustinegrass. In warm months, may also observe light-brown foliar lesions.	Bahiagrass, bermudagrass, centipedegrass*, St. Augustinegrass* zoysiagrass*
Gray leaf spot	<i>Pyricularia grisea</i>	Lesions begin as small, brown spots that expand into oval areas with tan centers and dark and purple or brown margins. Yellow halo may be present. During warm, humid weather, lesions covered with gray velvet mat of mycelium. Leaves wither, resulting in scorched appearance.	St. Augustinegrass*. Yellow-green cultivars are less susceptible than blue-green/bitter-blue cultivars. St. Augustinegrass treated with the herbicide atrazine is more susceptible.
Helminthosporium leaf spot/melting-out	<i>Bipolaris</i> , <i>Drechslera</i> and <i>Exserohilum</i> spp. (previously <i>Helminthosporium</i> fungi); and <i>Curvularia</i> spp.	Leaf spot symptoms vary with specific pathogen and host from small, solid brown to purple lesions to expanded lesions with bleached centers that girdle the leaf blade. Severely infected leaves turn reddish-brown to straw color. 'Melting-out' occurs under severe infection as turf areas thin and die. Lesions on stems are dark purple to black. Crown and root rots will also occur.	bermudagrass*, St. Augustinegrass, zoysiagrass
Pythium root rot	<i>Pythium</i> spp.	General turf browning and thinning. Roots appear thin with few root hairs and have a general discoloration. Turf does not respond to N applications.	All warm-season turfgrasses are susceptible.

* Most susceptible species

Control Strategies for Prevalent Warm-Season Turfgrass Diseases

Disease	Cultural control	Chemical control	Resistant species/varieties
Bermudagrass decline	Aerate and topdress greens monthly during late spring, summer and early fall. Apply $\text{NH}_4\text{-N}$ rather than $\text{NO}_3\text{-N}$. Balance N with K and apply micronutrients. Raise mowing height during outbreaks.	benomyl; fenarimol; propiconazole; thiophanate methyl, triadimefon	No resistant cultivars available.
Brown patch	Avoid excess N, especially readily available forms of N. Avoid excess irrigation.	anilazine; benomyl; chlorothalonil; iprodione; maneb; mancozeb; PCNB; thiophanate methyl; thiram. Do not use benomyl or thiophanate methyl if causal agent is <i>R. oryzae</i> or <i>R. zeae</i> . Use fenarimol, propiconazole and triadimefon as preventive, not curative compounds.	No resistant species are available.
Gray leaf spot	Avoid excess N. Irrigate deeply and only when necessary.	chlorothalonil; propiconazole; thiophanate methyl + mancozeb	Yellow-green cultivars of St. Augustinegrass are less susceptible. St. Augustinegrass treated with the herbicide atrazine is more susceptible.
Helminthosporium leaf spot/melting-out	Avoid excess N. Balance fertility components. Irrigate deeply and less frequently. Avoid thatch accumulation. Raise mowing height during disease outbreaks.	anilazine; chlorothalonil; iprodione; maneb; mancozeb; propiconazole; vinclozolin	No resistant species are available.
Pythium root rot	Improve drainage, aerate and reduce irrigation.	chloroneb; ethazol; metalaxyl; fosetyl-AI; propamocarb. Except for fosetyl-AI, these fungicides should be watered into the rootzone.	
Spring dead spot	Avoid low mowing heights, thatch, compaction and excess N.	benomyl; fenarimol; propiconazole; thiophanate methyl	No resistant species of bermudagrass are available.

Source: Dr. Elliott