Biology and Integrated Management of Rapid Blight, a New Disease of Rough Bluegrass, Perennial Ryegrass, Annual Bluegrass, and Creeping Bentgrass

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Objectives:

1. Conduct studies on the biology of *Labyrinthula* and the epidemiology of rapid blight disease.
2. Determine the role of soil and water conditions on occurrence of rapid blight.
3. Evaluate turfgrass species for their susceptibility to rapid blight and suitability as overseeding grasses.
4. Devise integrated control strategies for management of rapid blight epidemics.

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Project Duration: three years
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Rapid blight is caused by *Labyrinthula terrestris*, a newly described species of net slime-mold. On susceptible cool-season grasses, symptoms appear as irregular patches of chlorotic and necrotic turf, sometimes with water-soaked borders of the patches where disease is most active. Rapid blight can damage juvenile as well as mature turf and has been problematic in overseedings of rough bluegrass and perennial ryegrass on greens, tees, and fairways, as well as on established greens of annual bluegrass in California. In most cases, rapid blight has occurred during drought and affected sites have generally had higher than normal salinity in irrigation water and soil.

Our laboratory has focused on the biology, epidemiology, and control of this new and unique plant disease. In cooperation with the Fungal Genomics Lab at NC State University, we confirmed the identity of the organism genetically and showed it to be in a unique clade within the *Labyrinthulomycota*. Previously, we showed that *Labyrinthula* grows well at 22-26^{o} C and that there is a salinity requirement for growth of the organism *in vitro*. Isolates of *L. terrestris* from East Coast sources generally grew better at higher salinity than West Coast isolates. We showed that most cool-season turfgrasses are susceptible to rapid blight, but slender creeping red fescues, creeping bentgrasses, and some alkaligrasses are the most tolerant and some may be suitable for overseeding in high-risk sites.

During the past year, we have focused on determining the effects of irrigation water salinity on disease severity.

Rapid Blight symptoms appear as irregular shaped patches of chlorotic or darkened turf. Upon close examination, the darkened turf foliage appears water-soaked and plants often are reduced in size.

We used four cultivars each of perennial ryegrass, slender creeping red fescue, and Kentucky bluegrass that had a wide range of susceptibility/tolerance to rapid blight in previous studies. These were irrigated with saline water ranging from 0.2 - 5.0 dS/m and evaluated for leaf chlorosis/necrosis on non-inoculated versus inoculated plants. In these studies, increased salinity also led to increased disease severity in inoculated plants, but more tolerant plants, such as the slender creeping red fescues, required exposure to higher salinity levels to show rapid blight symptoms. Salinity level was highly correlated to rapid blight severity in these studies.

Previously, we have gathered information on soil and water salinity levels associated with known rapid blight outbreaks. We noted that the composition of West Coast irrigation water differed from East Coast sources, with West Coast sources having increased calcium and East Coast sources increased sodium. At equal salinity levels, it was determined that rapid blight was more severe when plants were irrigated with waters higher in sodium. This may have implications on disease occurrence and severity in West Coast locations versus East Coast locations.

We have conducted further experiments on fungicide control to determine if fungicides have indirect effects on plant responses to salinity when inoculated or not inoculated with *L. terrestris*. Interestingly, we determined that strobilurin fungicides vary drastically in efficacy for rapid blight. Pyraclostrobin controls the disease very well, but azoxystrobin does not. Trifloxystrobin is intermediate in disease control. In preliminary experiments, it was determined that disease control with pyraclostrobin was not due to indirect effects on salinity tolerance.

Summary Points

- Results from experiments to evaluate 49 different cool-season turfgrass species for their relative tolerance to the disease indicate that the grass species most tolerant to rapid blight are certain fescues, creeping bentgrasses, and alkaligrasses, while annual and rough bluegrasses, other bentgrasses, and most ryegrasses are quite susceptible.
- Increased salinity led to increased disease severity in inoculated plants, but more tolerant plants, such as the slender creeping red fescues, required exposure to higher salinity levels to show rapid blight symptoms.
- Rapid blight was more severe when plants were irrigated with waters higher in sodium.
- Pyraclostrobin (Insignia) controls the disease very well, but azoxystrobin (Heritage) does not. Trifloxystrobin (Compass) is intermediate in disease control.