TURFGRASS TRENDS

THE PROMISE OF COMPOSTING

PART 2 IN A SERIES

Alternative Approaches to Manage Dollar Spot

By J.B. Workman and C. Waltz

Over the last 40 years, fungicides have been the most widely used tool for managing dollar spot, *S. homoeocarpa*. As a result of numerous applications of fungicides during a growing season, resistance of *S. homoeocarpa* has led to an ongoing challenge of fewer fungicides being available to control the disease.

S. homoeocarpa has developed resistance to several classes of fungicides including heavy metal-based compounds, contact fungicides, and systemic fungicides such as dicarboximides, benzimidazoles, and demethylation inhibitors (DMI) (Ki Jo, 2008). Resistance of *S. homoeocarpa* to certain benzimidazole fungicides like Cleary 3336 and Chipco 26019, two commonly used older fungicides for dollar spot control, have been reported (Vargas et al., 1992, Ki Jo et al., 2008). Resistant strains to these particular fungicides were found to have persisted for more than 20 years on some golf courses. The development of resistance to the DMI fungicides like Bayleton and Rubigan occurred much slower compared to the benzimidazole fungicides. In some cases the benzimidazole fungicides developed resistance in one to two years after the products were used, whereas most of the DMI fungicides had been used for more than ten years before resistance was confirmed. In most cases, *S. homoeocarpa* exhibits cross resistance (i.e., resistance to more than one fungicide within the same chemical group) or multiple resistance (i.e., resistance to different fungicide classes).

Although fungicides have been successful for dollar spot management in the past, increasing levels of fungicide resistance, coupled with tightened environmental scrutiny of existing fungicides, has left fewer chemical options for controlling this pathogen. Therefore, turfgrass managers are looking for effective alternative disease suppressive practices that may help delay the occurrence of fungicide resistance or extend their effectiveness.

Incorporating natural organic amendments such as compost into turfgrass disease management may be an alternative for dollar spot control. Composting is the controlled rotting of organic matter. The composting process is mediated by microbial activity and can be affected by physical and chemical characteristics such as temperature, aeration, moisture, carbon to nitrogen ratio (C:N), and pH. The result is a stable end product with increased organic components and nutrient availability. The process is considered to be the most efficient treatment in producing an envi-

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FIGURE 1

Naturally suppressive composts can be incorporated into normal turfgrass maintenance.

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ronmentally safe and agronomically advantageous soil organic amendment at acceptable costs. The purpose of composting is to convert organic material that is unsuitable and incapable of being incorporated into the soil into a material that can be safely introduced into the ecosystem. Successful composting is achieved from the continual supply of oxygen and water to the microbial community, along with temperature and adequate mixing.

There is interest in the use of natural organic amendments for use on turfgrasses because of their potential effect on increasing soil microbial activity. Researchers have reported significant reductions in dollar spot severity following applications of certain organic fertilizers including Milorganite, Ringer Green Restore and Sustane, as well as certain composts prepared from turkey litter, sewage sludge and plant material. A high level of microbial activity in compost is believed to be a reason composts are able to successfully suppress turfgrass diseases. Increased microbial activity in soil presumably diminishes the activity of plant pathogens by antagonizing, parasitizing or competing with pathogens. Researchers from Cornell University postulated that suppression is a result of elevated microbial activity resulting in increased competition with pathogens for root exudates. Studies have shown that infectious disease agents are prevented from germinating by high microbial activity in composts through competition for nutrients. Through continual removal of nutrients, especially carbon and iron, pathogens are prevented from germinating and therefore remain inactive. Disease suppression may also be due to enhanced microbial breakdown, resulting in an increased availability of nutrients, which may stimulate plant recovery from disease infection. Known bacterial*(b)* and fungal*(f)* species in compost include *Fusarium heterosporum(f)*, *Acremonium* spp.*(b)*, *Rhizoctonia* spp.*(f)*, *Enterobacteria cloacae(b)*, *Pseudomonas fluorescens(b)* and *Pseudomonas lindbergii(b)*, all of which have been shown to suppress dollar spot.

Although the use of compost may not control turfgrass diseases to a level that may replace fungicides, its integration along with current disease management practices may reduce fungicide use and associated problems such as resistance. Sufficient organic composts may be introduced into the soil-plant system in order to support microbial growth and activity. Naturally suppressive composts can be incorporated into normal turfgrass maintenance by replacing sphagnum peat or other organic materials used in topdressing mixtures (Figure 1). Compared to peat, compost can allow turfgrass to green-up quicker and increase the microbial activity in the soil.

Taking a look at how compost may be used as an alternative to fungicides for dollar spot control is a subject of ongoing research at the University of Georgia. The objectives of this research are to (1) evaluate the application of natural organic composts limiting the severity of dollar spot and decrease the over-wintering inoculum of *S. homoeocarpa*, (2) assess the effect of nitrogen on disease suppression along with the role of microbial populations and (3) determine if multiple applications of composts combined with recommended low rate fungicide applications provide acceptable disease control.

Field studies were initiated in 2011 on an established stand of Sea Isle Supreme seashore paspalum (*Paspalum vaginatum*) and on a one-year-old stand of SR-1020 bentgrass (*Agrostis stolonifera*). The cultivars SR-1020 and Sea Isle Supreme were chosen based on their susceptibility to dollar spot. Bentgrass plots are being maintained under golf course putting green conditions, while the paspalum plots are similar to golf course fairway conditions. Four different composts are being applied to plots once a month at 50 pounds per 1,000 square feet. Compost 1 (Sodpro) is a by-product of the sod industry in Georgia. Compost 2 (Carbon Peat) is a mined compost in Georgia. Compost 3 (Foothill) is a by-product of the nursery industry in Georgia. Compost 4 (Farm Meal) is a by-product of cricket waste in Georgia. To separate plots, the systemic fungicide Emerald (boscalid) is applied monthly at the low and high labeled rate. To serve as a fertilizer standard, sulfur-coated urea is applied once a month at 0.25 pounds N per 1,000 square feet. A non-treated control is also included. Plots are evaluated for disease severity, turfgrass quality and color. Digital imaging is being used to determine the percent of infected tissue.

Dollar spot can be destructive to turfgrass stands. It continues to be one of the more costly turfgrass diseases to manage on an annual basis. Through this project, we are attempting to provide the best information on dollar spot control and become less reliant on pesticides. Golf course superintendents and athletic field managers who are considering biocontrol, or may be pressured to implement more pesticide-free programs, should be able to apply information from this project to their facilities.

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