

# Management of Bacterial Wilt of Creeping Bentgrass caused by *Acidovorax avenae*

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## Objectives:

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

During the 2013 field season, bacterial wilt management trials were established at Saucon Valley Country Club in Bethlehem, PA, Trump National Golf Club in Briarcliff Manor, NY, 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. Green #12 was utilized at the Trump course and was nearly 100% G2 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 2012, applications began in the first two weeks of May but disease was not apparent until late July. As a result, 2013 applications began in the first 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. The largest trial was undertaken at Saucon, utilizing 15 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, Agrimycin, Mycoshield and multiple foliar fertilizer treatments comprised of both nitrate and ammonium based formulations.



**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.**

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 2013 at this site. However, 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. Etiolation was only present in treatments utilizing elevated rates of nitrogen and Primo but nitrogen source did not seem to matter and not all replications were affected. Both trials employed treatments using an additional 0.25 lbs N/1000ft<sup>2</sup> biweekly (both nitrate and ammonia based materials) combined with 0.26 fl oz/1000 ft<sup>2</sup> Primo biweekly. As observed in 2012, treatment plots containing just Primo Maxx or elevated fertilizer did not result in any bacterial wilt related etiolation. Etiolation was not observed in any of the other treatment plots within the experiment or the control plots. Etiolation was not observed at any other time throughout the experiment. Unfortunately, the sporadic nature of the etiolation at these two trial sites made it difficult to draw substantive conclusions.

As mentioned previously, no bacterial wilt related etiolation was observed at the Saucon Valley site in 2013. The lack of observed symptoms at this site appears 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. Cutless applications continued until July, when the trial was begun. While temperatures were generally hot during July and August, residual amounts of Cutless present in plants may have counteracted symptom expression. In addition, the disease is a more significant problem under high humidity. In 2013, 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>)



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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 related to the environmental conditions at this location. The URI research green is wide open, with no trees and in a windy coastal climate. Brown patch is rarely observed and low humidity keeps most disease to a minimum.

Although there were no conclusive results to demonstrate that nitrogen formulation has an impact on disease development, combinations of high nitrogen and high Primo on pocketed and shaded greens resulted in bacterial-wilt induced etiolation. As was observed last year, superintendents who applied a DMI based fungicides during disease outbreaks reported substantially less etiolation for 5–7 days (one trial collaboration reduced symptoms on a collar not employed in this trial using this technique). Similarly, superintendents utilizing Cutless also reported fewer disease symptoms. Examination of reports of the disease in 2013, in combination with the observed results from this year's experiments,

also suggest that a combination of high humidity and high temperatures may play a stronger role in disease development than either factor singly.

#### Summary Points

- 2013 was a mild year for bacterial wilt of creeping bentgrass in the Northeast and symptoms were observed at low levels on only two of the four trial sites.
- High levels of nitrogen plus high levels of Primo Max stimulated bacterial wilt related etiolation but an effect of nitrogen source (nitrate vs. ammonium) was not demonstrated.
- The use of Cutless or DMI fungicides can reduce disease severity but results are variable and largely anecdotal, although for the second year in a row, no disease was observed on a course that switched its primary PGR from Primo to Cutless.
- 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.