

TURFGRASS TRENDS

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DISEASE MANAGEMENT

Anthracnose Update

Cultural practices affect spread of disease in Northwest

By Paul Backman, Gwen Stahnke and Eric Miltner

Anthrachnose basal rot (ABR) is a serious and common disease of annual bluegrass and creeping bentgrass putting greens. Incidence and the severity of ABR outbreaks greatly increased throughout the Midwest, Northeast and the Pacific Northwest in the late 1980s and 1990s.

This highly destructive disease rapidly became one of the most difficult and challenging management issues for many superintendents.

Anthracnose basal rot is caused by the pathogen *Colletotrichum graminicola*. Once established, ABR can quickly destroy the stems, crowns and roots of susceptible turf, compromising plant health, playability and appearance. This disease is highly destructive, difficult to manage and quite variable in symptom development and expression. Anthracnose basal rot development has been associated with nutrient deficiencies, low mowing heights, compaction, poor drainage and wounding caused by aerification and topdressing.

ABR was first confirmed in Washington in 1995. Several years prior to this, researchers noted that following aerification and topdressing, some *Poa* greens would wilt and collapse, but a disease or causal organism was not identified. This wilting typically followed a hot, dry period when the superintendent had been

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Combination of fungicides stems tide in mid-Atlantic

By David Spak

The increasing demand for tournament-level course conditions on a daily basis puts a strain not only on superintendents, but also the greens they're maintaining. The ill effects of the intensive manicuring needed to produce such conditions are no more visible than in the mid-Atlantic region, where basal rot anthracnose, once only a summer stress phenomenon, has become a nearly year-round, annual problem on courses.

Basal rot and foliar blight are the two dominant biotypes of anthracnose, a fungal disease first reported on greens in the United Kingdom in the 1950s. Principally a disease of *Poa annua* and creeping bentgrass greens, basal rot is the more prolific and widespread of the two and has begun appearing in March through November on *Poa* greens in the mid-Atlantic.

Early basal-rot infections have done the most damage on older mid-Atlantic courses. Henry Wetzel, superintendent at St. David's GC in Wayne, Pa., has encountered basal-rot anthracnose problems on his 76-year-old greens since the mid-1980s.

"These are old *Poa* greens built in 1926," Wetzel says. "Back in 1985, we had our first problem with basal rot, and we've been battling it ever since."

Difficult diagnosis

Basal rot infections in *Poa annua* first appear during cooler, moist weather conditions,

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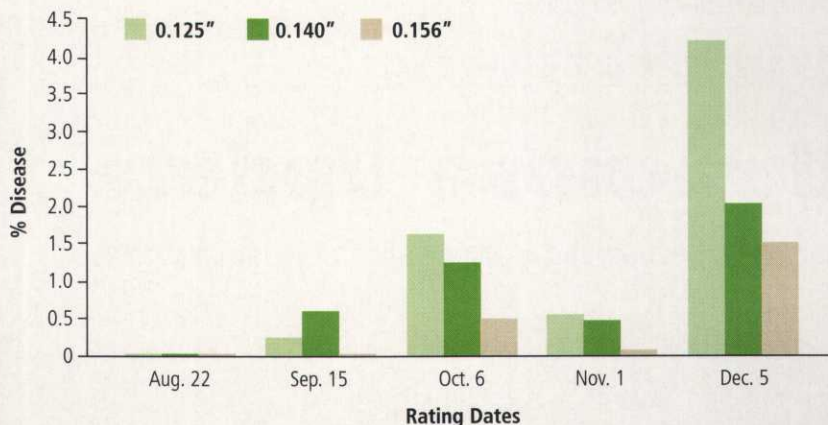
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FIGURE 1

Effects of three mowing heights on anthracnose basal rot severity



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spoon-feeding the greens with minimal fertility. In recent years, some superintendents have shifted their fall aerification practices several weeks earlier in the season to promote quicker healing.

Light brushing has also been used in these cases instead of dragging the sand into the surface. Dragging with a heavy mat opens up more wounds on turfgrass plants where infection can occur. When azoxystrobin became available to superintendents nearly five years ago, it provided exceptional control of ABR when it was used preventatively. However, there have been reports of possible anthracnose resistance to azoxystrobin after several years of use in the Pacific Northwest.

West of the Cascades

In the Pacific Northwest, west of the Cascade Mountains, the greens on older, established golf courses are predominantly annual bluegrass. The newly constructed golf courses are almost all planted with newer cultivars of creeping bentgrass.

The annual bluegrass greens are usually more susceptible to anthracnose infection than the creeping bentgrass greens. However, in early summer 2002, when temperatures were 85 degrees to 95 degrees Fahrenheit for several days, there were some cases

of anthracnose infection on creeping bentgrass. Certain cultural practices, such as verticutting and heavy sand topdressing, may have increased the severity of anthracnose infection.

Due to increased frequency of irrigation, the anthracnose infection on the leaves moved into the crowns of the plants. Aerification, overseeding and fungicides were used to stop the spread of the fungus and speed recovery.

If ABR does occur, early and correct diagnosis is essential for management. On newly infected annual bluegrass plants, a dark brown to black color appears in the crown. Then the foliage begins to turn yellow, initiating at the tips of the outer, oldest leaves first. Then it progresses to the sheath.

Turfgrass suffering from these symptoms form mottled or irregular patterns, roughly 1 to 12 inches in diameter. Those patches often affect large areas.

ABR symptoms are most severe when the turfgrass is experiencing physiological stress, particularly if the stress occurs when the weather conditions are optimal for infection.

Stress can result from a wide range of factors, including nutrient deficiencies, low mowing heights, compaction, poor drainage, wounding caused by aerification and topdressing, or shade.



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QUICK TIP

Are you thinking about snow mold yet? The Andersons offers a number of premium quality, well-sized products so you can apply fertilizer with snow mold control in one easy step. Check out Andersons FF1 14-3-3 and 10-0-14 with PCNB. Visit our Web site for more information at www.andersonsgolfproducts.com or contact your local Andersons Golf Products representative.

Research goals

The research discussed in this article was designed to minimize the occurrence of basal or crown rot through cultural practices. The objectives of this study were threefold:

- to evaluate how mowing heights and nitrogen fertility predispose annual bluegrass to ABR and determine how the same cultural factors help annual bluegrass recuperate from ABR damage;
- to document the environmental factors that contribute to ABR outbreaks in the Pacific Northwest; and
- to develop an effective ABR management strategy for superintendents, based on sound cultural practices.

At the Washington State University-Puyallup Turfgrass Research Facility, a 4,800-square foot annual bluegrass putting green was established using hollow-tine aeration cores acquired from putting greens at local golf courses.

Mowing heights of .125 inch, .141 inch and .156 inch were established. Each mowing height was fertilized at three different nitrogen rates: 3 pounds, 5 pounds and 7 pounds of nitrogen per 1,000 square feet per year.

In 1998, a severe ABR outbreak occurred in early September as a result of prolonged hot summer conditions, which required frequent irrigation. It was after symptoms developed that the mowing height and nitrogen treatments were put in place. The results of the project clearly showed that the highest mowing height and highest nitrogen rate produced the best turf quality and significantly increased the turf's recuperative ability from ABR.

In 1999 and 2000, mowing heights and nitrogen treatments were in place prior to the appearance of ABR symptoms. Again, the plots that were mowed the highest rate

and received the most nitrogen produced the highest quality ratings and the least amount of ABR symptoms.

The poorest quality plots exhibiting the most ABR were those that were maintained at the lowest mowing height and received the lowest nitrogen rate.

In the Pacific Northwest, ABR can occur in spring, summer, fall or winter. Over the duration of this study, heat stress in the summer was the most critical environmental condition leading to ABR. Hot, dry summers can lead to severe symptoms in the summer or earlier symptom development in the fall. Mild summers lead to symptom development in late fall or winter.

To summarize the impacts of management practices on ABR:

- Mowing heights and fertilization intensity have a significant impact on the quality and health of annual bluegrass putting turf.
- Healthy turfgrass is more resistant to ABR outbreaks.
- Prolonged heat stress predisposes annual bluegrass to severe ABR outbreaks.
- Lower mowing heights and lower nitrogen rates increase annual bluegrass' susceptibility to ABR.
- Once an ABR outbreak has occurred on annual bluegrass, fungicides are not effective at eliminating the symptoms.

This project showed that raising the mowing heights and increasing the nitrogen levels could reduce ABR symptoms that are already present in the turf stand.

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which are typical in late spring or early summer. First signs of infection include irregular patches of orange-to-yellowing turf (also known as "winter anthracnose") in March.

Later, infected plants collapse, which is often mistaken for bacterial wilt. Hair-like black, fruiting bodies at the base of plants are a tell-tale sign of anthracnose outbreaks, but by the time these hairs are visible with basal rot infection, it's already too late to respond with fungicide applications. Strains of the disease tend to attack the dominant grass type in a green while leaving lesser types untouched.

While there is no true fix on the exact conditions that have prompted the early appearance of basal rot, one can look at a mix of environmental and man-made factors as possible causes. Unusual weather patterns in the mid-Atlantic (from record highs one summer to unseasonable lows the next) contribute. Combine this with management practices meant to increase greens speeds, including low mowing heights, decreased nitrogen and topdressing, and the turf is weakened to a point where it is much more susceptible to disease. Poor drainage practices and reduced sunlight have also been shown to aggravate the spread of the disease.

"The methods superintendents use to maintain their greens, including increased mowing frequency, double- and triple-cutting and verticutting, have taken away their turf's ability to fight infection," says Dr. Bruce Clarke, director of the Center for Turfgrass Science at Rutgers University in New Jersey. Clarke is currently overseeing a series of fungicide trials for preventive control of basal-rot anthracnose on *Poa annua*/bentgrass greens.

"In the mid-Atlantic, the tremendous heat stress on turf recently only encouraged the development of the disease," he continues.

One thing is certain about basal rot infections: Without early detection or prevention, plants will ultimately die.

Cultural control

Most superintendents and researchers agree that extreme manicuring practices strain turf. Since this strain is self-inflicted, superintendents can adopt practices to minimize the damage caused by basal rot.

Recommended practices include raising

mowing heights, decreasing mowing frequency and using "floating" walk-behind mowers. Other recommendations for turf care while the disease is active include avoiding topdressing, vertical cutting, rolling and other injurious practices, as well as diverting traffic off greens.

When Wetzel encountered a particularly bad outbreak at St. David's last year, he decided to alter his manicuring practices.

"We had been mowing our greens at one-eighth of an inch," he says. "Last year's basal rot was particularly bad, so we finally raised mower heights to five-thirtyseconds of an inch, and this seemed to clear up the problem."

While these cultural practices provided Wetzel with a short-term solution for his basal-rot problem, the issue of players' demands for faster greens still remains.

"We've continued to mow at this height, but I don't know how long we can maintain that with the pressure we're getting from our players. Once I lower the mowing heights, I know the disease will be back."

In a basal-rot trial conducted by Clarke, measures to increase plant health have also resulted in noticeable disease improvements.

"We applied an additional one-eighth of a pound of nitrogen in the form of urea every two weeks," Clarke says. "These plots were visually less diseased."

Fungicide management

When superintendents do not have the option to commit fully to a basal-rot control program using cultural practices, fungicides become a necessity to prevent the disease. In these cases, applying both contact and penetrant fungicides, often in combination, has shown some success.

Because the timing and location of basal-rot infections are often unique to a specific course, superintendents should draw on past experiences, such as timing and environmental conditions present at the time of past infections.

Applications should be made at least two to four weeks prior to anticipated disease activity, and at 14-day intervals for maximum disease prevention. Making early applications is important, as basal rot is often difficult to detect in its earlier stages. Basal rot has proven to be a recurring problem. Rotating fungicides and applying multiple fungicide chemistries will reduce the risk of resistance.



QUICK TIP

One of the most frequently asked questions about Roundup Ready Creeping Bentgrass is, "How do I eliminate Roundup Ready Creeping Bentgrass if it ends up in my roughs?" Fortunately, the answer is simple: Use one of the other nonselective herbicides on the market today.

Clarke's ongoing trials began in May 2002. For these trials, he identified the four most widely used fungicide chemistries in use for anthracnose control — benzimidazoles, benzonitriles, demethylation inhibitors (DMIs) and strobilurins — applying a range of fungicide treatments that included them all. Clarke employed a spray interval of 14 days at varying rates.

"The benzonitriles and DMIs showed effective control, but the results from DMIs were variable," Clarke says. "In contrast, the strobilurins and benzimidazoles didn't provide effective control."

Best of both worlds

Since basal rot thrives on weakened turf, maintaining plant health is a necessity when balancing disease prevention with providing top-flight green speeds. Chipco Signature fungicide has shown an ability to improve turf health under stress conditions, and a new label including anthracnose-control recommendations allows for even greater application flexibility.

Whitford CC in Exton, Pa., like many older courses in the mid-Atlantic, had regularly experienced basal-rot problems. Most of the greens at Whitford are comprised predominantly of *Poa*, with percentages ranging from 30 percent to 70 percent. Situated in a valley, these greens are push-up type with little drainage, adding to the basal-rot problem that has appeared as early as February. Kris Givens, superintendent at Whitford CC, tried a number of methods to solve the disease problem.

"We tried organic products, along with ammonium sulfate every two weeks, for basal-rot control," Givens says. "We also tried fungicide treatments. Two greens were also reconstructed to USGA specifications, while drains were installed on four of our worst greens to alleviate standing water."

In field trials conducted last summer at Whitford CC, treatments of Chipco Signature+Daconil were applied, along with a range of other fungicides. The Signature+Daconil applications provided the highest levels of control and turf quality, preventing the appearance of basal rot through July.

"Basal-rot plot testing was conducted in April 2001 on our 13th green," Givens says. "We noticed no basal-rot activity on the plots with Chipco Signature+Daconil. In contrast,



Field trials at Whitford CC in Exton, Pa., show a combination of fungicides work best against anthracnose basal rot in the mid-Atlantic region.

anthracnose was severe outside of the Signature + Daconil plots."

Clarke applied Chipco Signature (4 ounces per 1,000 square feet) both alone and in combination with a number of products. "The Signature applications worked well through mid-August, but then experienced a drop-off," Clarke says. "However, a combination with Daconil Ultrex (3.2 ounces per 1,000 square feet) achieved higher control levels. While both the Signature and Daconil treatments provided strong anthracnose prevention, the two worked even better in combination."

Overall improvement

"I've used Chipco Signature in trials for a number of years, and each time I see enhanced density and turf quality," Clarke says. "I believe what we're seeing is a combination of both fungicidal activity and an overall improvement in plant health. Anthracnose is a plant health disease, so applying Signature in combination with your anthracnose treatment will certainly increase your control."

Whether using fungicides or cultural practices for basal-rot prevention, maintaining healthy greens is certainly everyone's top priority. It is up to superintendents to choose the best way to maintain that plant health with the resources they have available.

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