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ABOUT THE COVER

Our cover artist Beverly Bergemann captures the beauty, challenge and mystique of the 9th hole at Blackwolf Run Golf Course, host of the 2009 Wisconsin State Open.

"Rest is not idleness, and to lie sometimes on the grass under trees on a summer's day, listening to the murmur of the water, or watching the clouds float across the sky, is by no means a waste of time."

– By John Lubbock (1834 to 1913) English banker, politician, biologist and archaeologist. This quote by Sir Lubbock reminds us to take a moment to enjoy and reflect on the many gifts we have during this busy summer season.

THE GRASS ROOTS

THE GRASS ROOTS is a bi-monthly publication of the Wisconsin Golf Course Superintendents Association, printed in Waunakee, Wisconsin by Kramer Printing. No part of THE GRASS ROOTS may be reprinted without expressed written permission by the editor.

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Deep Thoughts...

By Dustin Riley, *Certified Golf Course Superintendent, Oconomowoc Golf Club*

The President's message within *The Grass Roots*, has always been a great avenue to communicate an update of Association activities to the members of the WGCSA. With the hiring of Brett Grams and Paydirt Services, LLC, WGCSA activity updates will now be provided by Brett, the WGCSA Chapter Manager. So, what should I discuss in my message? Life lessons? Philosophies?

Yikes! I may ponder some thoughts once and a while, but by no means am I to be included with the likes of Plato, Aristotle or even Friedrich Nietzsche. Heck, I had to search the internet to learn how to spell their names correctly. When it comes to birthdays or anniversaries, thank goodness for Hallmark cards, because if I ever need to come up with an original, witty statement, I'll either hurt my brain or it'll end up becoming a "Roses are Red, Violets are Blue" rhyme. Language creativity is NOT a skill or gift I can flaunt. So, this message will not include any profound thoughts or visions.

But, I can use this message to remind everyone of a few things. As golf course superintendents we:

- Have the skills, education and work ethic to help our facilities succeed, even during these difficult economic times.
- Have the vision and ability to adapt to any crisis or situation. As well as the willingness to "jump in and get it done".
- Have the obligation to acknowledge and praise our employees that are key to our success.
- Have absolutely NO control over weather. As soon as we think we are a 1/4 step ahead of Mother Nature, she quickly reminds us who's boss. And where else can one manage turf in a climate that can experience October, mid-August and September weather over a 10-day span in June.
- Should use sun screen and schedule skin cancer screenings. We love to work outside. Let's protect ourselves and our families. Besides, it's not really too impressive that we have great sun tans only from the "neck up" or from the "elbows down".
- Need to laugh. "Laughter is almost as effective as exercise on physical and mental well being. About 100 to 200 laughs are equivalent to 10 minutes of jogging or rowing because this boosts blood flow by at least 20% and reduces the risk of developing heart disease." (National Post, April 11, 2008)
- Have a great network of professional colleagues that is willing to provide advice or experiences when any one of us encounters a problem.
- Need to avoid taking golf course criticism too personally. It's impossible to please 100% of the people 100% of the time. There will always be a member or guest that believes the "other courses" do something better. Focus on the areas that we have control of. Yet remember, that the "other course's" members or guests are saying the same thing and could be referencing your golf course.

And finally...There's only 24 hours in a day. Remember your family needs to be part of each and every day.

Take care. Be happy. Enjoy life.

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Managing Shaded Turf, Part I: Why Shaded Putting Greens Go Down in the Summer

By Dr. John Stier, *Professor and Chair, Department of Horticulture, University of Wisconsin-Madison*

It's been estimated that approximately 25% of our turf suffers from some sort of shade stress. Certainly, most golf courses have at least one putting green where shade causes the turf to thin and grow poorly. I've been on too many courses that otherwise looked impeccable, but where the superintendent was having difficulty keeping their position because of a problem shaded green, to think that shade doesn't cause job stress, too.

We often create our own hells. Many of us have visited courses during their construction, only to see putting greens purposely placed in a grove of trees, where lack of sunlight and air movement are sure to cause problems. On older courses, it's not uncommon to hear something like ""clearly the superintendent is at fault, we didn't have these problems 20 years ago when the course was built". My comment back is usually something to the effect of "What do you think the trees have done in 20 years?" These types of situations are what leads some people to the conclusion that a chainsaw is a superintendent's best friend!

Sometimes the turf survives adequately for several years, only to die in one particular summer or spring for no apparent reason. Again, the superintendent is not necessarily at fault because various stresses can accumulate over the course of a summer or winter that tax the grass beyond its limits. For example, my neighbor, who lives on a heavily wooded lot, reseeds his lawn nearly every spring. The lawn looks great for the first several weeks after germination. By late summer, the turf is noticeably thinner than it was in the spring. In the following spring, it is sometimes no better or worse, other years it's nearly completely dead. What's going on?

Turf dies in the shade for at least one of three reasons. Tree roots can outcompete turf for water, reducing the turf's ability to grow. Contrary to popular belief, the roots of many tree species grow quite close to the surface. I've seen semi-shaded putting greens where the turf died back in squiggly lines during summers; digging into the green, large tree roots were at fault.

The second, and more common reason, for turf death on shaded putting greens is disease. In shade, the lack of air movement and sun create high humidity and moderate the temperature fluctuations, which make for a microclimate more favorable for fungal pathogens. *Microdochium* patch (otherwise known as pink snow mold) is a common pathogen during the summer in shaded conditions (Fig. 1). We often don't see the typical snow mold patch on the surface, though, as the fungus usually grows just below the leaf surface, sapping the vitality of the living grass plants, causing leaves to discolor and turf to thin. Rarely does the fungus actually produce visible mycelium as shown in Fig. 1. However, I believe the Turf Diagnostic Lab at the O.J. Noer Facility has received samples containing *Microdochium* patch disease in every month of the year, with samples during the summer coming from shaded areas. Powdery mildew, leaf spot, brown patch, and rust are other diseases which are favored by shade. Dollar spot, incidentally, does not appear to be favored by shade, though it's possible the disease may cause different types of symptoms than we're used to seeing.

Fig. 1. *Microdochium* patch on Kentucky bluegrass at 10% sunlight. Note the yellowed leaves caused by the disease before the obvious patches of mycelium developed on the surface.

Lack of sufficient light is the main reason turf dies in shade. Light is necessary for photosynthesis, which produces carbohydrates (sugars) for the plant to use for growth and respiration 24 hours a day, seven days a week, 52 weeks of the year. Photosynthesis, of course, occurs only during the day when temperatures are above freezing, and is very limited until temperatures reach about 40° F. Respiration increases as temperatures rise, and if respiration rates surpass photosynthesis, the turf eventually runs out of carbohydrates and dies (Fig. 2). Consequently, if the summer temperatures are too high, my neighbor's turf is unable to

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store enough carbohydrates to supply the turf during the winter, and so in the spring the turf can be dead, assuming it can even survive the summer. I've offered him my chain saw, but he's refused it. The best thing my neighbor has going for him is his eternal optimism and an indulgent wife!

Quality of light is also important. Light comes in different wavelengths: picture light coming from a prism, where white light is split into the colors of a rainbow (think Pink Floyd's album cover "Dark Side of the Moon"). Tree shade reduces the amount of high energy blue light, transmitting instead mostly the lower-energy red light to the turf. The lack of blue light received by turf starts a chain reaction which ends up in the form of weak, spindly shoots with long, narrow leaves and an under-developed root system. This etiolated condition occurs because the turf produces excessive amounts of the hormone gibberellic acid, which causes excessive cell elongation. When photosynthesis rates are high, cell elongation is accompanied by production of more cell wall material, resulting in relatively thick cell walls and wider leaves that can resist traffic and disease-causing fungi. In the shade, the turf plants don't make enough sugars to continue building the cell walls as thick as they should be, making the plant less traffic tolerant and easier for fungi to enter. The lack of light also means each plant has fewer shoots, and those shoots have fewer leaves, than plants in full sun. In some cases, the vascular system disintegrates, reducing the plant's ability to transport water, nutrients, and sugars. In any case, the lack of strong, robust growth makes the turf less traffic tolerant which isn't a good thing for putting greens.

In some cases, turf is only shaded from one or two sides, and may receive full sunlight for several hours a day. The rule of thumb is that six hours of sunlight a day will allow turf to grow about as well as turf that doesn't receive any shading has actually been based on research (Bell and Danneberger, 1999). A probable misperception is that morning sun is better than afternoon sun. A look at the actual amount of light that occurs on a given day, however, reveals no differences in the amount of light energy between morning and noon, unless cloud cover occurs for part of the day (Fig. 3). Figure 3 also shows that six hours of sunlight between 6 am and 12 pm still doesn't provide as much energy as six hours of sunlight from 9 am to 3 pm. Furthermore, Bell and Danneberger (1999) actually tested morning versus afternoon sunlight on creeping bentgrass and found no difference in growth, which is pretty good news considering most of us don't have much say in whether shading of a putting green will occur in the morning or the afternoon.

In the next issue of *The Grass Roots* I'll cover strategies for successfully managing shaded turf.

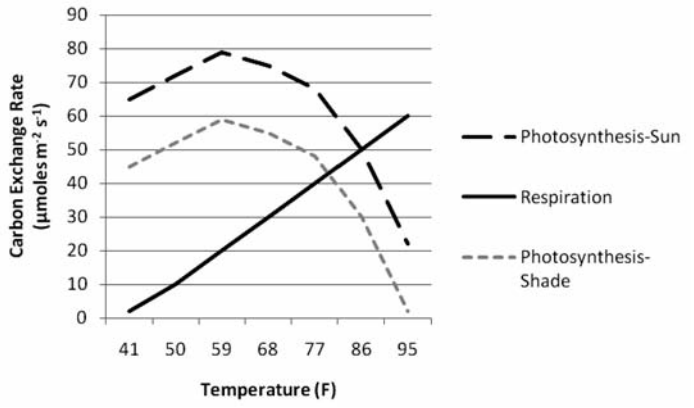

Fig. 2. Representation of temperature and shade effects on photosynthesis and respiration of creeping bentgrass, modeled partly after Gaussoin et al., 2005.

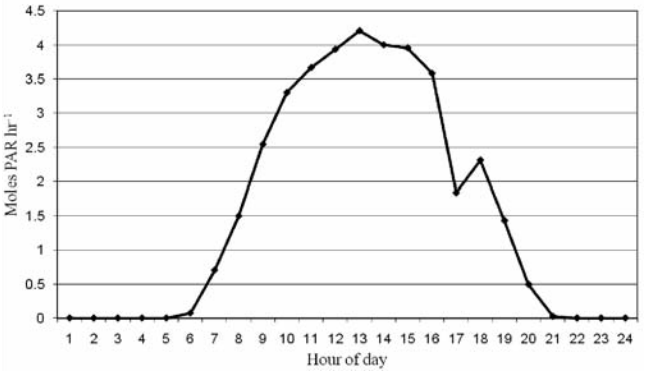

Fig. 3. Hourly variation in sunlight (= PAR) at the O.J. Noer Turfgrass Research and Educational Facility in Madison, WI, on 28 May 2006. Sunlight used in photosynthesis is termed photosynthetically active radiation (PAR) and is measured in mols. The dip between 5 and 6 pm was due to cloud cover.

Conventional strategies such as pruning, changing the height of cut, and others will be discussed. I'll also cover some new strategies that have been developed in the past 10 years from university research, including some funded by the Wisconsin Golf Course Superintendents Association!

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When the Bark is Bigger Than the Bite!

By, Paul Koch, *Turfgrass Diagnostic Lab Manager, University of Wisconsin - Madison and* **Dr. Jim Kerns,** *Department of Plant Pathology, University of Wisconsin - Madison*

For seven days in mid-June, summer in Wisconsin was nasty. High temperatures reached the mid-90's, dew points stretched into the unbearable 70˚ range, and the only breath of wind came when cruising around on a cart. Even the number most turfgrass pathologists look at, the nighttime lows, were only getting down into the mid-70's. After a cold spring, summer had finally announced its presence.

What this meant for the region's superintendents was a lively, and in some cases panicked discussion on when and what to spray for proper disease control. Most of the talk centered on Pythium blight (*Pythium* spp), which under the right conditions can cause significant damage in a short period of time. According to the Compendium of Turfgrass Diseases, 3rd ed., those optimal conditions are high temperatures between 86 and 95˚F, low temperatures above 68˚F, with oppressive humidities and/or the presence of free water (Smiley *et al.*, 2003). We certainly had those conditions during our hot spell in June, but surprising to some we actually saw little in the way of Pythium blight on Wisconsin golf courses.

During my 4 year tenure here at the Turfgrass Diagnostic Lab, I have observed that Pythium blight is actually one of the most over-diagnosed diseases made on site at the golf course. This doesn't mean we don't see Pythium blight in Wisconsin, we do, but its not nearly as widespread on creeping bentgrass during hot conditions as some might think. Whenever fluffy, white mycelium is observed on turf during the summer it's usually assumed to be *Pythium*. But oftentimes it's actually another disease that we see much more commonly during Wisconsin's summers, and one very few superintendents tend to worry about.

Brown patch in its early stages of symptom development can actually appear quite similar to Pythium blight. The turf can appear purplish or have a reddish cast, start out as small and irregularly shaped

patches, and can even produce the dreaded white, fluffy mycelium. As the disease continues to develop, the patches increase in size and become more circular and tend to look like the "classic" brown patch we all know and love. But not too many of us tend to sit around and let diseases develop to see which destructive disease we might have.

The literature says that brown patch symptoms develop in much the same conditions that Pythium blight does; high humidities and nighttime temperatures above 68˚F. So why then do we normally see more brown patch in Wisconsin than Pythium blight? To give an oversimplified answer, the reason is water. *Pythium* organisms are not true fungi, but instead belong to a related group called oomycetes (or commonly known as water molds). They require ample free water to produce their fast moving infective propagule called a zoospore. Zoospores move quickly in the presence of water, and can infect turfgrass plants before the turf knows what hit them. But in the absence of free water, *Pythium* will usually produce a more long-term survival structure called an oospore. Oospores can infect turf themselves, but don't usually cause the rapid disease progression associated with Pythium blight. Instead, they can produce another structure called a zoosporangium that will produce zoospores once free water returns (Couch, 1995). Since *R. solani* does not produce any spores or other forms of fast moving infective propagules, it doesn't require the ample free water present to infect the turf that Pythium blight does. The lack of free water, along with shorter intervals of oppressive summer weather compared to other parts of the country, are the main reasons we experience more brown patch then Pythium blight in Wisconsin.

When fluffy, white mycelium is observed in the turf immediate plans are usually made to make a fungicide application to control the disease before it spreads (Figure 1). Since white, fluffy mycelium was observed and Pythium blight is thought to be a more destructive disease, usually an application of mefenoxam (Subdue Maxx™) or propamocarb (Banol™) is made. While both of these products are excellent for controlling Pythium blight, they provide no control of any other commonly seen turfgrass diseases. Other fungicides such as azoxystrobin (Heritage™) and pyraclostrobin (Insignia™) provide acceptable control of Pythium blight, but provide excellent control of brown patch and several other patch diseases (Vincelli and Powell, 2007). Since brown patch is more commonly observed instead of Pythium blight anyways, applying a more broad-spectrum fungicide might be the more cost effective move. This situation played out at least one Madison-area golf course, where the superintendent feared Pythium blight damage and made a course-wide mefenoxam application. It was only after a disease outbreak on the course did he send a sample to the TDL for diagnosis, have it diagnosed as brown patch, and make a second course-wide application with a more broad-spectrum fungicide.

Figure 1: While both diseases can produce copious amounts of white mycelium, under intense conditions of heat, humidity, and water Pythium blight will be more damaging. Both these samples were incubated in a moist chamber for two days at 90˚F, and the Pythium sample on the right has caused more extensive damage than the brown patch sample on the left.

Figure 2: Pythium blight observed near a drain tile, where ample free water will cause optimal infection conditions.

Now this isn't to say that Pythium blight is not a problem in Wisconsin. We did receive several samples of Pythium blight during the June heat wave, but they were oftentimes isolated to certain environments. Pythium blight near bodies of water or near drain tiles (Figure 2) was observed and shouldn't come as a surprise with the pathogen's reliance on free water. Extensive Pythium blight was also observed in many of our newly renovated bentgrass plots (Figure 3), which wasn't surprising either because of the increased susceptibility of juvenile turf plants. In any of these specialized cases, a fungicide such as mefenoxam or propamocarb should be used to provide control under these extreme pressures. To summarize, in specialized situations be ready for the prospect of significant *Pythium* infection, but just don't let *Pythium's* bark fool you into preparing for its bite.

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