

SEEING SPOTS: THE FUTURE OF DOLLAR SPOT MANAGEMENT

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If you turned on the Weather Channel this morning and they told you it was going to rain today and possibly for the next several days in Lansing, would you come here unprepared to deal with that possibility? Most people faced with that decision would come prepared for rain. We also believe that superintendents would prefer more information about their golf course conditions especially if formatted and analyzed in a way that helps support decision-making. In the not too distant future, we will begin to see these decision support tools become available to the superintendent for disease management.

Dollar spot is the most important disease of high-value golf turf areas. The disease begins as a small bleached area on the leaves of an infected plant and rapidly expands to encompass an area about the size of a silver dollar. The primary problem with dollar spot is that the blighted tissue creates thousands of small, circular depressions in an untreated area causing non-uniform ball roll and an unsightly appearance. Until very recently, dollar spot has always been regarded as an unimportant disease to study because many fungicides were available to control epidemics. However, with the restrictions on the use of the fungicide chlorothalonil on the horizon and the specter of DMI and benzimidazole fungicide resistance in the past, researchers are beginning to conduct research that will influence how you manage dollar spot in the future.

Some of the areas that are being explored include: the development of disease resistant grasses for golf course use, a better understanding of basic infection processes, and development of epidemiological models that will be integrated into site specific, or region specific recommendations for dollar spot control.

DISEASE RESISTANT GRASSES

Several different universities and companies in the U.S. are evaluating dollar spot resistant grasses for use on golf turf areas. The overarching goal of most of these efforts is to develop grasses that, while not necessarily totally resistant, can delay the onset of the epidemic long enough into the season so that only a few fungicide applications would be necessary for season-long control. Longer-term ideas revolve around taking advantage of molecular biology and biotechnology to identify and incorporate genes that make grasses resistant to pathogen attack. Ultimately, the successful development of these longer-term projects will rely on the policy developments regarding genetically modified organisms (so-called GMOs).

The goal of these strategies is to find grasses that can provide the high-quality playing surfaces while at the same time enabling the superintendent to control dollar spot with only a few spray applications, or cultural management techniques.

BASIC INFECTION PROCESSES

Because dollar spot research has primarily focused on fungicide control until very recently, our basic understanding as to how dollar spot causes disease is not understood. Many questions that will impact the success of managing dollar spot in the future need to be resolved. Some possible questions are:

- Does dollar spot kill plants, or does it just kill leaf tissue?
- How does dollar spot kill (plants and tissue)? Is it a toxin? Direct kill? Enzymes?
- Why do dollar spots only expand out to the size of a silver dollar and then seem to stop? Is the plant doing something to stop the disease?
- Where do new infections begin? Is it from previously infected tissue that is in the thatch or soil? Are infected clippings brought into an area from somewhere else?
- Does the plant do anything to make itself more susceptible to disease? Dew, guttation fluid production? Shoot density?
- Why are some bentgrass cultivars that are heat tolerant also very susceptible to dollar spot? Is there a link?

You can see from these questions that we need much more information about these basic processes in order to understand why and how dollar spot begins. Information developed from this kind of research will help improve current management strategies and lead to the discovery of new management strategies for dollar spot control.

EPIDEMIOLOGICAL MODELS AND SITE SPECIFIC MANAGEMENT

Dollar spot begins developing in June and will progress throughout the summer until late September. The study of disease progress over time is called epidemiology. Research that is being conducted here at MSU is beginning to help us understand how dollar spot progresses over time. Understanding how dollar spot advances over time will give us information about the developmental stages that the disease undergoes. Through this understanding we can begin to develop models to predict when dollar spot may occur. An example of this type of model would be using the forsythia bloom to time spring applications of preemergence crabgrass control.

The goal of our work is to better understand the underlying processes that govern when and where a dollar spot outbreak is likely to occur. Over time, we will be able to use weather data from a golf course, localities, and even regions to predict the risk of a dollar spot outbreak for a given location. It would then be a superintendent's decision to make a fungicide application or not. This type of prediction is very much like the rain example above or how the Centers for Disease Control predicts which strains of flu will be important so that companies can prepare the flu shots for the upcoming season.

Superintendents of the future will have information gathered from many different sources analyzed to help them make decisions about when and where to make a fungicide application for the most effective control of dollar spot. This information will come from weather stations, irrigation equipment, monitoring sensors on mowers, and other maintenance equipment. The information will be coupled with location information from built-in GPS units and analyzed to provide a superintendent a view of what is happening out on the course with respect to water use, disease control, and weed pressure. The job of the superintendent is then to use the information along with experience to make decisions about what maintenance practices will be needed to maintain the highest possible playing conditions.