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

Bruce Martin and Paul D. Peterson
Clemson University

Objectives:

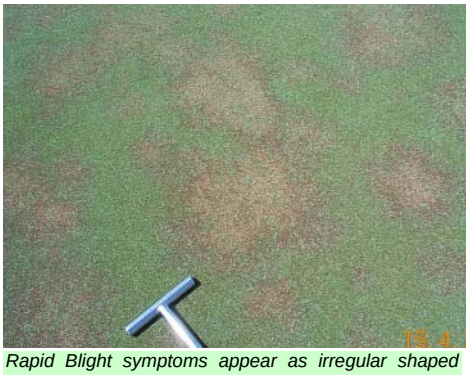
1. Conduct studies on the biology of *Labyrinthula* and the epidemiology of Rapid Blight disease.
2. Determine the role of soil and water conditions on occurrence of Rapid Blight.
3. Evaluate turfgrass species for their susceptibility to rapid blight and suitability as overseeding grasses.
4. Devise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

Start Date: 2003
Project Duration: three years
Total Funding: $77,720

Rapid Blight Disease is causing extensive and costly damage to golf course greens, tees, fairways, and roughs cultured to rough bluegrass, perennial ryegrass, annual bluegrass, and sometimes to creeping bentgrass in the southeastern and western United States.

First diagnosed in 1995 in California on *Poa annua* putting greens, the destructive disease has been identified on over 100 golf courses in 11 states. Rapid Blight is caused by an obscure microorganism known as *Labyrinthula*, also referred to as a net slime mold. The pathogen's ability to survive and cause disease in plants that live in saline environments is one of its major characteristics. 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.

Little work had been done previously on culturing/growing the Rapid Blight organism for the purpose of studying and understanding its biology and epidemiology. Our investigations have allowed us to successfully grow *Labyrinthula* on a special medium composed of horse serum, artificial seawater, antibiotics, and fungicides.

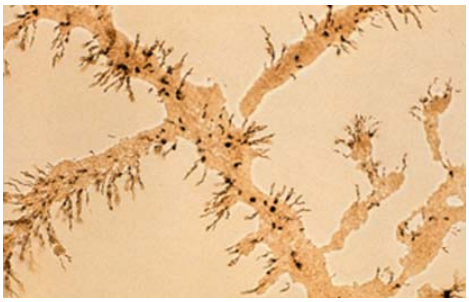


Rapid Blight symptoms appear as irregular shaped patches of chlorotic or darkened turf. Upon close examination, the darkened turf foliage appears water-soaked and plants often are reduced in size.

We also have studied and measured its growth parameters on both solid and liquid media, as well as at different salinity and temperature levels. We have investigated different isolation techniques with infected leaf tissue, agar plugs, and loop-type streaking. In addition to our successful short-term storage techniques, we are investigating medium and long-term storage methods. Our research also has produced successful methods for effective inoculation experiments.

Preliminary data indicate that salinity linked to irrigation water quality plays a major role in disease development. Rapid Blight has been diagnosed primarily in the fall, winter, and spring months, suggesting that cooler temperatures also may promote the disease. We have initiated a nationwide Rapid Blight - Disease, Water, and Soil Survey, with the assistance of USGA agronomists and other turfgrass professionals across the country. We are asking golf courses with suspected Rapid Blight to submit a sample for disease diagnosis and to submit enough water for irrigation water analysis. The response has been very positive, allowing us to gather vital information for a database on soil, water, and timing parameters.

Our studies in laboratory growth chambers have focused on examining the relative susceptibility of various cool-season grasses to Rapid Blight. Preliminary results indicated a high degree of susceptibility in cultivars of rough bluegrass and perennial ryegrass, while certain cultivars of alkaligrass and creeping red fescue appear to contain levels of resistance. This is in agreement with a field trials conducted in the fall of 2001. We proceeded to



Labyrinthula *cells growing in artificial seawater agar. Notice the characteristic streaming of cells.*

screen cultivars and seed lots of rough bluegrass, perennial ryegrass, bentgrasses (velvet, colonial, redtop, creepers), fescues (creeping red, slender, Chewings) , alkaligrass, crested dogtail, and tufted hairgrass.

In 2001, we determined that the fungicides mancozeb, trifloxystrobin, and pyraclostrobin were efficacious in the control of Rapid Blight. Now that the organism can be cultured and the disease induced reliably, greenhouse and growth chamber trials will be conducted to evaluate other chemistries for Rapid Blight control.

Summary Points

- Clemson University researchers are successfully growing *Labyrinthula* on a medium composed of horse serum, artificial seawater, antibiotics, and fungicides.
- Preliminary data indicate that salinity linked to irrigation water quality plays a major role in disease development.
- Researchers have initiated a nationwide Rapid Blight - Disease, Water, and Soil Survey, with the assistance of USGA agronomists and other turfgrass professionals across the country.
- Preliminary results indicated a high degree of susceptibility in cultivars of rough bluegrass and perennial ryegrass, while certain cultivars of alkaligrass and creeping red fescue appear to contain levels of resistance.