Anthracnose of Bentgrass and Annual Bluegrass Putting Greens

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Annual bluegrass and creeping bentgrass putting greens are susceptible to turfgrass anthracnose, a disease caused by the fungus *Colletotrichum cereale* (formerly called *Colletotrichum graminicola*). This fungus is sometimes found on dying leaves of Kentucky bluegrass and tall fescue during periods of heat or moisture stress, but is not considered a serious problem on these turfgrass species.

Symptoms

Anthracnose may occur throughout the growing season but is most common in the heat of summer. From a distance, affected turf appears unhealthy and has a yellow or bronze cast (Figure 1). The turf wilts rapidly during midday and requires frequent irrigation. The disease is worse on annual bluegrass than bentgrass.

Distinct leaf spots are not formed. Instead, individual leaf blades fade from dark to light green and then yellow. The youngest leaf is the last to change color. The fungus produces black structures (called acervuli) with spiny hairs (called setae) on leaves and crowns that are easily visible with a 10X hand lens (Figures 2 and 3). Acervuli can be found on naturally senescing (dying, old) tissue, where *Colletotrichum* is a secondary pathogen. Visible acervuli on green tissue strongly indicate that anthracnose is the primary pathogen.

Basal crown rot occurs when the anthracnose fungus infects the crown. Plants with basal crown rot are killed, resulting in a thinning of the turfgrass. Acervuli and small, black fungal resting structures are visible with a hand lens (Figure 4).

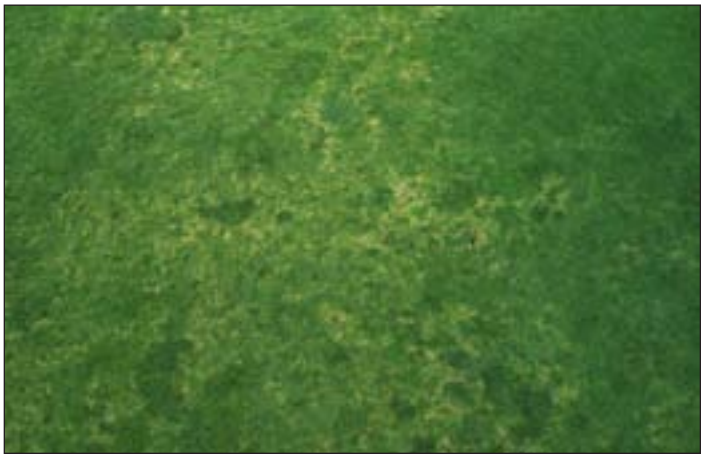

Figure 1. Bronze cast on a mixed bentgrass/annual bluegrass green. Photo courtesy PACE Turfgrass Research Institute. (www.paceturf.org)

Figure 2. Black spore-producing structures (acervuli) mark the spore-producing bodies on the yellow leaves. Photo courtesy PACE Turfgrass Research Institute. (www.paceturf.org)

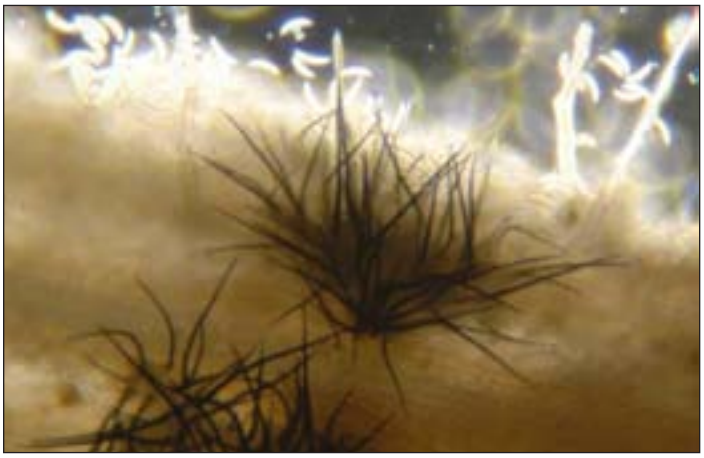

Figure 3. Close-up view of spiny hairs (setae). Photo courtesy PACE Turfgrass Research Institute. (www.paceturf.org)

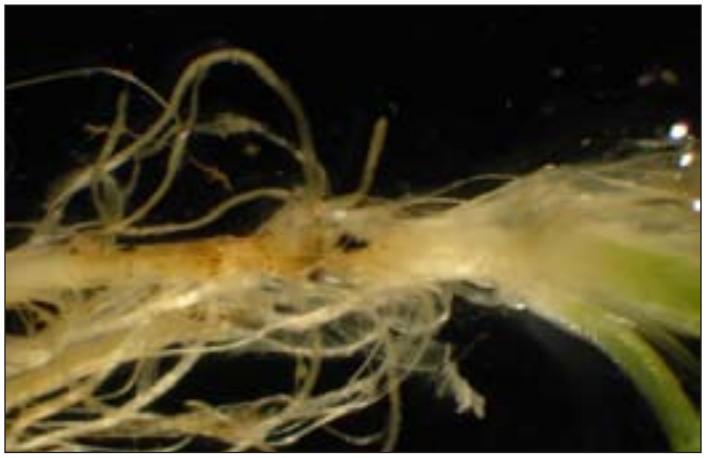

Figure 4. Black fungal growth is visible on the crown in the basal rot phase of anthracnose. Photo courtesy PACE Turfgrass Research Institute (www.paceturf.org).

Control

Anthracnose is difficult to control after symptoms appear. The best strategy is to prevent anthracnose by alleviating the underlying stresses that trigger disease development.

Nutrition: Do not starve the turf during the summer months. Light, frequent fertilizations may help the turf withstand stresses and recover quickly from anthracnose damage. For example, in recent studies at Rutgers University, maintaining nitrogen at 3.0 pounds per 1,000 square feet per year was key to anthracnose management. During summer months, weekly applications of nitrogen at 0.1 pounds per 1,000 square feet reduced disease by 25 to 73 percent compared to the same amount applied monthly. A good strategy is to apply about 0.5 pounds nitrogen per 1,000 square feet per month divided into weekly or biweekly applications.

Mowing: Low mowing heights can increase anthracnose development. At heights at or below ⅛ (0.125) inch it is extremely difficult, or even impossible, to prevent anthracnose with fungicides. Recent studies at Rutgers, The State University of New Jersey, indicate that raising the mowing height slightly (as little as 0.015 inch) can decrease anthracnose severity. In those same studies, contrary to expectations, increasing the *frequency* of mowing (double-cutting) did *not* increase the disease severity. Use walk-behind mowers on greens with a history of the disease. Also mow the perimeter of the green (the so-called clean-up lap) every other day to prevent compaction. If anthracnose is present, do not mow when the greens are wet.

Other Cultural Practices: Anthracnose tends to be more severe on putting greens with poor air movement and poor drainage. Don't overwater putting greens: excessive soil moisture may damage roots and decrease photosynthesis. This puts the grass into a highly vulnerable state and predisposes it to anthracnose injury. On greens with a history of the disease, consider a rigorous aerification program in fall and spring. Deep tine or core aerify in the fall. Compacted greens may be periodically aerated by spiking, slitting, or hydro-jecting. It has been assumed that topdressing increases anthracnose by introducing wounds. However, in recent trials at Rutgers, light, frequent topdressing increased anthracnose temporarily but actually reduced it overall later in the summer. Those trials are ongoing and more definitive results will be reported in the coming 1 to 2 years.

Fungicides

Several fungicides (see table) are labeled for anthracnose control. All products work best when applied on a preventive or early curative schedule. Once anthracnose is severe, fungicides are not very effective. Furthermore, some strains of the anthracnose pathogen may be resistant to certain fungicides (see table). Follow label instructions about resistance management. Rotate to different chemistries (different mode of action), and consider tank-mixes with a contact fungicide. Preventive applications of reduced rate tank mixes of a DMI fungicide (see table) and chlorothalonil at 2-week intervals have provided good control of anthracnose in some studies. Remember that high rates of DMI fungicides on putting greens can cause undesired growth-regulator effects especially in summer.

During an anthracnose outbreak avoid excessive "rescue" applications. Superintendents may try multiple products at frequent intervals in the hopes of reversing damage from anthracnose. In most cases, these attempts fail. Anthracnose is almost always associated with an underlying environmental or management-based stress. The most rapid improvement from anthracnose damage occurs following significant (cooler) weather changes and less stressful management practices.

Table 1. Fungicides labeled for anthracnose.

Active ingredient	Fungicide group	Efficacy and notes	Typical application interval (days)	Examples of products
Azoxystrobin*	QoI (strobilurin)	Good to excellent, *at risk for fungicide resistance*	14-28	Heritage
Bacillus licheniformis	Biological control	Limited data available	3-14	EcoGuard
Bacillus subtilis, strain SQT 713	Biological control	Limited data available	7-10	Rhapsody
chlorothalonil	chloronitrile	good	7-14	Daconil Ultrex, Manicure, Concorde SST, Chlorostar, Echo, Pegasus L
fenarimol	DMI	Fair to good, *Possible resistance risk*	30	Rubigan
fludioxonil	Phenylpyrolle	Fair to good,	14	Medallion
fluoxastrobin	QoI (strobilurin)	Limited data available, *at risk for resistance*	14-28	Disarm
hydrogen dioxide	Oxidizing agent	Limited data available	7	Zerotol
myclobutanil	DMI	Fair to good, *Possible resistance risk*	14-21	Eagle
polyoxin D	Polyoxin	Good to excellent	7-14	Endorse
propiconazole	DMI	Good, *possible resistance risk*	14-28	Banner, Spectator
pyraclostrobin	QoI (strobilurin)	Good to excellent, *at risk for fungicide resistance*	14-28	Insignia
thiophanate-methyl	Benzimidazole	Fair to good, *at risk for resistance*	10-14	Cleary's 3336, Fungo, Systec 1998, Cavalier, T-Storm
triadimefon	DMI	Fair/inconsistent, *possible resistance risk*	14-45	Bayleton, Proturf Fungicide VII
trifloxystrobin	QoI (strobilurin)	Good to excellent, *at risk for resistance*	14-21	Compass
triticonazole	DMI	Good to excellent, *possible resistance risk*	14-28	Trinity

* Resistance to azoxystrobin and thiophanate methyl has been reported in several states. Other QoI (strobilurin) fungicides have the same mode of action as azoxystrobin and might also be at risk. DMI resistance was reported in California in 2007. Follow labeled instructions for resistance management for all fungicides.

Table modified with permission from *Chemical Control of Turfgrass Diseases 2008* by P. Vincelli and A.J. Powell, University of Kentucky.

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