

# Management of Bacterial Wilt of Creeping Bentgrass caused by *Acidovorax avenae* on golf courses in the Eastern United States

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Start Date: 2012  
Project Duration: 3 years  
Total Funding: \$43,542



Turfgrass and Environmental Research Online  
Volume 14, Number 2 | March—April 2015

## Objectives:

1. *To identify specific pesticides or other plant health promoting materials that can reduce the severity of bacterial wilt symptoms on golf course putting greens.*
2. *To determine the effect of plant growth regulators on the incidence, severity and occurrence of bacterial wilt on golf course putting greens.*
3. *To identify cultural practices that may limit the spread and severity of the disease on golf course putting greens.*

During the 2014 field season, bacterial wilt management trials were established at Saucon Valley Country Club in Bethlehem, PA, Rye Golf Club in Rye, NY and at the Skogley Turfgrass Research Facility at the University of Rhode Island in Kingston, RI. Trials were conducted on operational greens with a previous history of the disease and the URI fungicide research green (with no history of disease). The practice green utilized at Saucon Valley consisted of 100% A1/A4 creeping bentgrass. The practice green at Rye Golf Course was a mix of both older and newer bentgrasses and the research green at URI was 100% L-93 creeping bentgrass.

In 2014, applications began in the second week of July and were repeated biweekly, for a total of 4 separate applications. At the URI research facility, applications were made on a weekly basis for a total of 8 applications. Each application protocol was slightly different, to account for space constraints and the needs of collaborators. Both golf course trials utilized 11 treatments and the smallest trial was at URI, utilizing 7 treatments. Trials included the following products: Signature, Daconil Action, Daconil Weatherstik, Primo Maxx, Cutless, Tide Paclo, Mycoshield and multiple foliar fertilizer treatments comprised of both nitrate and ammonium based formulations.

While significant etiolation as a result of bacterial wilt was seen at Saucon Valley in 2012 where high levels of fertilizer and Primo Maxx were applied simultaneously, no etiolation was observed throughout the trial in 2014 at this site. Small amounts of etiolation were observed at Rye Golf during the first week of July, just prior to the start of the trial but no etiolation or bacterial wilt was observed following the initiation of the trial.



**Etiolation is the elongation and yellowing of turfgrass leaves and shoots. The bentgrass shoot on the left is showing signs of etiolation. Many causes have been implicated and research is needed to determine the cause of these symptoms.**

As mentioned previously, no bacterial wilt related etiolation has been observed at the Saucon Valley site since 2012. In 2013, the lack of observed symptoms at this site appeared to be the result of a change in management practices at the course. Specifically, the superintendent switched his PGR program from Primo to Cutless early in the year and the lack of Primo seemed to prevent the disease. However, at the Rye Golf location, disease was observed in the trial area but unfortunately, before the trial began. It is notable that the period in which the disease expressed itself was the single week of



the summer where conditions were extremely humid and very hot, breaking the 90°F threshold. The remainder of July and August were very mild and most superintendents reported excellent weather for growing cool season turf. In comparing the three years of the trial, growing degree days do confirm the significant environmental differences. The Cornell University Network for Environmental and Weather Applications shows that as of 9/1/2013, Farmingdale NY had experienced 2463 GDD from May 1st. In 2014, only 2330 GDD had accumulated. In 2012, where the most disease in this trial was observed, 2574 GDD had accumulated. In 2010, when the disease has been most severe throughout the country, 2822 GDD had accumulated by 9/1. In addition, the disease is a more significant problem under high humidity. In 2014, Northeastern courses experienced less overall humidity during high heat than in previous years (specifically 2010 and 2011). No etiolation was observed at the URI site

either, even though extremely high levels of nitrogen (0.3 lbs/1000 ft<sup>2</sup>) and Primo (0.26 fl oz/1000 ft<sup>2</sup> or 11.2 oz/acre) were applied weekly and Cutless was never employed. In addition, freshly grown, demonstrably aggressive *Acidovorax avenae* was applied to the URI trial site in a back-pack sprayer at 109 cfu twice during the course of the experiment in order to increase the probability of disease. The lack of disease development is likely to be related to the environmental conditions at this location. The URI research green is wide open, with no trees and in a windy coastal climate with low humidity.

In previous years, combinations of high nitrogen and high Primo Maxx on pocketed and shaded greens resulted in bacterial-wilt induced etiolation. This was not observed this year but since 2010, the temperature and humidity for the peak period of disease expression has been declining steadily. Bacterial wilt is a particularly severe problem in southern states where bentgrass is



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**Small amounts of etiolation were observed at both the Trump National and Rye Golf sites during the third week of July, just prior to the second chemical application. Etiolation was light, at less than 10% of coverage in affected plots.**

being grown and the primary environmental differences between the Northeast and the Southeast are sustained high temperatures and humidity. While it does appear that nitrogen and Primo Maxx can exacerbate or stimulate the disease, they do not appear to have any effect when summer temperatures and humidity are low.

#### **Summary Points:**

- 2014 was an extremely mild year, both for temperature and humidity, and very little bacterial wilt of creeping bentgrass was observed in the Northeast or at the trial sites.
- High levels of nitrogen plus high levels of Primo Maxx have stimulated bacterial wilt related etiolation in the past but do not appear to incite disease at low temperatures and humidity.
- Greens with perennially high humidity continue to experience the most significant problems with disease, suggesting that tree removal and fans are the most important mechanisms to reduce disease long-term.