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## The Wily Disease Dollar Spot!

by Professors H. T. Wilkinson & R. T. Kane  
University of Illinois, Urbana-Champaign

There is a storm of activity developing about the disease we all know as dollar spot. Feeding this activity is the inability to control the disease at various golf courses in the mid-west. Descriptions and remedies shot from the hip are surfacing in trade journals, but we do not feel the facts have been discovered. Let me review some of the basic facts about dollar spot and then move into methods of managing the disease.

Dollar spot is a warm season disease caused by a fungus. While the fungus can be isolated, its' exact description can not be stated because scientists have been unable to critically observe its' sexual structures. In an attempt to solve the problem, scientists are currently employing protein and DNA analyses. That being the case, it is reasonable to state that the fungus does not appear to be *Sclerotinia homoeocarpa*, but may belong to the genera *Lanzia* or *Moellerodiscus*. Is this important to you? Yes, because until we know how to exactly identify the fungus that causes dollar spot, we will not understand the variation from one location to the next. Variation leads to different behaviors among fungi, for example, different disease severity or resistance to fungicides.

We do know that the fungus lives in grass leaves (dead and alive). The spread of leaf material by machinery, water, wind and even people can move the fungus and consequently move the disease. When the air and soil temperatures are warm (15-29C) the fungus starts to grow both into and on grass leaves. If the air is very warm (20-29C) and humid, you can actually see the white mycelium on the turf associated with the dollar size spots. Be advised, dollar spot fungi are not the only organisms that can produce white threads on turf. Other non-damaging fungi, insects and mites also can create the same appearance. A little careful inspection will give you a definite assessment.

Dollar spot fungi attack the leaf tissue and cause a lesion that is characterized by a white (bleached) center and red-orange borders. Again, you can be fooled early in the season if you do not inspect the leaves carefully. Sun scald also will produce "white lesions" on leaves, but the scalded areas are **not** colored at their borders. In most turfs, dollar spot will not result in total destruction of the grass plant. Because it generally affects the leaves, the crowns, roots and rhizomes remain intact. It is for this reason that good management of dollar spot must address both the health of the turf and the suppression of the fungus.

Before addressing a program for good management of dollar spot, it would be useful to discuss the general philosophy of turfgrass disease management. Diseases are natural processes and in many respects, more so than the turf on a golf course. Both disease and grasses are indigenous to the mid-west and can exist together in balance, i.e., neither are causing major problems for the other. Disease problems arise on golf courses because the relation between grass and pathogen is imbalanced. This is unavoidable for the most part because we **want** the grass to grow as a highly altered turf. While severe disease reduces the quality of the golf course turf, it is unwise to assume that all disease should be eliminated from the golf course. For

ten years, I have encouraged golf course superintendents to **manage** disease, not attempt to eliminate it. First, eliminating a disease is nearly impossible, but more importantly, eliminating disease further imbalances the turf ecosystem and brings on bigger and more difficult problems. **To manage a disease means to keep it in balance, i.e., not allow it to cause severe destruction and not eliminate it.** To control a disease is different than managing it. Control means to focus your effort on reducing the pathogen population, and elimination is the ultimate goal. For example, the use of a fungicide is a control measure when used alone, not a management tool. In recent published, but unscientific articles, programs entirely based on the application of fungicides have been recommended for dollar spot **control**. This is the wrong approach for this or any other disease. The most important component in any disease management program is the turfgrass. Disease can not be balanced if the turf is in a poor state of health. Fungicides can be used effectively in a good management program, but **superintendents should not become “addicted” to fungicides on their golf course.** There are some excellent programs integrating cultural practices, fertility management, fungicides and even biological management that will produce superior results to a control program that depends simply on fungicides.

Dollar spot is a disease of bluegrass, bentgrass, ryegrass, fescue and some of the warm season grasses. There is little difference in genetic resistance among cultivars within each species of grass, therefore little additional disease management can be achieved by selecting one grass cultivar over another. Bluegrass and fescue are more resistant than the bentgrasses and the ryegrasses. The current effort to produce genetically resistant cultivars of bentgrass is minimal and can not be expected to change the present situation in the foreseeable future.

Disease management must occur in two phases: i) reduction or suppression of the pathogen population or activity; and ii) recovery of the diseased turf through growth. These two phases are not completely separate, but actually complement each other. Reduction of the pathogen population usually is necessary if you experience severe disease. When dollar spot is noticeable and the spots are increasing in size and number, the fungal population is very active and needs to be suppressed. There are several ways to accomplish this. Fungicides are the most familiar and generally effective control measure to achieve a *rapid suppression of pathogen activity*. Remember, they act primarily on the fungus and have limited effects on the plant. Therefore, they only accomplish one of the two phases of disease management.

The use of fungicides should be limited to curative programs, in most cases. The reason for this is the fact that the fungicides are generally fast acting (less than 7 days). Dollar spot will develop slowly at first and not result in death of the turf for months, and if your turf has good fertility, it will recover fast. There are both systemic and contact fungicides available, and both are quite effective. Which should you use? This question is less important than some other questions concerning the selection of fungicides. Systemics are purported to move in the grass plant, but how far and how long? Do they move from the leaves to the roots? No! Do they move from the tip of the leaf to the base, or vice versa? No! If you apply them today, will they move into the new tissue that is produced tomorrow? Probably not. The movement that is most likely to occur is short distance,

i.e., millimeters from the point of contact. Therefore, it is still important to get good coverage when applying systemic fungicides. Because the systemics penetrate the leaf, they last longer and this is their main attribute. Contact fungicides are simply that. They act where you put them on the leaf, and as the leaves grow the newly formed tissue is unprotected. Contacts are a little faster acting than systemics. If the dollar spot is severe and spreading rapidly, then you would reduce the fungal activity faster with a contact. If the disease is not rapidly developing, either should be effective. Another consideration is the alternation of fungicides used on a golf course. It is generally recommended that you do alternate, but also realize that every time you expose your turf to a different fungicide you create another imbalance. Is it simply enough to switch the brand of chemical or its' formulation? No! That does not satisfy the objective for switching fungicides? Is it sufficient to simply switch from a contact to a systemic fungicide? No! The objective for using alternative chemicals is to present the pathogen population in your turf with different chemicals, i.e., different molecular structures. For this reason, you must understand what is the active ingredient for each fungicide. Knowing this, you can quickly understand which are similar and which are not. But why alternate the chemicals? If you continually use the same chemical, the pathogen population will gradually adjust itself genetically, until it is less sensitive or even insensitive to that chemical. This has been generally termed fungicide resistance and is the fault of the user not the pathogen. It is important to review your entire control program, and not simply consider one disease at a time. There are many other differences between contacts and systemics that need to be considered, but this is outside the limits of this article. Generally, for the control of dollar spot, I encourage superintendents to use low rates in a curative manner, but there are other practices that should be considered as well.

The integration of fertilization and cultural practices can have a dramatic effect on managing dollar spot, and these can enhance the effectiveness of fungicides. Your turf nutrition is very important in terms of managing dollar spot. Dollar spot is a “weak-turf” disease; meaning that the more nutritionally stressed the turf is, the more severe disease will be. A nutritionally balanced turf will contract less severe dollar spot and recover from the disease faster. I can not recommend, generally, how much fertilizer to put on a course. This must be determined for each course, and possibly, for different areas on a single course. You can have both your soil and your grass leaf tissue analyzed. In addition to the general fertilization of your course, consider putting a little urea into the tank with your fungicide. Why is this a good idea? First, the turf that is attacked is probably not quite rich enough in nitrogen. Second, the nitrogen applied with the fungicide gives the plant a surge of nitrogen during the important recovery phase of disease management. Third, you will find that you can dramatically reduce the rate of fungicide used. Finally, you will also find that the turf will contract less dollar spot the next time the disease starts to develop.

Finally, much can be accomplished by integrating some simple cultural practices. Watering should be done thoroughly (deeply), as infrequently as possible and never in the late afternoon. Remember, the fungus thrives under wet, humid conditions. Promote rapid drying of the grass leaf surfaces. It is the

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(Dollar Spot cont'd.)

water on the leaves that absolutely is necessary for dollar spot to develop. Rapid leaf drying can be accomplished by allowing good air flow and reducing shade over the turf. Lastly, biological controls are starting to appear in research tests. The use of organic amendments has shown some encouraging results. The basis for this effect could be a combination of nutrition and microbial suppression of the dollar spot fungus. In another technical report, several different fungi, that also live in turf, have been used to reduce dollar spot disease severity. Keep your eyes open for more developments on this.

## The Times, They Are A Changin!

by Don Spier

During the past fifteen years, the public's view of plant protectants has changed from a passive awareness, to an "anti-pesticide" perception. I believe that some golf course superintendents are changing their pest control programs in response to the increased environmental pressures. I also believe that further changes will be necessary, to insure that the golf course superintendent has effective management tools to work with in the future.

Basic manufacturers, such as Ciba-Geigy, are also aware of the public's views on pesticides. Most trends in our industry are now driven by environmental issues. We as manufacturers of plant protectants, believe that a pro-active stance must be taken regarding the safe, effective use of our products. Part of this pro-active stance is to provide the golf course superintendent with products, formulations, and packaging that are environmentally sound. Providing biological alternatives, is another way the basic manufacturers can be pro-active regarding environmental issues.

Products that are more active, requiring less active ingredient per acre, are becoming the norm. Flowables, dry flowables, and emulsifiable concentrates have replaced most wettable powders. Soon gels and tablets may be available. Water soluble packets, and returnable close system containers are now being used. All of these formulations and package systems meet environmental needs by providing increased worker safety, reducing rinsates, and reducing landfill solid waste. Over the next decade, a number of biological alternatives will be available to the golf course superintendent.

Many golf course superintendents are taking a "wait and see" approach to the alternatives mentioned above. Having talked to university professors and regulatory experts, I believe that the time to use these products, package systems, biologicals, and formulations is now! By using these products now, the golf course superintendent is taking a pro-active stance on the environmental issues that concern the public, and his club members. I realize that some of these alternatives require changes in application methods, and may be more costly; however, isn't one of the jobs of the golf course superintendent to make recommendations to his directors that protect their club from liability, and provide his workers with the highest possible degree of safety?

The times, they are a changin! The public has changed, the manufacturers are changing. And, the golf course superintendent should consider change.

## Another Court Decision

by Dave Blomquist, Naperville C.C.

A recent court decision may cast a dark cloud over golf courses in the near future. The Supreme Court has ruled that local community decisions may overrule a federal standard for pesticide applications. This means that uninformed individuals may enact laws that seriously affect the way we manage our golf courses. Pesticides have been under scrutiny for several years now. Television and print media have wrongly blamed pesticides for everything from a simple headache to cancer. Fact: Pesticides have been used in substantial amounts for nearly 50 years, and there is no evidence from analysis of cancer patterns that pesticide residues are responsible for any cancers in adults or children.

Alar, a man-made plant growth regulator used on apples, was targeted by a group led by Meryl Streep. Their claim was that it is harmful to children when they eat treated apples. Fact: Alar caused cancer in laboratory mice only when they were given levels **four million** times greater than any human exposure.

Because uninformed groups are affecting law makers, the cost of getting a potential pesticide to market is skyrocketing. NCC spends \$30,000+ annually to protect the turf from fungus and insects. That cost goes up each year. Many materials that were in use on a regular basis have been banned making it much more expensive and difficult to maintain your golf course. If this irresponsible lobbying continues, the game as we know it today will change as there is no way we can provide the conditions we now have without pesticides.

If there are any questions or comments about this issue, please feel free to call me at 355-9807. I would love to discuss this with you.

**Editor's comment:** (Dave Blomquist wrote this article for his club's monthly newsletter).

## Earthworms

Earthworms (*Annelida* and *Oligochaeta*) are perhaps the best known of soil macroorganisms. Again, depending on how favorable soil conditions are, there may be as many as 70,000 per 1000 square feet of root zone. Frequent counts of 20 earthworm casts per square foot in the spring are noted. Ten earthworms per cubic foot of soil can have a favorable influence on soil conditions.

Earthworm casts in a years time may amount to as much as 40 pounds of soil deposited on the surface for each 1000 square foot of root zone. These casts are greatly enriched in comparison with the surrounding soil. For example, the nitrate content of casts can be increased by over 300 percent; the phosphorus content may be increased by over 600 percent and the potassium content by over 1000 percent. Calcium and magnesium increases are usually less; i.e., 40 percent for calcium and 200 for magnesium. These increases in plant nutrients come about through the ingestion of soil by the worm. It conditions the soil as it passes through its system, thus bringing about this enrichment.