

Getting the Upper Hand on Dollar-Spot Disease

New technology has potential to reduce fungicide inputs and provide quality playing conditions.

BY JIM SKORULSKI



Resistance varies widely between cultivars of creeping bentgrass and between grass species. Selecting a more resistant plant will help to delay the onset of disease and reduce the severity of the infection, which should improve the results of all other management tactics. Work with your regional university or visit the NTEP website to learn what cultivars have the highest degree of resistance to dollar spot.

Dollar-spot disease (*Sclerotinia homoeocarpa*) continues to be a significant pest of golf course turf. The pathogen attacks most cool- and warm-season turfgrass species. Dollar spot is a persistent and adapting pathogen that has become tolerant of various fungicides and, if left unchecked, can spread to epidemic proportions, leaving playing surfaces scarred and pitted. Consequently, it is no surprise that more money is invested to manage dollar-spot disease than any other turfgrass pathogen.

Fungicide programs remain the backbone of most dollar-spot management programs. However, the availa-

bility of disease-resistant turfgrass cultivars, better knowledge of the pathogen's life cycle, and the development of innovative cultural practices have improved the ability to manage dollar spot and could reduce our reliance on fungicides. The following article will review some new management tools and ideas that may be utilized in an integrated approach to combat dollar-spot disease.

ENVIRONMENT/CULTURAL PRACTICES

Dollar-spot disease first appears when average air temperatures climb above 55 degrees Fahrenheit, but disease

activity is highest when air temperatures range between 70 and 84 degrees Fahrenheit and relative humidity is greater than 85 percent. Periods of heavy dew or extended leaf wetness also favor dollar-spot development. Courses tend to first see disease symptoms in mid to late spring or early summer. Dollar-spot activity can slow or remain constant depending on summer weather conditions. A second and often more damaging wave of disease activity usually begins in late summer and can continue into late fall.

When it comes to warm-season grasses, bermudagrass is still the predominant choice and generally toler-

ates dollar spot quite well. Seashore paspalum is increasingly utilized on southern golf courses, especially in areas with poor water quality, and it is rather susceptible to dollar spot. In fact, dollar-spot resistance is a major focus of the seashore paspalum breeding programs ([Raymer et al.](#)). While there are no resistant varieties currently available, Sealsle 1 and Sealsle 2000 have shown improved tolerance to dollar spot compared to other commercial varieties (personal communication).

A promising disease-forecasting model for dollar-spot disease has been developed by Dr. Damon Smith at Oklahoma State University, with cooperation with research from the University of Wisconsin, Pennsylvania State University, the University of

Tennessee, and Mississippi State University. Dr. Jim Kerns indicated the model uses the impacts of relative humidity (RH) on the pathogen and basis disease activity when RH is 70 percent or higher for five days (personal communication). The model has proven reliable in field work and will hopefully become available on a commercial level in the spring of 2015. The model will help managers use weather data to determine when the pathogen will be most active.

Management practices that alter environmental conditions to hinder the pathogen or promote plant health will always be beneficial in reducing the potential for dollar-spot infection. Although management practices alone may not prevent disease, they can delay the onset and reduce the

severity of infection. The following are some effective and often overlooked practices that have been shown to reduce dollar-spot infection and severity:

- Remove trees and thin brush to increase sun and wind exposure. The primary objective is to dry turf surfaces more quickly. This sounds so elementary and yet disease “hot spots” or indicator areas are often the result of compromised growing environments.
- Drag, roll, or mow the turf in the early morning hours. Research has shown that removing dew can reduce dollar-spot infection. It may be difficult for smaller operations to remove dew from large acres of fairways, but try to at least target areas that historically have the highest incidence of dollar



This picture illustrates differences in disease susceptibility between cultivars of creeping bentgrass. Note how free of disease the two Colonial bentgrass plots are near the top of the picture.



Dragging and rolling remain effective practices to shorten the duration of leaf wetness and the severity of dollar-spot disease.

spot when weather conditions favor disease development.¹

- Lightweight rolling can reduce the incidence of dollar spot. Research work at Michigan State University showed that rolling wet or dry surfaces reduced dollar-spot incidence as compared to non-rolled plots. The reason for the suppression is not clearly understood but may be related to a secondary physical or biological effects brought on by rolling.
- Avoid late-evening irrigation if possible. A short irrigation window will reduce the duration of leaf wetness and minimize environmental conditions that favor disease development.
- Maintain turf vigor with adequate nitrogen fertility. Fertilize with controlled-release nitrogen fertilizers or spoon-feed with soluble nitrogen sources to keep the turf vigorous. Research has shown that the nitrogen source is less important than the availability of nitrogen to the plant for disease suppression.
- Reduce excessive thatch. Excessive thatch is primarily a concern in fair-

ways, tees, and roughs. Use core aeration, dethatching practices, and sand topdressing to reduce thatch and create unfavorable conditions for the pathogen.

SELECT THE RIGHT GRASS

Grasses vary widely in their susceptibility to dollar spot, and resistance varies among turf species and between cultivars within a species. For example, annual bluegrass is more susceptible to dollar spot than creeping bentgrass, and cultivars within the creeping bentgrass species exhibit varying degrees of dollar-spot susceptibility. However, utilizing a more resistant grass does not eliminate disease, but it can reduce the rate and severity of infection and significantly reduce the use of fungicides. Recent advances in turfgrass breeding have resulted in dollar-spot-resistant cultivars of creeping bentgrass. The creeping bentgrass cultivars Declaration, Barracuda, Luminary, 13M, Landmark, and Memorial exhibit increased resistance to dollar-spot disease and other pathogens. Colonial bentgrass has an even higher level of

resistance to dollar spot than creeping bentgrass and is certainly worthy of consideration for fairway use at some golf courses.

However, selecting a grass solely on its ability to resist a specific disease is not recommended. Rather, resistance should be a strong factor in the selection process. Also, consider that incorporating new resistant grasses into mature turf is difficult. When converting grass species or cultivar, the best results are achieved with regrassing programs or, to some degree, interseeding into disease- or stress-damaged surfaces. Visit the National Turfgrass Evaluation Program website — www.ntep.org — to find data on important turfgrass qualities, including disease resistance.

FUNGICIDE MANAGEMENT

Fungicides remain an important tool in dollar-spot disease-management programs. However, an overreliance on fungicides, a limited fungicide rotation, or poor spray applications will reduce the level and duration of disease suppression. Fungicides will be most

effective when applied preventatively and when pathogen pressure is low. Research has shown merit to applying a fungicide in spring even before temperatures are favorable for dollar spot. Early fungicide application is thought to reduce disease pressure and delay the onset of disease symptoms. One common method of early fungicide application for the control of dollar spot is to apply a penetrant fungicide after the second mowing, followed by a traditional spray program. Subsequent traditional spray programs for dollar spot are most often based on a calendar schedule. However, relying on a calendar-based fungicide schedule may become obsolete as more precise disease forecasting information becomes available. Improvements in disease forecasting can be used to target the dollar-spot pathogen more precisely and possibly reduce the number of fungicide sprays applied throughout the season. The following

are some basic considerations to improve your fungicide management program:

- The success of a fungicide program requires thorough spray coverage. Research has shown flat-fan nozzles that produce fine to medium spray droplets provide the best fungicide coverage. Air-induction nozzles will produce larger spray droplets while still providing good coverage and are a better choice for windy conditions when spray drift is a concern.
- Apply contact and penetrant fungicides at 1-2 gallons of water per 1,000 square feet. Removing dew before applying contact fungicides may improve results, but dew removal before spraying a penetrant fungicide is not necessary.
- Use full-label rates of fungicides when disease pressure is high and when making curative applications.
- The dollar-spot pathogen has become fully resistant to thiophanate-methyl

at most sites. Reduced control of dollar spot is also being reported for fungicides in the demethylase inhibitor (DMI) — e.g., propiconazole — and dicarboximide — e.g., iprodione — fungicide families. Resistance to DMI and dicarboximide fungicides is not complete, but when pathogen resistance is an issue, the duration of suppression is shorter and control is rate-responsive. Maintain a good rotation between fungicide families to delay the onset of resistance. Tank-mix penetrant fungicides with contact products, especially when disease pressure is high. Dr. Geunhwa Jung, jung@psis.umass.edu, and associates at the University of Massachusetts have developed a test that can be used if fungicide resistance is expected. The test results will provide the degree of resistance of certain populations of the dollar-spot pathogen and offer recommendations for spray rotations



Shade and limited air circulation can extend the duration of leaf wetness that the pathogen uses to spread and infect plants.

Table 1
Biological Materials for Turfgrass Disease Suppression
(B. Clarke 2014)

Biocontrol Agent	Some Product Names	Diseases Suppressed	Resistance Risk Level
<i>Bacillus licheniformis</i>	EcoGuard	Dollar spot	Low
<i>Bacillus subtilis</i> GB03 strain	Companion	Summer patch, brown patch	Low
<i>Bacillus subtilis</i> QST713 strain	Rhapsody	Summer patch, brown patch	Low
<i>Gilocladium catenulatum</i> J1446 strain	Prestop	Foliar diseases	Low
<i>Reynoutria sachalinensis</i>	Regalia PTO	Foliar diseases	Low
<i>Streptomyces lydicus</i> WYEC 108 strain	Actinovate SP	Soilborne diseases	Low
<i>Trichoderma harzianum</i>	Bio-Trek, Turfshield, TurfMate	Brown patch, dollar spot	Low

and cultural practices to combat any resistance.

THE FUTURE

The future of disease management will be interesting and exciting. Turfgrass pathologists continue to develop new best management practices that focus not only on chemical controls but also on cultural practices that can be used to reduce disease pressure and improve plant resistance. The development of plant defense activators is also promising. Plant defense activators are compounds that trigger a plant response to a pathogen. The phosphite/phosphonate products, which are thought to initiate a plant response against *Pythium* blight and anthracnose, may be the best-known materials in this group of compounds. Acibenzolar is another plant-signaling agent and is a registered active ingredient in Daconil Action. The product Civitas has also been shown to induce natural plant resistance to dollar spot and other pathogens. The plant defense

activator products do not directly attack the pathogen but enhance the plant's natural defense system.² There are also a number of biological-control products available that are slowly being incorporated in field-research programs. Biological-control products contain bacteria or other microbial agents that have the ability to suppress the dollar-spot pathogen under controlled conditions. However, additional field work is needed to determine the efficacy of biological-control products and how they can best be used in the field. Table 1 lists a number of biological-control compounds for the suppression of turfgrass diseases.

Jeffery Carlson manages the Vineyard Golf Club, in Edgartown, Mass., where there are no traditional fungicide programs available. Carlson uses a number of the biological products, plant defense activators, rolling, and other innovative cultural practices and resistant grasses to control dollar spot and other pathogens. The disease-management program at the Vineyard

Golf Club involves a labor-intensive, integrated approach that continues to evolve. However, the overall success of Carlson's unique disease-control program demonstrates that management options outside of traditional fungicide programs can be used to suppress disease and provide very acceptable playing conditions for his golfers.

REFERENCES

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