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

Spring dead spot is the most devastating and important disease of bermudagrass that undergoes winter dormancy. 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, giving way to the encroachment of weeds and costly management efforts to eliminate weeds and reestablish grass in the affected area.

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 and host factors influence this interaction.

We have inserted two different fluorescent reporter genes (red and green) into the fungus and examined root and stolon infection of various bermudagrasses. For the interspecific hybrid (*Cynodon dactylon* × *C. transvaalensis*) cultivars 'Tifway' and 'Midlawn', root cortical cells were rapidly colonized. However, the root's stele remained uninfected 10 days after inoculation. For a *C. transvaalensis* accession, both the root cortex and stele were colonized by eight days after inoculation. In general, 'Tifway' roots exhibited greater colonization and necrosis than the more tolerant cultivar 'Midlawn' and *C. transvaalensis*, which, though its roots were heavily colonized, exhibited very little necrosis.

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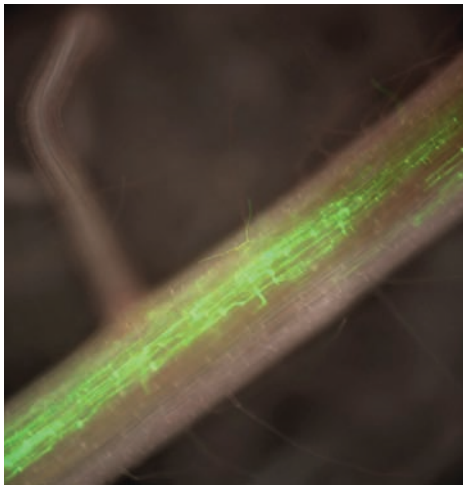
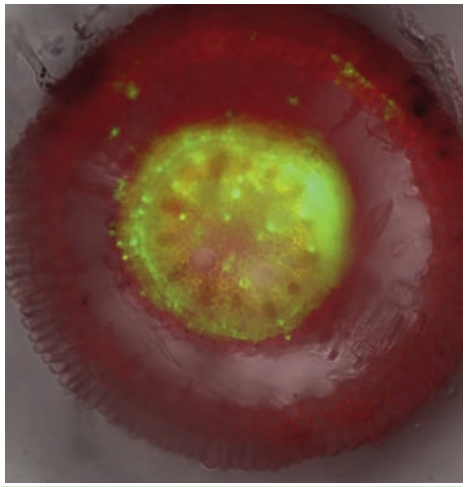


Root cortical cells were rapidly colonized in the interspecific hybrids 'Tifway' and 'Midlawn'.

Additional studies have been conducted on the stolons of these bermudagrasses. When stolons were inoculated on unwounded internodes, very limited epidermal and cortical infections were observed after 28 days for all three bermudagrasses. However, stolons that were root-inoculated six weeks earlier became infected through cut end of the stolon.

For 'Tifway' stolons, infection resulted in internal necrosis and cavities, similar, but less severe response was observed for 'Midlawn', however in *C. transvaalensis*, stolon tissues were colonized without any apparent necrosis.



For a C. transvaalensis *accession, both the root cortex and stele were colonized by eight days after inoculation.*

Ongoing studies using the confocal scanning laser microscope will optically 'section' infected roots and produce 3-dimentional images of the fungus as it moves in and on bermudagrass roots. This basic information on how the cultivars react to the fungus will improve our ability to enhance and deploy host-plant resistance through traditional breeding efforts at Oklahoma State University.

Summary Points

- Fungal colonization of root tissues varied among the bermudagrass cultivars examined.
- Colonization and necrosis of roots was extensive for 'Tifway', less for 'Midlawn', however, limited necrosis occurred for the *C. transvaalensis* accession even though it was extensively colonized.
- Internal colonization of stolon resulted in severe necrosis for 'Tifway' but not for the *C. transvaalensis* accession.
- This information will be used to enhance host-plant resistance through traditional breeding efforts at Oklahoma State University.