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TURFGRASS TRENDS

DISEASE MANAGEMENT

Developing Effective Fungicide Programs for

Spring Bermudagrass Dead Spot Control

By L.P. Tredway and E.L. Butler

Spring bermudagrass dead spot is the most severe disease in the transition zone. The disease may occur wherever bermudagrass goes dormant in the winter, but it is particularly severe in the northern-most range of bermudagrass growth. Intensely managed turf, such as golf courses, is particularly prone to the disease.

As the name implies, spring dead spot symptoms appear in the spring as bermudagrass comes out of winter dormancy. Circular patches of turf ranging in diameter from 6 inches to several feet remain dormant as the surrounding turf turns green. The patches of dormant turf eventually disintegrate, leaving depressions in the playing surface.

Recovery from spring dead spot is slow and occurs from spread of bermudagrass into the patch from the outside. In severe cases, recovery can take the entire growing season.

Application instructions on fungicide labels are vague and do not provide specific guidelines for the timing or method of applications.

In many regions, spring dead spot is the only disease of bermudagrass that warrants preventative fungicide applications. Unfortunately, there is a lack of fungicide treatments for spring dead spot that are both cost-effective and reliable. In fact, some university extension services specifically do not recommend fungicide applications for spring dead spot because of unreliable results, and most others provide no specific recommendations. Furthermore, application instructions on fungicide labels are vague and do not provide specific guidelines for the timing or method of applications.

Spring dead spot can be effectively managed with a combination of variety selection and cultural practices. Bermudagrass varieties selected for cold-tolerance, such as Midiron, Vamont and Tifsport, tend to have increased spring dead spot resistance. Culturally, spring dead spot is encouraged by high nitrogen levels in the fall, potassium deficiencies, high soil pH, soil compaction, excessive thatch and poor soil drainage. Correcting these cultural problems is a critical first step for spring dead spot management.

In many cases, cultural practices alone do not provide adequate control, and fungicide applications are needed to prevent unacceptable turf damage.

Currently, five fungicides are labeled for spring dead spot: 3336 (thiophanate-methyl), Banner (propiconazole), Eagle (myclobutanil), Heritage (azoxystrobin), and Rubigan (fenarimol). Of these, Rubigan and Eagle are most widely used for spring dead spot control.

What factors are responsible for the erratic nature of spring dead spot control? Answer-

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Spring bermudagrass dead spot turns lush green turf into unsightly brown patches.

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ing this question is the key to developing effective, reliable recommendations for spring dead spot control.

Factors influencing control

Although the above-ground symptoms of spring dead spot are most striking, the disease actually develops below ground in the roots, rhizomes and stolons.

Three fungal species have been shown to cause spring dead spot: *Ophiosphaerella herpotricha*, *O. korrae*, and *O. narmari*. These fungi belong to a group of pathogens called the ectotrophic root infecting (ERI) fungi. Other pathogens in this group include *Magnaporthe poae*, which causes summer patch in the bluegrasses and *Gaeumannomyces graminis*, which causes take-all patch in bentgrasses.

For effective control of summer patch and take-all patch, the timing and method of fungicide application is critical. Applications must be initiated early, when the pathogens are just beginning to grow and infect roots. Infection of bermudagrass roots by *Ophiosphaerella* species is thought to occur in the fall, but the precise soil temperature that triggers disease development is unknown and must be determined so that applications can be timed accurately.

Application methods that move a fungicide into the root and crown area are most effective for control of take-all patch and summer patch. Increased water volumes (5 gallons water per 1,000 square feet), post-application irrigation (one-quarter inch of water), or fungicide injection (1 to 2 inches deep) significantly improve control, compared to standard applications in 2 gallons per 1,000 square feet.

Application method may also impact spring dead spot control, but its effect has not been studied in detail.

Differences in pathogen distribution may also be responsible for erratic control of spring dead spot. The *Ophiosphaerellas* are not known to vary in their response to fungicides, but they do differ in their aggressiveness, with *O. herpotricha* being more aggressive than *O. korrae*. Most attempts to control *O. herpotricha* with fungicides have failed, whereas control of *O. korrae* has been moderately successful.

In the Midwest, *O. herpotricha* is the predominant cause of spring dead spot, with *O. korrae* and *O. narmari* present at low levels. *O. korrae* is the predominant species in the eastern United States, but *O. herpotricha* may also be present in certain locations.

Tackling Spring Dead Spot

At North Carolina State University, we established a research project to identify the most effective and cost-efficient methods for spring dead spot control in bermudagrass. Field experiments were initiated in the fall of 2002 on Tifway bermudagrass maintained under athletic field conditions at the Walnut Creek Softball

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Complex in Raleigh, N.C. This location has a history of severe spring dead spot infestation, and the disease is well-distributed across several fields in the complex. Prior to our experiments, the fields had never been treated with fungicides for spring dead spot control.

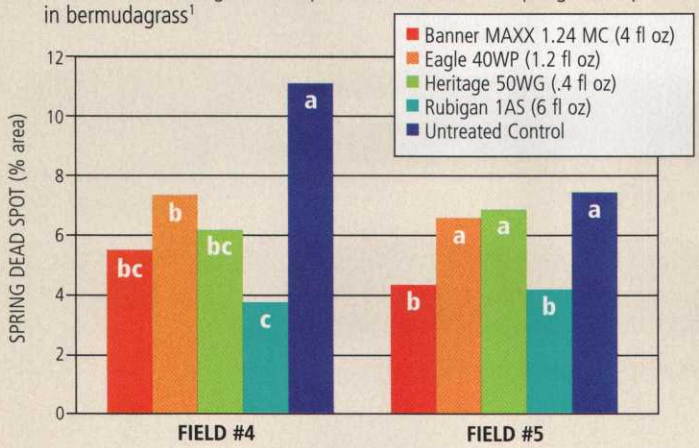
Two separate experiments were conducted in 2002-2003, one to evaluate application methods and another to evaluate application-timing regimes. Four fungicides were used in both experiments: Banner Maxx (4 fluid ounces per 1,000 square feet), Eagle (1.2 ounces per 1,000 square feet), Heritage (.4 ounces per 1,000 square feet), and Rubigan (6 fluid ounces per 1,000 square feet).

In the application-method study, each fungicide was applied on Sept. 24 and Oct. 31 using one of five different application methods: surface application in 2.5, 5 or 10 gallons water per 1,000 square feet, surface application (2.5 gallons per 1,000 square feet) watered in with one-quarter inch of water immediately after application, or subsurface injection to a depth of 1.5 inches to 2 inches using the Cushman Envirojet.

In the timing-regime study, each fungicide was applied in 5 gallons per 1,000 square feet using seven different application timing regimes.

FIGURE 1

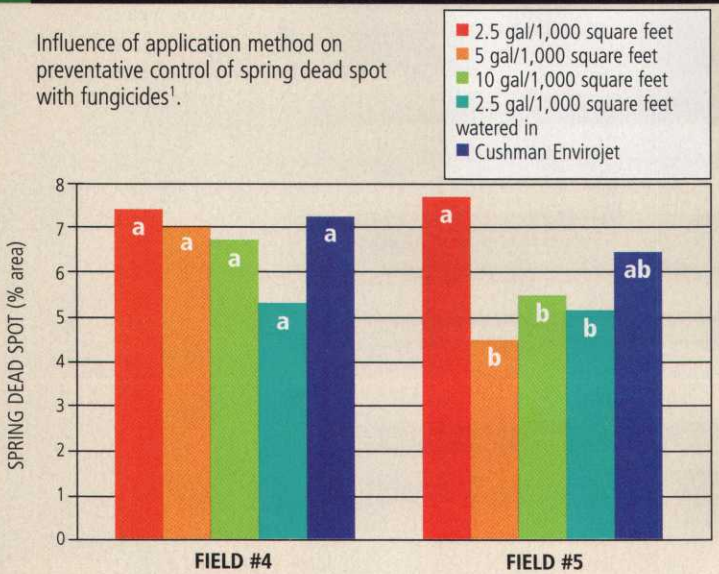
Effectiveness of fungicides for preventative control of spring dead spot in bermudagrass[1]



[1]Treatments were applied on Sept. 24 and Oct. 31, 2002. Data is an average of five application methods. Data bars containing the same letter are not statistically different.

FIGURE 2

Influence of application method on preventative control of spring dead spot with fungicides[1].



[1]Treatments were applied on Sept. 24 and Oct. 31, 2002. Data is an average of four fungicides. Data bars containing the same letter are not statistically different.

Bermudagrass varieties selected for cold-tolerance, such as Midiron, Vamont and Tifsport, tend to have increased spring dead spot resistance.

The application-method study was conducted twice, on Fields 4 and 5. The timing-regime study was conducted once on Field 5.

In the application-method study, Banner Maxx, Heritage, Eagle and Rubigan significantly reduced spring dead spot incidence on Field 4, but only Banner Maxx and Rubigan controlled the disease on Field 5 (Figure 1).

Overall, Rubigan provided the best control, reducing spring dead spot by 66 percent and 45 percent on Fields 4 and 5, respectively. Banner Maxx also performed well, reducing the disease by 51 percent and 45 percent on Fields 4 and 5, respectively.

The method of application had a significant impact on spring dead spot control on Field 5 but not on Field 4 (Figure 2). On Field 5, applications in 2.5 gallons per 1,000 square feet were less effective than applications in 5 or 10 gallons per 1,000 square feet, or 2.5 gallons per 1,000 square feet watered in with one-quarter inch of water. Using these methods improved spring dead spot control by 41 percent, 29 percent and 32 percent, respectively.

Fungicide injection, using the Cushman

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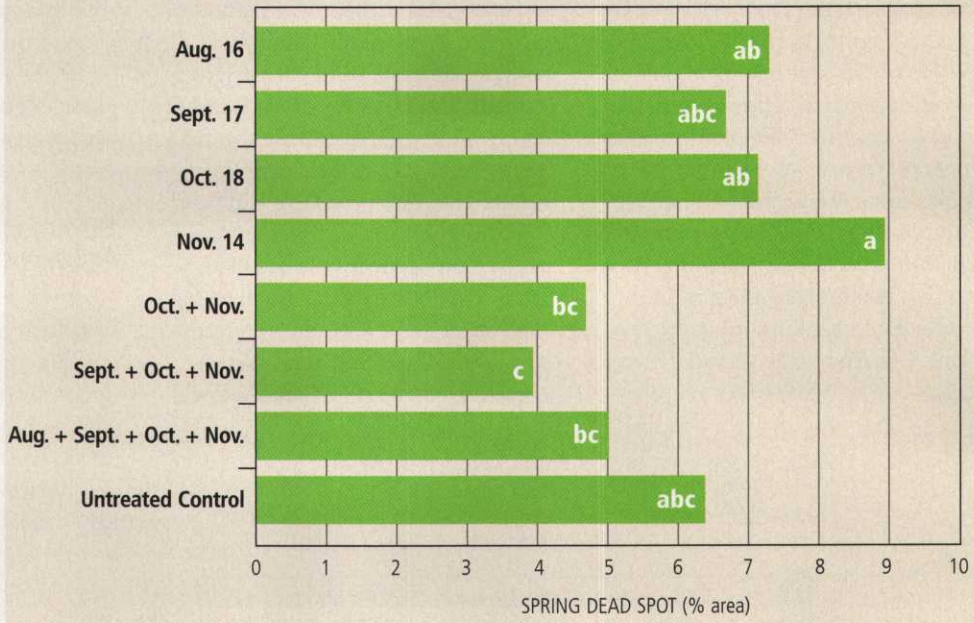
Currently, five fungicides are labeled for spring dead spot.

FIGURE 3

Influence of application timing on preventative control of spring dead spot with fungicides[1].



[1]Treatments applied in 5 gallons of water per 1,000 square feet on Aug. 16 , Sept. 17, Oct. 18, and/or Nov. 14. Data was collected on May 13, 2003, and is an average of four fungicides. Data bars containing the same letter are not statistically different.

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Envirojet, provided an intermediate level of disease control (Figure 2).

In the timing-regime study, few significant differences were observed among the seven application timing treatments, but some trends can be noted (Figure 3). A single application made in August, September or October was more effective than a single application made in November, and multiple applications were more effective than the single applications.

According to soil temperature data, fungicide applications were most effective when average daily soil temperatures were between 60 degree Fahrenheit and 80 degree Fahrenheit (Figure 4). The growth of bermudagrass roots is severely diminished when soil temperatures are below 60 degree Fahrenheit, and their capacity absorb systemic fungicides may also be reduced.

Do fungicides speed spring recovery?

Some turf managers have observed that preventative fungicide applications in the fall can increase the rate of recovery from spring dead spot in the spring. Is this wishful thinking or a real phenomenon?

In an attempt to answer this question, we rated spring dead spot incidence in the above experiments every two weeks, beginning at green-up and continuing until full recovery. From this data, statistical analysis was used to estimate the rate of recovery for each plot. No differences in recovery rate were observed on Field 5. On Field 4, fungicides did not increase the rate of recovery from spring dead spot (Figure 5).

Surprisingly, Banner Maxx, Heritage and Rubigan applications actually slowed the rate of bermudagrass recovery compared to the untreated plots. More research is needed to investigate potential negative side-effects resulting from fall application of fungicides to bermudagrass.

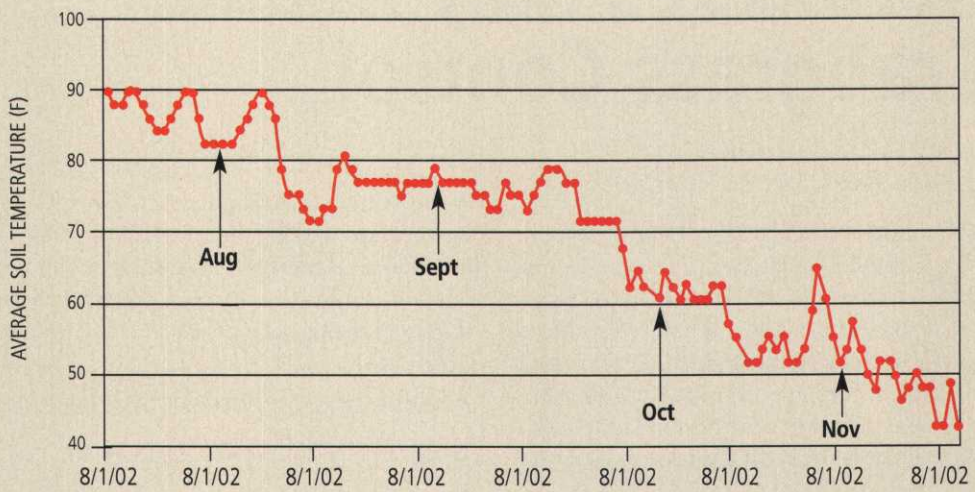
Summary and conclusions

For decades, turfgrass researchers have attempted to develop effective methods for spring dead spot control. Therefore, it is no surprise that we did not identify the magic bullet after only one year of field research.

We did, however, observe several important trends:

FIGURE 4

Average daily soil temperature (4-inch depth) in Raleigh, N.C., from August to November, 2002. Arrows indicate timing of monthly applications in timing regime experiment (Figure 3).

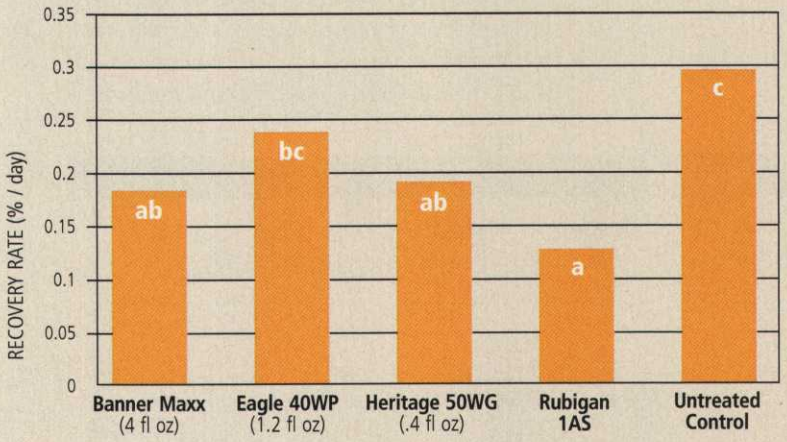


(1) Rubigan and Banner Maxx were more effective for spring dead spot control;
(2) Fungicides that were applied in high volumes of water, or watered in after application, were more effective than standard surface applications;
(3) Fungicide applications were most effective when average daily soil temperatures were between 60 degrees Fahrenheit and 80 degrees Fahrenheit.
(4) Regardless of timing, single fungicide applications did provide significant control of spring dead spot, whereas multiple applications did tend to suppress the disease; and
(5) Fungicide applications did not increase the rate of bermudagrass recovery in the spring. In fact, some fungicides actually reduced the recovery rate.

It is also important to note that our research areas had never been treated for spring dead spot prior to our experiments. Many turf managers have observed that spring dead spot control improves after several successive years of preventative applications. While Rubigan and Banner Maxx appear to be more effective in the first year, Cleary 3336, Eagle, and Heritage may be viable options for spring dead spot control in successive years.

FIGURE 5

Rate of bermudagrass recovery from spring dead spot injury in response to preventative fungicide applications[1].



[1]Treatments were applied on Sept. 24 and Oct. 31, 2002. Data was collected on bi-weekly intervals from May 13 to June 24, 2003, and is an average of five application methods. Data bars containing the same letter are not statistically different.

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