Infection and Colonization of Bermudagrass by Ophiosphaerella herpotricha*, the Causal Agent of Spring Dead Spot*

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Objectives:

1. To transform *O. herpotricha* to express fluorescent protein genes.
2. Evaluate infection and colonization of bermudagrass cultivars at different temperatures.
3. Evaluate differences in infection and colonization between bermudagrass cultivars that vary in disease susceptibility.

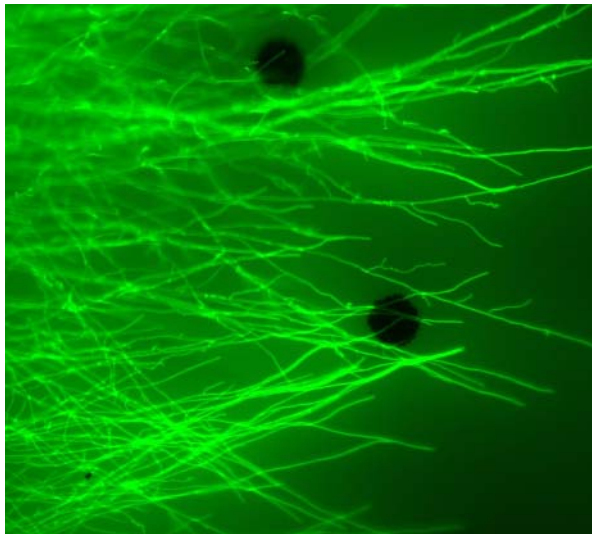
Start Date: 2006
Project Duration: three years
Total Funding: $59,684

The most devastating and important disease of bermudagrass where it goes dormant in the winter, is spring dead spot. The disease is caused by one or more of three fungal species in the genus *Ophiosphaerella* (*O. herpotricha, O. korrae, or O. narmari*). The disease results in unsightly dead patches on fairways, tees, and bermudagrass greens, the encroachment of weeds, and an increase in management efforts to eliminate weeds and encourage regrowth of bermudagrass into the dead areas.

Despite the identification of the causal agents of the disease since the 1980s, the underlying factors that ultimately lead to death of the plants are poorly understood. A critical limitation to the study of turfgrass root diseases is the inability of researchers to rapidly and easily study the plant-fungus disease interaction because it happens below ground and often inside of roots. The overall goal of this study is to enhance our understanding of the interaction between *O. herpotricha* and its bermudagrass host and how environmental factors influence this interaction through the manipulation of genes in the fungus.

The first objective of this research uses a novel gene transformation system to insert a variety of fluorescent protein genes (visualization genes) into the causal fungus, *O. herpotricha.* In this system, a gene encoding a fluorescent protein will be under the control of a strong constitutive promoter gene that will cause the fungus to fluoresce. The expression of these fluorescent proteins permits the visualization of the fungus from bermudagrass roots allowing studies on disease progression and how various conditions prevent or promote disease.

The transformed fungi will be inoculated onto the bermudagrass cultivars 'Tifway', a susceptible host, and 'Midlawn', a cultivar that is less severely injured by the disease. Differences in disease reaction between the two cultivars and the influence of temperature on the disease will be evaluated at the cellular level.



Expression of fluorescent proteins permits the visualization of the fungus from bermudagrass roots.

To study the progression of disease, a confocal scanning laser microscope will be used to optically section infected roots, producing 3-dimentional images of the fungus as it moves in and on bermudagrass roots. We expect to observe cellular differences in the infection and colonization of bermudagrass cultivars that differ in susceptibility to *O. herpotricha*. This basic information on how the cultivars react to the causal fungus will improve our ability to deploy and enhance host-plant resistance through traditional breeding efforts at Oklahoma State University.

The most devastating and important disease of bermudagrass is spring dead spot.

Summary Points

- Fluorescent protein genes have been introduced into and expressed by *O. herpotricha*, the causal organism of bermudagrass spring dead spot.
- The fluorescent fungi are being used to study the progression of disease on bermudagrasses that differ in susceptibility to the disease.
- This information will be used to enhance host-plant resistance through traditional breeding efforts at Oklahoma State University.