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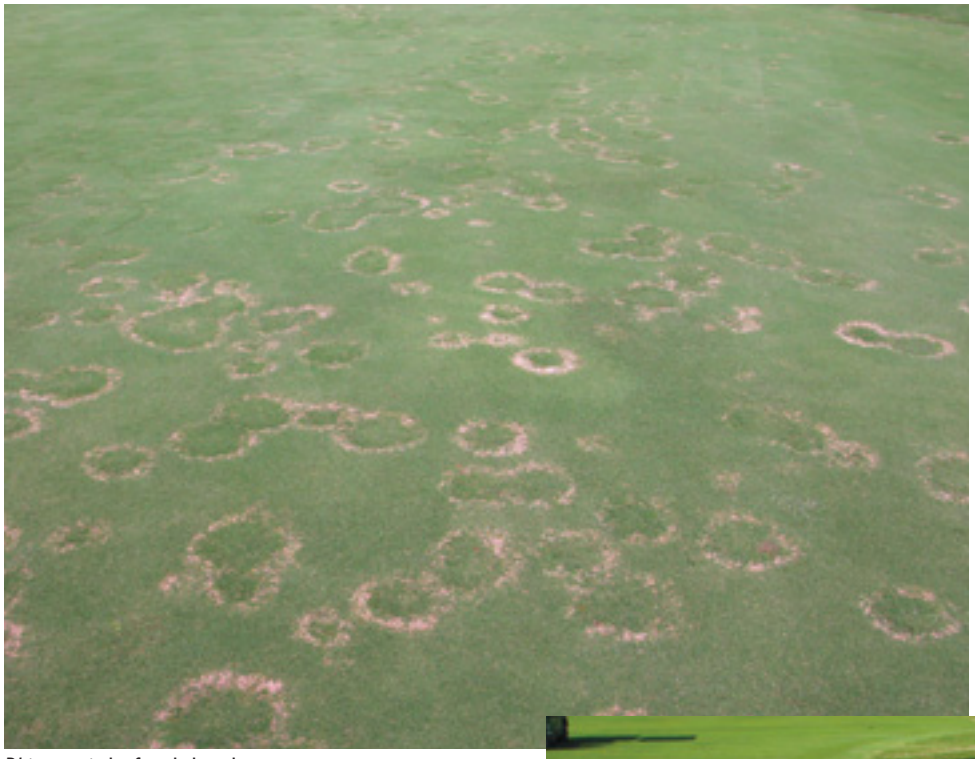
Leaf and Sheath Blight of Bermudagrass Putting Greens

Clemson University scientists investigate how to manage this increasingly serious disease of southern putting greens.

BY BRUCE MARTIN AND DARA PARK



Rhizoctonia leaf and sheath spot on an ultradwarf bermudagrass putting green.

OBJECTIVES

- Collect isolates of *R. zeae* from symptomatic bermudagrass and complete Koch's postulates in greenhouse tests.
- Determine the influence of Primo, thiophanate-methyl, and Heritage treatments on disease severity.
- Determine the effects of various rates of N and K on disease severity and control.

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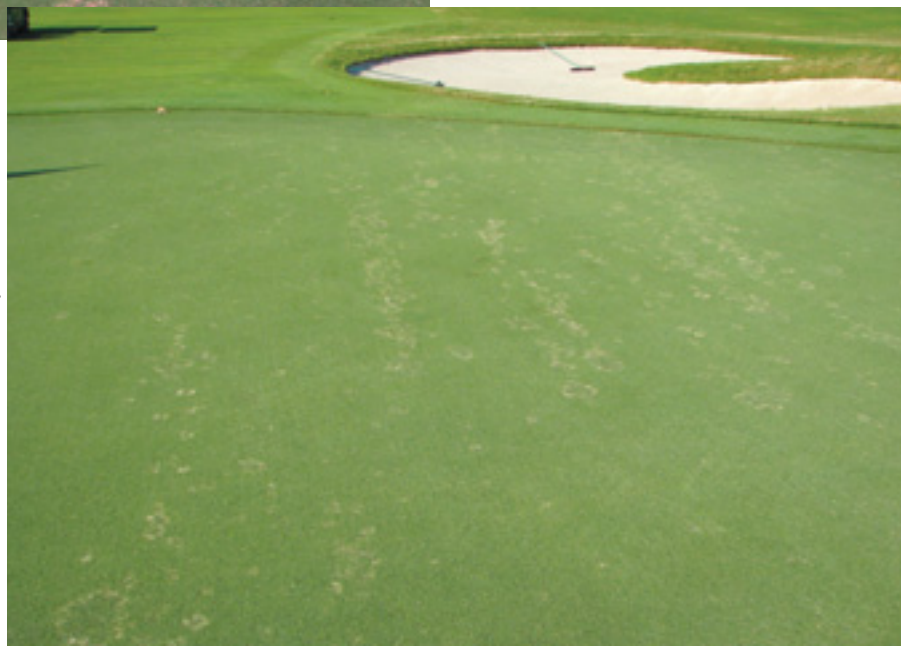
In recent years, there has been an increasing frequency of occurrence of leaf and sheath blight caused by *Rhizoctonia zeae* (or related fungi) on

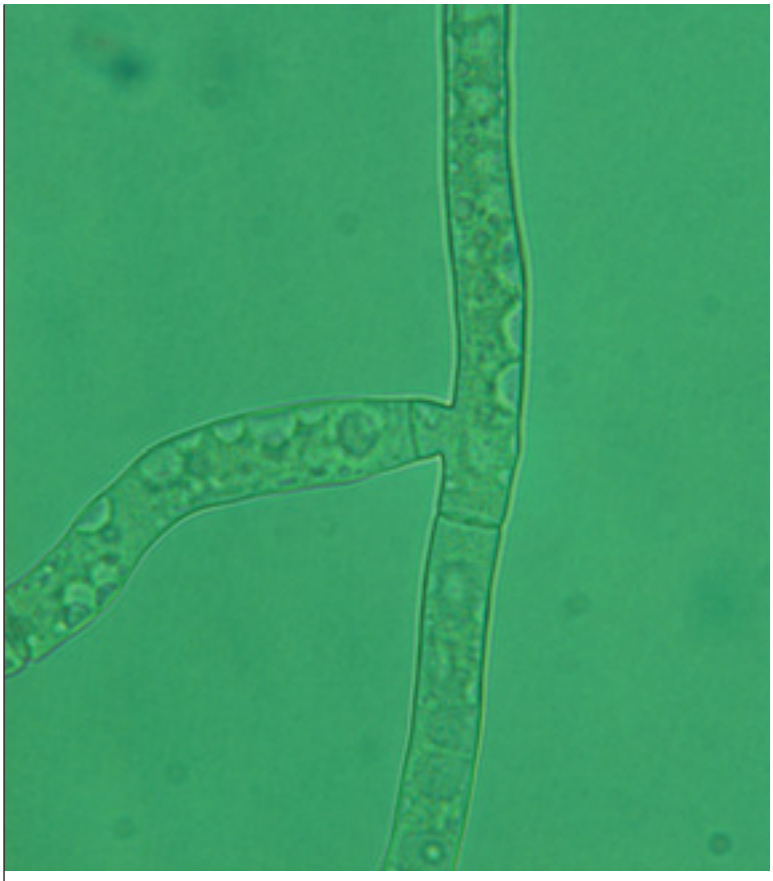


In South Carolina, *R. zeae* is a well-documented pathogen of creeping bentgrass putting greens, causing brown-patch-like symptoms in the heat of summer. It also has frequently caused similar symptoms in overseedings (primarily *Poa trivialis*) in the fall and spring when temperatures are warm and humidity is high and prolonged.

bermudagrass putting greens. Some have called the disease "mini-ring," but this is a misnomer since the disease was unknown. In the late 1990s, Dr. Monica Elliott (Florida) and Dr. Bruce Martin (South Carolina) observed the disease on Tifdwarf bermudagrass putting greens. In South Carolina, *R. zeae* is a well-documented pathogen of creeping bentgrass putting greens, causing brown-patch-like symptoms in the heat of summer. It also has been seen frequently causing similar symptoms in overseedings (primarily *Poa trivialis*) in fall and spring when air temperatures are warm and humidity is high and prolonged. The fungus has been identified and pathogenicity documented as well on St. Augustinegrass, centipedegrass, and seashore paspalum. In all cases the disease has not been controlled with benzimidazole fungicides, as *R. zeae* is essentially immune to that chemistry.

Recent outbreaks have occurred on all of the common ultradwarf bermudagrass cultivars on putting greens (Tifeagle, Champion, and Mini-Verde) as well as TifDwarf and even TifGreen in the southeastern United States. Although timing varies, generally the disease is first noticed in late August to early fall months. Initial symptoms are bronze patches of a few inches up to 36 inches or more in diameter. If not controlled quickly with fungicides, the pathogen blights and bleaches the lower leaves, which results in a persistent, distinct patch symptom that is very hard to heal when days become shorter and night temperatures cool. The difficulty in healing the disease is more problematic in transition-zone climates than in more tropical or subtropical environments where turf recuperative potential is prolonged. Disease has been known to recur in spring months after turf emerges from dormancy, and, presumably, it can affect spring transition in overseeded systems.

Why are these new outbreaks increasing in frequency? Possible reasons include: reduced fertility, nutrient deficiency due to increased irrigation of sand-based greens planted to shallow-rooted ultradwarf bermudagrass cultivars, or increased use of thiophanate methyl in summer for bermudagrass decline, thereby inducing an increase in this non-target disease. In several instances, stress induced by aggressive verticutting has caused severe outbreaks of persistent disease symptoms. Low nutrition or reduced recuperative potential due to any of the reasons outlined would be expected to increase disease severity.



Species of *Rhizoctonia* are composed of mycelia and sclerotia only in the asexual state, so characteristics are few that can be used taxonomically. The characteristics that can be used to identify fungal mycelia as a species of *Rhizoctonia* include lack of spores, septate hyphal strands (contains cross walls between hyphal cells), and lack of clamp connections (a microscopically visible bridge across septa). The mycelia of *R. solani* (left) have right-angle branching, constriction of hyphal branches near their origin, and hyphal cells containing many nuclei.

In the summer and fall of 2008, the disease again occurred on several golf courses in South Carolina and throughout portions of the southeastern United States. Cultivars were TifEagle, Champion, Tifdwarf, Miniverde, and Tifgreen. Again *Rhizoctonia zeae* was isolated from a few samples when they were submitted to the lab before treatment with fungicides. Identification of *R. zeae* has been based solely on cultural characteristics, primarily on sclerotia size and abundance (*R. zeae* typically has multiple very small sclerotia, in contrast to *R. circinata* or *R. oryzae*). Recently, however, molecular methods have been used to distinguish among *R. zeae*, *R. oryzae*, and *R. circinata*. Cultures have been recovered from bermudagrass patches that resemble (culturally) all three of these fungi. Molecular identification of these isolates was conducted during the winter of 2008.

In 2007, three trials were conducted but went out curatively after symptoms became well established. Trials were placed in late September (Experiment 1) and late October (Experiment 2), when symptoms were severe and day length and temperatures were not favorable for bermudagrass growth. In 2008, trials were conducted on a chipping green in Columbia, South Carolina, and a putting green near Florence. Intentions were to initiate the trials in July, prior to symptom expression, but symptoms already were

CONNECTING THE DOTS

An interview with Dr. Bruce Martin *regarding leaf and sheath blight of bermudagrass putting greens.*

Q: *Why has leaf and sheath blight of bermudagrass increased in recent years?*

A: Although not a proven link to outbreaks, we think that superintendents, in general, limit the growth of putting green turf by consistent low cutting heights, reduced fertility, and use of growth regulators. Also, nutrient deficiency, induced by increased irrigation of shallow-rooted bermudagrass cultivars, may be connected to symptom persistence. This disease has been known for some time, but outbreaks have become more challenging to prevent and control once symptoms become well established. In fact, the fungus may be controlled by a number of fungicides, but the factors outlined above limit the ability of the plant to recover.

Q: *The causal organism for leaf and sheath blight of bermudagrass,* Rhizoctonia zeae, *is the same fungal pathogen that causes patch symptoms in some cool-season turfgrass species. Are the infection symptoms similar on bermudagrass?*

A: Yes, in general the symptoms are very similar: ring-like patches are produced by *Rhizoctonia cerealis* that causes yellow patch in cool-season grasses. These symptoms also are produced by infections from *Waitea (Rhizoctonia) circinata*, which causes brown ring patch in *Poa annua*. And *R. zeae* causes *Rhizoctonia* leaf and sheath spot in bentgrass during the heat of summer months that frequently exhibit symptoms of bronze rings or patches. In fact, infections on bentgrass in summer and bermudagrass are similar in timing.

Q: *What are your current management recommendations for superintendents?*

A: Try to eliminate as much stress as practical by raising the cutting height, incorporating rolling for green speed and consistency, and judiciously applying complete fertilizers to promote some growth for recovery. Incorporate the use of slow-release fertilizers so that nutrient deficiencies are less likely. Aggressive cultural practices, such as aeration and verticutting, should be completed by early August in transition-zone climates to give the turf time to recover. Fungicides such as Heritage, Prostar, Banner, and Headway (combination of azoxystrobin and propiconazole) have shown some efficacy when applied quickly, after initial symptoms have developed, or preventively.

Q: *Your data suggest that watering-in fungicide applications reduces disease symptoms. How much difference does this make, and was watering-in effective to reduce disease symptoms for all fungicide treatments?*

A: More work needs to be done on application timing, water volume used, and post-application irrigation. In our trials, we saw a significant reduction in symptoms, but not complete elimination of symptoms by irrigation after application. This implies that infections are in the lower leaf sheath/upper rootzone, which is supported by our isolations from infected bermudagrass plants.

Q: *What is the geographic distribution of the collected isolates?*

A: We have isolates from North Carolina, South Carolina, Georgia, Florida, Mississippi, Alabama, Louisiana, and Texas. All of these states have seen the disease, and it is likely the disease has occurred in Argentina, Uruguay, Thailand, and China (based on symptoms through digital photography).

Q: *Does nutrient management appear to be part of the answer?*

A: More work is needed on this, but superintendents managing this disease should increase their fertility programs and incorporate slow-release potassium (K) in an attempt to avoid deficiencies, as it seems to be helping along with other cultural practices outlined above.

Q: *If superintendents want to scout for early developing symptoms, what are the timing and visual clues?*

A: They should be aware of symptoms that can occur at any time the bermudagrass is green and growing, but particularly during mid-to-late summer. The initial symptoms are light yellow to bronze rings that may be a few inches in diameter up to a foot or more in diameter. A sample should be taken immediately before applying fungicides and submitted to a lab (with digital photographs of symptoms) in which the superintendent has confidence. They should treat quickly after confirming the diagnosis.

Jeff Nus, Ph.D., *manager, USGA Green Section Research.*

present when the trials were established (symptoms showed earlier than usual). Only Heritage gave some control in the single component fungicide trial. In another experiment, however, we looked at a program approach, rotating fungicides and fungicide mixtures with one set of treatments watered-in before sprays dried and the other set left on the leaf. We did observe that watering-in the fungicides made a positive difference, and these trials gave us some evidence that preventive treatments have to be initiated much earlier than we first supposed.

SUMMARY POINTS

- Leaf and sheath blight caused by *Rhizoctonia zeae* and related fungi on bermudagrass putting greens has not been controlled with benzimidazole fungicides.
- Molecular methods have been used to distinguish among *R. zeae*, *R. oryzae*, and *R. circinata* and were conducted during the winter of 2008.
- Fungicide trials were conducted in 2007 and 2008. Only Heritage gave some control in the single-component fungicide trial.
- Watering-in fungicides made a positive difference and suggested that preventive treatments have to be initiated much earlier than first supposed.

RELATED INFORMATION

http://turf.lib.msu.edu/ressum/2008/69.pdf

Bruce Martin, Ph.D., *professor, Turfgrass Pathology, Pee Dee Research and Extension Center; and* Dara Park, Ph.D., *assistant professor, Turfgrass Soil and Water Quality, Department of Horticulture; Clemson University, Clemson, S.C.*