Has Dollar Spot Control Been A Problem For You?

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Dollar spot caused by *Sclerotinia homoeocarpa* F.T. Bennett is one of the most important turfgrass diseases, capable of attacking both cool- and warm–season grasses. The causal fungus was identified and named by F.T. Bennett in 1937. The cool-season turfgrass species adapted to Wisconsin's climate are bentgrass (creeping and colonial), fescue (tall, red, sheep, and fine-leaf), and bluegrass (Kentucky and annual). We have all experienced difficulty controlling dollar spot during the last few years. The number of samples received at the Turfgrass Diagnosis Lab last year which tested positive for dollar spot is another clear indication of the recent unusual severity of this disease.

I will write about some factors that might cause an increase in the incidence and severity of dollar spot and a decrease in the efficacy of fungicides. Did you find that you needed to apply a higher rate of fungicides and more often to control dollar spot in the last few years? I went to the 2001 GCSAA conference in Dallas to attend a seminar entitled "Disease Identification and Control" given by Drs. Bruce Clarke and Bruce Martin. Dr. Bruce Clarke also emphasized the recent changes in dollar spot control. The optimum temperature for the dollar spot fungus is 70°-80° F, along with high relative humidity (>85% at night). These conditions likely prevailed for an extended period of time last year. The weather could be the major factor for the promotion of dollar spot, along with other factors such as low mowing heights, low nitrogen levels, improper applications of fungicides, and especially fungicide resistance development.

In addition, I would like to report on some important issues about dollar spot that others are talking about at the local and national meetings. First, the scientific name for the pathogen, *Sclerotinia homoeocarpa* has been debated, and will be given a new scientific name. The new name for this fungus will be *Rutstroemia floccosu*, the name being proposed by Drs. J. Powell and J. Vargas, 2001. Whatever the pathogen name is, the disease name, dollar spot, will be the same.

Second, I'd like to comment on the development of fungicide resistance in the pathogen. The definition of fungicide resistance is "The stable, inheritant adjustment by a fungus to a fungicide, resulting in a less than normal sensitivity to that fungicide" (Dekker, 1995). Basically, the fungus that was previously sensitive to fungicides has been put under the selection pressure of repeated applications of fungicides, and has genetically changed to obtain an ability or has been selected from the fungal population to be relatively resistant or tolerant to the fungicides. The development of fungicide resistance is dependent upon the fungicide's mode of action (for example, cell membrane toxicity, interference with DNA synthesis and lipid metabolism, and so on) and whether the fungicide is a specific (single) or multisite fungicide. Single or specific site fungicides inhibit only one function critical to the fungal cell, but mul-

tisite fungicides inhibit several functions of fungal cells. Most of the protectant and contact fungicides are multisite and, in most cases, their efficacy has remained stable over the years. In contrast, some systemic fungicides, e.g. DMIs, with specific site action are losing their effectiveness in a short period of time. The fungi that rapidly become resistant to particular fungicides often demonstrate cross resistance, meaning "resistance to more than one fungicide mediated by the same gene" (adapted from Disease Identification and Control by Golf Course Superintendents Association of America) to structurally related chemicals or to chemicals with similar modes of action.

We are all aware of previous instances of developing fungal resistance to heavy metal-based fungicides such as cadmium and mercury, benzimidazoles (Tersan 1991, Fungo 50, and Clearly's 3336), anilazine (Dyrene), dicarboximide fungicides (Chipco 26019), and demethylation inhibitors (DMIs: Rubigan, Banner, and Bayleton) in various regions of the United States. There are many ways of reducing the possibility of the development of fungicide resistance. Researchers may prefer one of following methods: a tank mix of reduced or recommended rate of fungicides, a rotation of chemicals with different modes of action, the timing of application, and proper management techniques. These methods usually should work well. The important thing to remember is to adapt at least one management strategy of reducing the development of fungicide resistant strain. When fungicide-resistant dollar spot fungi have not been observed, it indicates to me that alternate applications of systematic and contact fungicides registered for dollar spot control have been used in an integrated control program to prevent the build-up of fungicide-tolerant fungus strains. The systemic fungicide will continue to eliminate the majority of the dollar spot fungus population that is sensitive to systemics, while the contact fungicide will be used primarily to prevent the build-up of systemic fungicide-tolerant strains of *R. floccosum*.

The third and last topic is seasonal variation of dollar spot species, i.e. different fungal pathogens in early spring and fall. Do you remember a talk on dollar spot presented by Dr. John Powell (University of

Minnesota) at Wisconsin EXPO 2001? The seasonal variation among dollar spot isolates caught my attention. I asked him to send me his recent research paper on it, which is in press at the Journal of Plant Disease. In the northern U.S. two major seasonal epidemics (from May to late-July and mid-August to October) have been known to occur. Based on DNA sequence information, the authors concluded that the seasonal dollar spot epidemics observed in the northern U.S. are caused by a single species (*R. floccosum*) rather than several species of fungi. So, that result still did not explain why two separate outbreaks of dollar spot occurred in two seasons. Two hypothetical explanations for their results that come to mind are as follows: 1. The DNA technique they utilized could not detect the amount of variation among pathogen isolates for the two seasons. 2. For those particular years, the environmental conditions maybe were favorable for the dollar spot pathogen for extended period of time during the time of their experiment.

In conclusion, I am convinced that we should start collecting dollar spot isolates throughout Wisconsin this year, in order to detect any trace of fungicide resistance, and study the seasonal variation using different types of DNA techniques (random amplified polymorphic DNA, RAPD marker, The Grass Roots Volume XXIX (4): 37-41). If you have had difficulty controlling dollar spot, please let us know and we will collect dollar spot isolates from your golf course.