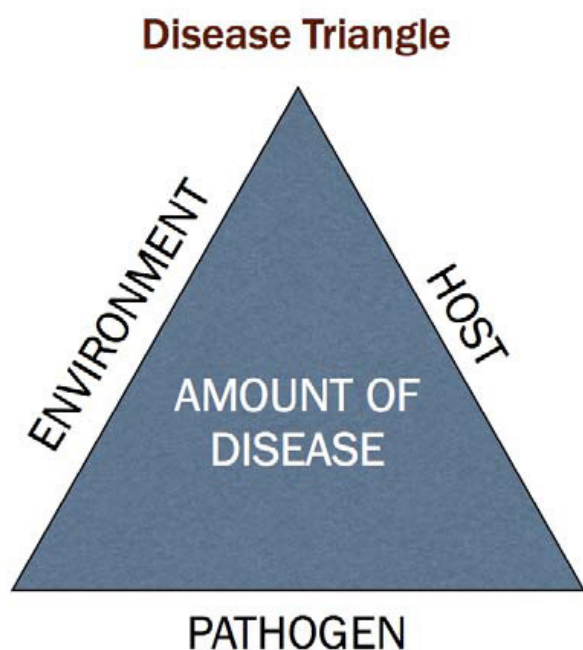


## Turfgrass Pathology 101

By Dr. Jim Kerns, Department of Pathology, University of Wisconsin -Madison

Throughout the summer there are many samples submitted to the Turfgrass Diagnostic Lab, yet the majority of the diagnoses we report are abiotic. Why? Plant diseases are actually a rare event in nature. Three very specific characters have to align at a certain time in order for a disease to develop—a virulent pathogen, a susceptible host and a favorable environment (2). Fortunately in turfgrass systems the plant pathogens are ubiquitous, turfgrass plants are susceptible to many pathogens, as are long-term perennial plants. Therefore the driving factor for turfgrass diseases is the environment. For some turfgrass diseases we know the specific requirements for infection and for others we know very little. However golf course superintendents can use the most basic fundamental of plant pathology, the disease triangle, to help them combat turf diseases.



**Pathogens** are parasites that feed off of living organisms. The most important group of plant pathogens in turf is fungi. Within the fungal kingdom there are many different groups, but the groups of primary importance are the ascomycetes and basidiomycetes. The distinction between these two groups is very important because it is the underlying

reason for fungicide selection. Ascomycetes typically are controlled best with products like boscalid (Emerald), pen-thiopyrad (Velista), iprodione (26 GT), vincozolin (Curlan), chlorothalonil (Daconil), and the DMIs (Bayleton, Tourney, Triton FLO, Trinity, Torque, Banner MAXX, Eagle, Rubigan). Examples of common turfgrass diseases caused by ascomycetes are dollar spot, Microdochium patch, anthracnose, take all patch, summer patch and leaf spot diseases. I did not include the QoIs because I do not believe ascomycete fungi are their strength, although QoIs can be very effective against anthracnose, summer patch, and take all patch.

Basidiomycetes on the other hand, are controlled well with QoIs (Heritage, Insignia, Compass, and Disarm), flutolanil (Prostar), fludioxonil (Medallion) and the DMIs. Examples of common turfgrass diseases caused by basidiomycetes include brown patch, brown ring patch, gray and speckled snow mold, yellow patch and fairy ring. Those pesky Pythium diseases are caused by organisms that are no longer considered fungi, they were reclassified a number of years ago into a new kingdom that includes diatoms and brown algae. This is the reason why products that effectively control Pythium diseases rarely have efficacy against other diseases. Fungicides that are typically most effective against Pythium diseases include mefenoxam (Subdue MAXX), fosetyl-Al (Signature), ethazole (Terrazole), propamocarb (Banol) and Stellar (fluopicolide and propamocarb). Just a basic understanding of how plant pathogens are classified can dictate fungicide selection.

Going one step further, knowing how fungi move and infect plants also will help with fungicide selection. The dollar spot fungus does not produce a spore and is thought to infect neighboring plants with hyphae. But where does the initial source of inoculum come from? The origin of initial inoculum remains unknown for this fungus. We think the initial source of inoculum may come from the seed and the fungus can survive in or on plant tissue during the winter. More to come on this topic so stay tuned. Since the dollar spot fungus does not produce a spore, contact fungicides such as chlorothalonil only provide adequate protection if reapplied on a frequent basis. Yet applications of systemic products like Emerald and the DMIs tend to provide better more long lasting protection against dollar spot.

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Tank mixtures utilizing a contact fungicide and a systemic fungicide were believed to have synergistic effects against the dollar spot fungus. An article in Plant Disease published in 2008 by Dr. Lee Burpee and Dr. Rick Latin demonstrated that synergistic effects did not occur that any increase in efficacy was likely just an additive effect (1). However, the need to mix systemic and contact fungicides stems from the fact that we do not know fully understand the conditions that favor disease development for each turfgrass disease.

**Host** refers to the plant and turfgrasses such as Kentucky bluegrass, fine fescues and bentgrasses are susceptible to disease. I wrote specifically about this issue in a previous GrassRoots, but basically there are cultivars of each species that are more resistant to certain disease.

However, no cultivar to my knowledge is immune. Physiological stress is something that can predispose turfgrass plants to disease. Alternating mowing and rolling is an exceptional way to limit stress on turfgrass plants and thereby may limit disease development regardless of the cultivar used. Although some new creeping bentgrass cultivars are more resistant to the dollar spot fungus, these cultivars still can get the disease. Presently it does appear that planting dollar spot resistant cultivars results in few fungicide applications, but the durability of resistance remains to be seen.

Environment is the biggest factor driving disease development. Yet for many of the most important turfgrass diseases we do not have a clear understanding of how the environment affects disease development. This is why

my program has focused a lot of effort into understanding dollar spot. If we can pinpoint the factors that influence dollar spot development and survival, we maybe able to develop management strategies that do not solely rely on fungicides. Our goal is not to completely eliminate fungicide applications, but rather to use it as a tool one that is used precisely and accurately. From our research, in collaboration with Dr. Damon Smith, we know that the dollar spot fungus needs five days of relative humidity at 70% or higher to produce foci (spots). Based on this we have developed a forecasting tool that accurately predicts dollar spot development, which in turn also accurately forecasts fungicide applications. Using this tool we have been able to save up to two fungicide applications in a season. This is without utilizing other cultural management techniques such as rolling, dragging, or fertilization.

Although we do not have much control over the macro environment, there are ways to manipulate the microenvironment. Research conducted by Paul Giordano, a PhD student at Michigan State under the direction of Dr. Joe Vargas, has shown that rolling once a day, either morning or afternoon, significantly reduced dollar spot development. Since differences were not detected between morning and afternoon rolling treatments, Giordano et al.



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investigated volumetric water content (VWC) and microbial populations in the top 1-inch of soil. They found that VWC and microbial populations were elevated (3). Although more research is warranted on this topic, Giordano has demonstrated that simply rolling can modify the microclimate.

Other ways to modify the microclimate is to remove trees to improve light and air penetration. This could help with summer stress and winter damage. Light frequent topdressing was shown to minimize anthracnose severity. The thought behind this was protection and insulation of the crowns. Removal of dew by dragging or mowing significantly limited dollar spot development and could be another way to manipulate the microclimate in order to reduce fungicide inputs. Of course aerification is one of the best tools for microclimate manipulation and typically promotes vigorous turf growth. Understandably many of the strategies we discussed may not be feasible at your course, but maybe there are

a few techniques outlined in this article worth trying. After all isn't limiting pesticide usage a good thing, one that could be marketed to golfers???

## References:

1. Burpee, L., and R. Latin. 2008. Reassessment of fungicide synergism for control of dollar spot. Plant Dis. 92: 601-606.
2. Couch, H.B. 1995. Diseases of Turfgrasses. Krieger Publishing Co. Malabar, FL. pgs. 13-17.
3. Giordano, P., J. Vargas, T. Nikolai, and R. Hamerschmidt. 2010. Investigating mechanisms of dollar spot reduction through light-weight rolling on creeping bentgrass putting greens. ASA-CSSA-SSSA Annual Meeting Abstracts. Long Beach, CA.

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