

Biology and Management of *Acidovorax avenae*

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Objectives:

1. Determine the distribution of *Acidovorax* and *Xanthomonas* species associated with declining creeping bentgrass putting greens.
2. Conduct growth chamber and field tests to confirm the pathogenicity of bacterial species and closely define the symptoms induced by those that are pathogenic.
3. Determine the specific environmental conditions and cultural practices that are conducive to infection of creeping bentgrass by bacterial pathogens.
4. Identify effective cultural and chemical practices for management of bacterial diseases in creeping bentgrass.

Start Date: 2011

Project Duration: undetermined

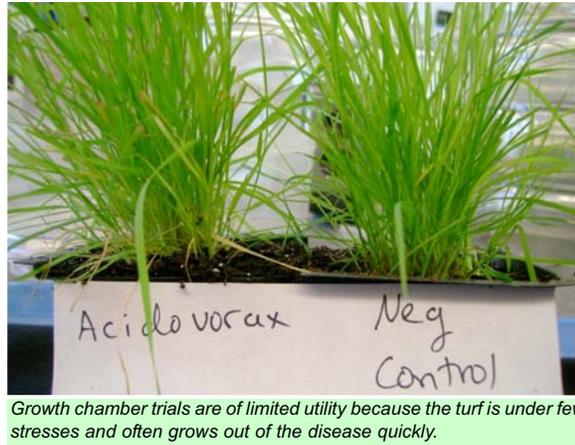
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Bacterial wilt of creeping bentgrass was extremely severe throughout the eastern half of the United States in 2010 as a result of the unprecedented summer heat and humidity. The disease caused significant damage to creeping bentgrass greens from Maine to South Carolina. In 2011, conditions were less severe in the Northeast, but southern and midwestern courses continued to experience a dramatic decline in turf quality as the disease progressed into the summer months. There are no chemical pesticides labeled for the control of the disease.

During the summer and fall of 2010, 14 different *Acidovorax avenae* isolates were collected at the University of Rhode Island from Connecticut, Massachusetts, Rhode Island, New York, New Jersey, Pennsylvania, Ohio, Illinois, and Virginia. The bacteria were subjected to ELISA and PCR testing, both of which uniformly identified the isolated bacteria as *Acidovorax avenae*.

Once identified, three of the isolates were then inoculated onto grasses in the growth chamber setting to determine pathogenicity. The bacteria were fully pathogenic on the following bentgrass varieties: 'PennA4', 'South Shore', 'Crenshaw', 'Providence', 'Mackenzie', 'L93', 'Cato', 'SR1150', 'Penncross', 'Pennlinks', 'Penneagle', 'SR7200' (velvet bentgrass), 'Exeter' (colonial bentgrass), and 'Alistar' (colonial bentgrass). The isolates were moderately pathogenic on annual ryegrass and non-pathogenic on *Poa annua*, Kentucky Bluegrass (variety 'Nuglade'), perennial rye (variety 'Turf Star'), tall fescue (variety 'Pixie') and fine fescue (variety 'Cindy Lou').

The most promising material for



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control of the disease is currently Actigard (acibenzolar-S-methyl), which is currently marketed for turf in combination with chlorothalonil and is being called Daconil Action. During the summer of 2011 we ran a number of trials in the growth chamber to measure the effect of both this product and Primo Maxx (trinexapac-ethyl) on disease progression.

While anecdotal information has suggested that Actigard could lessen disease symptoms, other information suggested that Primo could exacerbate symptoms. Unfortunately, *Acidovorax avenae* appears to be a relatively mild pathogen when plants are in good health (that is, when they are cut at 1/2" or higher, receive no traffic, are not cut regularly and are well fertilized and watered). When plants are infected in the growth chamber, our experience has been that infected leaves die back quickly, but uninfected leaves quickly replace them, resulting in short-lived symptoms and quick recovery. This limits the utility of growth chamber studies.

No field trials were conducted at URI in 2011 as a result of much milder environmental conditions and the lack of disease expression in general. The results of the growth chamber studies indicated that Daconil Action could dramatically reduce symptoms to very low levels, (less

than 15% symptoms compared to 65% in the controls) when applied preventatively. Unfortunately, curative trials failed to show a difference between the control and Daconil Action-treated plants because all plants recovered within 2 weeks of inoculation.

Observations of golf courses that used Daconil Action curatively during the summer of 2011 did demonstrate noticeable improvement on greens that were infected

with the pathogen. Growth chamber experiments with Primo Maxx did not demonstrate any increase in disease symptoms, yet superintendents continue to report a correlation between Primo use and bacterial wilt symptom development.

Summary Points

- Bacterial wilt of bentgrass is caused by *Acidovorax avenae* (presumably variety *avenae*) and is widely distributed throughout the United States, where it causes a wilt and decline of creeping bentgrass.
- The pathogen can attack any variety of creeping bentgrass but does appear to be more aggressive on selected clones when it occurs in the field.
- The pathogen does not attack annual bluegrass or other turf type grasses.
- Disease is highly dependent upon prevailing weather conditions and health of the turf. Highly stressed turf under high temperature is most likely to see damage.
- Growth chamber trials are of limited utility because the turf is under few stresses and often grows out of the disease quickly.
- Daconil Action is highly effective at limiting disease symptoms when applied preventatively, and Primo Maxx does not appear to increase disease symptoms.