Growth and Pathogenicity of Ophiosphaerella agrostis *and Epidemiology of Dead Spot, a New Pathogen and Disease of Creeping Bentgrass*

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Objectives:

1. Develop a dead spot disease cycle based on field environmental monitoring data and observation.
2. Determine conditions that are necessary for ascospore development and dispersal.
3. Determine genetic variation and develop species-specific primers for *O. agrostis.*
4. Determine the effect of various fertilizers on the incidence, severity, and recovery of bentgrass from dead spot.

Start Date: 2001
Project Duration: 3 years
Total Funding: $87,000

Creeping bentgrass is a widely used turf species on golf course putting greens throughout the United States. Dead spot is a relatively new disease of creeping bentgrass, which is incited by *Ophiosphaerella agrostis*. The prominent use of creeping bentgrass on golf courses makes this disease a potentially serious problem, particularly on relatively young greens. The second phase of this project will investigate the epidemiology and cultural management of dead spot and provide a molecular description of the pathogen.

In the Mid-Atlantic region, initial disease symptoms appear between mid-May and early June. Release of ascospores provides a primary and secondary source of inoculum. Ascospore release is influenced by environmental conditions was assessed. Major ascospore release events (>200 ascospores per hour) generally occur at dawn and dusk and during rain events or periods of extended leaf wetness.

Infection was greatest between late June and early August, but no new infections generally occur after early October. Field-generated environmental monitoring data indicate that new infection centers develop two to four days following periods of extended leaf wetness and average air temperature between 18 and 27 C. The pathogen can be found throughout all plant tissues during the summer, but survives winter as mycelia in creeping bentgrass crowns, stolons, and roots and from overwintering pseudothecia.

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All nitrogen fertilizers (n=9) evaluated in a field study aided in the autumn recovery of bentgrass affected by dead spot. Nitrate- and urea-based N-sources enhanced the recurrence of the disease in the second year of the study. Applications of ammonium sulfate resulted in no new infection centers in the second year and also was shown to suppress yellow patch (*Rhizoctonia cerealis*), algae, and sod webworm (*Crambus spp.*).

Unlike other turfgrass pathogens within the genus Ophiosphaerella, O. agrostis *commonly produces flask shaped fruiting bodies known as pseudothecia on necrotic leaf, sheath and stolon tissue.*

Species-specific primers were developed and currently are being used to test for the presence of the pathogen in commercially available bentgrass seedlots. Genetic diversity among 78 *O. agrostis* isolates from various geographic regions currently is being investigated by amplified fragment length polymorphism (AFLP). All data will have been collected by December, 2003, but statistical analyses of most data has not been completed.

Nitrate- and urea-based N-sources enhanced the recurrence of the disease in the second year of the study. Applications of ammonium sulfate resulted in no new infection centers in the second year.

Summary Points

- Initial dead spot symptoms appear between mid-May and early June and was greatest between late June and early August, but no new infection centers appeared after early October.
- The pathogen rapidly produces prodigious numbers of ascospores which can germinate within two hours in the presence of bentgrass leaves and roots.
- During the winter months, the pathogen was commonly isolated from bentgrass crowns, stolons, and roots and from overwintering pseudothecia.
- All nitrogen fertilizers evaluated in a field study aided in the autumn recovery of bentgrass affected by dead spot. Nitrate- and urea-based N-sources, however, enhanced the recurrence of the disease in the second year of the study. Applications of ammonium sulfate resulted in no new infection centers in the second year
- Genetic diversity among 78 *O. agrostis* isolates from various geographic regions currently is being investigated by amplified fragment length polymorphism (AFLP).