

Bacterial Diseases Of Turf: Are They Real?

By Dr James Kerns, Department of Pathology, University of Wisconsin - Madison

This summer has been absolutely brutal for golf course superintendents. It has been extraordinarily hot and in many places extremely dry. So dry in fact that many of my inoculations at the Noer have been unsuccessful. Yet I keep hearing about a potential bacterial disease plaguing creeping bentgrass putting greens throughout the Midwest. Relative humidity levels have been so low that there is not a lot of leaf wetness, even though we continue to irrigate putting greens. Without leaf wetness fungi and bacteria have a difficult or impossible time penetrating a plant. The simplest thing I learned in all my studies is the most important thing to a microbe is water. Water this summer is in short supply and we are not irrigating enough to maintain consistent leaf wetness.

I think many understand the importance of water for fungi. We have not seen much Pythium and brown patch although temperatures have been conducive. Dollar spot is trying to develop, but is slowed when we enter periods of low relative humidity. Anthracnose maybe showing now,

but our work indicates that the fungus started the infection process in late May or early June when soil temperatures were between 65 and 70°F. Yet, I still keep hearing about a mysterious bacterial disease that threatens creeping bentgrass greens throughout the United States. Seems puzzling to me considering that bacteria also require water to grow and thrive on plant tissue.

A couple years ago, Dr. Joe Vargas isolated a new bacterium from creeping bentgrass putting greens in North Carolina: *Acidovorax avenae* subsp. *avenae*. Symptoms associated with this bacterium included necrosis, etiolation (abnormal shoot elongation), chlorosis and decline, but these symptoms were isolated to perimeter of the putting green and somewhat into the collars (Image 1 and 2) (Giordano et al., 2010). When the summer of 2010 hit much of the bentgrass suffered in the transition zone, likely due to extreme heat throughout the region. However, because a new disease was discovered rumors of this problem started to spread. The whole issue reminds me of stories I've read

about Orson Wells' reading of *War of the Worlds*. Just a single person reading a story so passionately convinced many that Martians were invading us.

I am not trying to down play the importance of this potential disease, but I am trying to demonstrate a point about putting the horse in front of the cart. This disease is still unknown. There are many questions that remain unclear about it. What are the actual symptoms associated with the disease? This has been problematic because when researchers try to inoculate with the pathogen and the symptoms described by Dr. Vargas cannot be reproduced (Latin 2010 and 2012). It is possible that *Acidovorax* lives on the plant surface as a saprophyte and waits for the plant to decline before increasing its numbers or there could be another bacterial pathogen that is causing the symptoms. It is not unlikely that a bacterium is associated with elongation as many bacteria produce plant hormones like auxin and gibberellic acid. There are also many articles demonstrating that bacterial populations can increase yields of cereal crops (Bottini et al., 2004). However, this has yet to be demonstrated in a turfgrass system.

In the July issue of GCM, Dr. Rick Latin (2012) wrote an excellent article summarizing the current state of knowledge regarding bacterial diseases in turf. There are three diseases associated with bacterial pathogens: bacterial wilt, bacterial brown stripe and bacterial decline. The latter is the disease that is spreading fear through the golf course superintendent community. It is extremely important to understand the differences between these diseases. What we are currently seeing associated with creeping bentgrass is not bacterial wilt. Dr. Latin uses the term bacterial decline to describe the current problem associated with *Acidovorax avenae*. This is a good way to describe this disease because it seems like the disease is only observed when creeping bentgrass is under extreme stress.



Image 1. Etiolated creeping bentgrass shown from above. Note the extremely long growth and the bleached appearance.



Image 1. Etiolated creeping bentgrass shown from above. Note the extremely long growth and the bleached appearance.

What can be done to manage bacterial decline? Traditional fungicides will not work at all. The best bet to manage this disease is to maintain a healthy plant. Easier said than done I know, but there are keys to maintaining plant health during stress. Do not back off nitrogen. As the plant root respiration and growth slows so does their ability to take up nitrogen therefore a consistent supply

is needed to maintain healthy plants. Keep poking holes in the putting surface even if it is extremely hot. Poking holes will allow for air exchange, which can also cool the soil slightly. Maintain consistent regulation with Primo. Dr. Soldat's work with GDD and Primo applications clearly demonstrate the need to keep creeping bentgrass under regulation. As temperatures increase

so does the metabolism of trinexapac-ethyl, the active ingredient in Primo. As creeping bentgrass plants come out of regulation they enter a rebound phase of growth and coupled with any plant growth promoting bacteria could induce extreme elongation of plants. Monitor soil moisture with a TDR probe. I saw the benefits of this probe first hand during a recent visit. Dr. Soldat and I were at a golf course with *Poa annua* suffering and using the probe we determined that soil moisture was between 18 and 24%. This was adequate soil moisture, so the plants were either suffering from fungal infection or plain old heat stress. Finally, do not apply products that could potentially harm the plants. These would include DMIs, Zeritol, any copper products, and other growth regulators such as Trimmit.

Bacterial decline is still a mysterious disease that warrants further investigation. There are a number of researchers working with this disease and we will continue to monitor their progress and provide updates as needed. As for now, if you happen to suspect bacterial decline please send a sample to the TDL prior to making any management decisions.

References:

Bottini, R., F. Cassan, and P. Piccoli. 2004. "Gibberellin production by bacteria and its involvement in plant growth promotion and yield increase". *Applied Microbiology and Biotechnology*. 65:497-503.

Giordano, P.R., J.M. Vargas Jr., A.R. Detweiler et al. 2010. "First report of a bacterial disease on creeping bentgrass (*Agrostis stolonifera*) caused by *Acidovorax* spp. in the United States". *Plant Disease* 94: 922.

Latin, R. 2010. "Bacterial disease on turf". <http://turf.unl.edu/pdfctarticles/augbacteria.pdf>

Latin, R. 2012. "Bacterial decline of creeping bentgrass". *GCM*. July: 82-88.

HARTMAN
Golf & Sports Turf
Renovation & Restoration

8099 Bavaria Rd.
Victoria, MN 55386
P - 952.443.2990
www.hartmancompanies.com