



**Dennis Robinson from Horst Distributing and Chad Harrington from Autumn Ridge GC volunteered for the week.**



**One of two sand sculptures near the entrance.**



**Rusty Boldrey from Riesterer & Schnell helps to set up and stage walking mowers for the evening shift.**



**Par 3 17th Hole**

ended with a score of 72 and a tie for 18th place. Tiger Woods generated the largest crowds and conversation but he also struggled after having some hope for a comeback with a 73 on Sunday to finish with a tie for 28th.

American Express provided spectators with single channel receivers to listen to live play by play action from SiriusXM. I was unsure of the value of golf play by play at first but really enjoyed the updates in my earpiece on Sunday as players climbed and fell off the leader board.

As managers of our own facilities most of us understand the stress of a member guest or the local club championship. Try multiplying that stress by 1000 and that would describe Christopher Zugel's year.

As superintendent at the Straits course Chris is given the task of preparing the unique course for the worlds best players regardless of what curveballs mother nature or the PGA throws at him.

Fescue fairways are designed to play dry and firm but as we all know this summer has provided ample rainfall for Wisconsin Golf Courses and tournament week was no exception. Wednesday brought early and midmorning thunderstorms and when I arrived on the course after the lightning stopped I counted 40 staff members and volunteers on the 10th hole alone with

buckets, shovels and rakes walking though the back 9 bailing and preparing bunkers for the days practice rounds.

The rain and light winds provided for soft conditions and easy scoring for the first two days of tournament play before sunshine and wind firmed things up the way coastal golf is expected to be.

My favorite part of covering a tournament us sitting down with the superintendent and getting to know them and their course. I appreciate learning about families and how our WGCSA members entered the golf industry.





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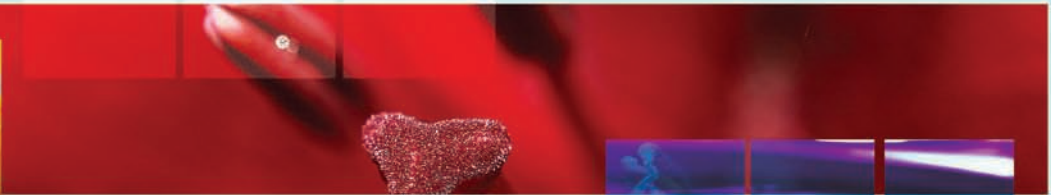
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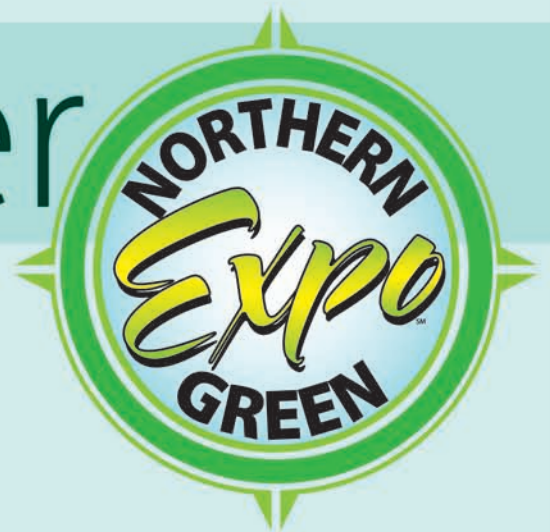


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In my short time with Chris more than once he pointed out he felt honored by the attention he and the course receives but he gives the majority of the credit to the staff members and volunteers who make it all come together. He wishes that the staff members could be in earshot every time someone compliments him on the job they do.

Tournament week there were

135 workers available with a 50/50 split between staff and volunteers to make everything perfect for the event. Zugel gives credit to Assistant Superintendents Joseph Sell and Emily Shircel for providing leadership to the staff and keeping things running smooth. No golf course provides tournament conditions without great equipment technician staff members per-

fecting the quality of cut.

Christopher spent most of his childhood in the Atlanta area where he played golf but soccer was his sport of choice. With the majority of his family in the business world Zugel was not sure what he wanted to do when he entered college but he knew he did not want to put on a suit and tie every day.

He was sure he wanted to head west for college and he picked Colorado State University in Fort Collins to start an education in history to perhaps become a teacher but quickly switched to landscape architecture.

As he spent his time drawing landscapes he was intrigued by the turf students who were learning to maintain a variety of landscapes. Working with the plants seemed to interest him, so he settled on horticulture major with a concentration in turf management, graduating from Colorado State in 2000 under the guidance of Dr. Tony Koski.

His original goal was sports turf management but right out of college any job in your field will do. Zugel was an Assistant Golf Course Superintendent at Blackwolf Run in Kohler (02-05), the Senior Assistant Golf Course Superintendent at the Straits Course (05-08) before following a dream of working at a Major League Ball Park as the Grounds Manager for the Milwaukee Brewers.

Chris's Grandfather worked for the Milwaukee Brewers from 1969 when he helped unload trucks when the team moved to town from Seattle until his retirement in 1984. His position with the ball team helped guide Zugel's interest in sports turf management. Zugel enjoyed his time working with Gary Vandenberg and being part of a major league baseball team, although the field of play is obviously smaller.

Zugel rejoined Whistling Straits in 2009 and brought major tournament experience to this year's event as he previously was on staff for the

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Wisconsin Favorite Steve Stricker walks from the 17th tee.



The Zugel family; Elliot, Haiden, Jennifer and Chris.

2007 US Senior Open and 2004 PGA Championship at Whistling Straits along with the 2002 Honda Classic at the TPC Heron Bay in Coral Springs, FL.

Before work responsibilities cut into his training time Chris was very interested in bicycle racing and entered quite a few road races around the world. He still enjoys riding but a on a more casual basis for the time being. He is helping to coach soccer for his daughter Elliott's team which has been an eye opening experience dealing with a large number of young future soccer stars.

Chris lives in Kohler with his wife Jennifer who works in the Human Resources Department for the Kohler Power Group. Along with daughter Elliott who is 5 the couple has a 2 year old son Haiden.

From talking to Zugel it is clear he enjoys the uniqueness of Whistling Straits fescue fairways and the excitement that comes from working with the Pete Dye design and championship golf. "It is fun to be part of the excitement," he explained.

Looking back at it tournament week brought weather challenges no one wanted but the staff accepted them as part of their responsibility and handled the extra work smoothly.

Congratulations to Zugel, the staff and volunteers for providing a great venue for the worlds best players. The bleachers are gone, the extra bridges removed and cart paths buried under mounds until 2015 when the PGA Championship Returns to Whistling Straits. 🌱

## Member 9 With Christopher Zugel

1. **What was your first vehicle?** 1972 Volkswagen Karman Ghia
2. **Favorite piece of golf course equipment?** Scottish Blackface Sheep
3. **18 hole Handicap?** 14
4. **What is your current vehicle?** 2009 Ford Ranger
5. **Favorite TV shows?** Formally Lost, now a tie between 30 Rock, Modern Family and Wipeout
6. **Favorite professional sports team?** Boston Red Sox
7. **Favorite main course meal?** Anything that you can get at a Mexican restaurant
8. **Pets?** German Short Hair: "Lucky"
9. **Favorite thing about working in the golf industry?** Every day is just a little bit different than the next



# Status of DMI Resistance with Respect to Dollar Spot

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

Just recently I was at a meeting in Hartford, CN to discuss DMI resistance in populations of the dollar spot fungus, *Sclerotinia homoeocarpa*. The meeting consisted of a day and a half of presentations from the likes of Dr. Frank Wong (UC Riverside), Dr. Geunhwa Jung (UMass), Dr. Lane Tredway (NCSU), and members of Drs. Jung's and Tredway's program. I must admit that I am not a resistance guru, so it was very informative meeting for me. Basically the idea of the meeting was to give researchers an idea of the current research being done and have an opportunity to discuss how to handle DMI resistance in the future. There was some very interesting data presented at this meeting, which will be discussed in the following few paragraphs.

Before talking about the presentations and some of the newest findings with DMI resistance, it is important to review what a DMI fungicide is. DMI stands for Demethylation inhibitor, which means they target a specific process in the sterol biosynthesis pathway. Specifically these fungicides prevent ergosterol biosynthesis, a critical component of a fungal cell wall (Figure 1). Without ergosterol the fungal membranes become leaky and other toxic sterols build-up, thereby inhibiting fungal growth. I know you're dying to know what mechanisms control sterol biosynthesis! This is where DMI resistance becomes fuzzy. The genetics behind sterol biosynthesis is messy to say the least. This is the reason why the DMI fungicides are considered to have a low to medium risk for resistance.

Although the fungicides do act on a single site, many genes regulate the single site and there are probably many different types of ergosterols. The bottom line is DMI resistance within dollar spot fungal populations is real, but has rarely amounted to control failures.

Back to the presentations, Dr. Wong spoke about using the examples in other crops as a means to learn about management in turf-grass. Basically in other crops researchers have found that the level of DMI resistance can be delayed or maintained by increasing rates and shortening intervals between sprays. Although Dr. Wong was correct, the problem with turf is the rates are already

much higher than in other crops and currently intervals are already relatively short. I guess if there were issues with dollar spot control we could shorten intervals to 7 days, but many courses in the Midwest do not have a budget that would sustain such costs. Dr. Wong also highlighted that DMI resistance seems to be fairly stable once we detect reduced levels of sensitivity to the fungicides. In other words, we may not revert back to a population that is extremely sensitive by avoiding the DMI chemistries all together. That being said, it does not mean that we cannot use DMI fungicides. By using management strategies like tank mixing and alternating

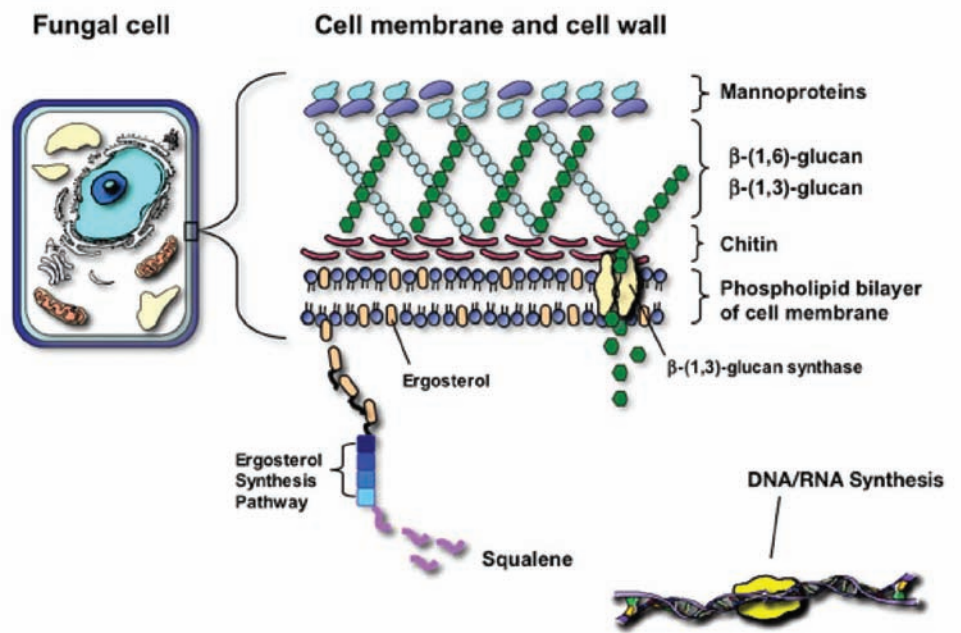



Figure 1. Depiction of ergosterol within a fungal cell and the mechanism proposed for synthesis of the molecule. Notice how many ergosterols are contained within the fungal cell membrane, which depicts how important ergosterol is to a fungus. The image was adapted from [http://www.doctorfungus.org/thedrugs/antif\\_pharm.htm](http://www.doctorfungus.org/thedrugs/antif_pharm.htm).

chemistries, we can sustain the level of sensitivity within the pathogen population.

Following Dr. Wong, Dr. Tredway discussed the differences in controlling DMI resistant *S. homoeocarpa* individuals curatively and preventatively. He found that curatively the DMI fungicides were not able to suppress the very resistant individuals. Preventatively however, he did not see any differences in control regardless of the sensitivity level of the pathogen. Basically dollar spot is controlled well with preventative applications versus curative applications. I think this is something the Midwest has known for a long time! I do think that DMI fungicide resistance is something to keep in mind because we do not want to lose that class of chemistry. Yet I do not think it is the main reason for the reduction in intervals I heard about at this meeting, nor do I think it is the only explanation for the lack of curative control. We do not know enough about the biology of the dollar spot fungus to make these conclusions. For all we know the fungus may not be active when curative applications are conducted. Hopefully the turfgrass pathology program at UW can answer some basic biology in the next few years.

Remember I mentioned the genetics of DMI resistance was messy, well Dr. Jung and Dr. Banya Ma (a post-doc in Dr. Tredway's program) elaborated on this. They are working on identifying the genes responsible for DMI resistance in the dollar spot fungus. They have made significant progress, but they are finding that the picture is not so clear. Dr. Tredway's group has found a gene that appears to be correlated with DMI resistance, but they still have quite a bit of work to do. Dr. Jung's group is working on characterizing the importance of an efflux pump in *S. homoeocarpa* populations. This pump is thought to be a mechanism that allows the fungus to pump out the DMI fungicides, thus avoiding growth inhibition. These two are doing excellent work and have formed a nice collaboration. I cannot wait until the next time we get together to hear what they are doing.

Essentially, resistance to the DMI fungicides is real and something to keep in mind. I am unsure of how much field resistance actually exists because of the rates and intervals we use in turf. However, it is imperative to practice tank mixing DMI's with a multi-site inhibitor such as chlorothalonil or mancozeb or rotate to a different mode of action. This will help delay or prevent the onset of field resistance. Keep in mind there are many flavors of DMI's presently: propiconazole, metconazole, triticonazole, triadimefon, fenarimol and myclobutanil. Look at the Frac code listed on the fungicide label, rotating chemicals means not using another chemical with the Frac code # 3. Fungicide resistance is a complicated subject and if you have any concerns or questions, please do not hesitate in contacting us! 

## ELIMINATE GUESSWORK WHEN SPRING FEEDING

Spring fertilization varies greatly on a number of factors. Cultural practices performed, soil amendments made, irrigation and drainage upgrades, fertilizers applied, and what happened last fall plays a significant role with this season's success. However, having a sound fertility program will provide you with your best chance of success for the upcoming season.

Typically, spring applications are applied after the early flush of shoot growth has occurred, but predicting spring weather can be a challenge when it comes to soil and air temperature, and precipitation. That's why choosing a fertilizer that performs in cool climates is so vital.



**John Meyer**  
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Although fine-tuning a spring fertilization program varies on many factors, its importance will be felt all summer long and even into the fall. The benefit of using an all-weather, long-lasting performer such as UMAXX provides immediate benefits, as well as a positive long-term impact. UMAXX gives the freedom to apply as a nitrogen component in a blend or part of a soluble fertilizer program. UMAXX offers consistent performance regardless of temperature or application type.

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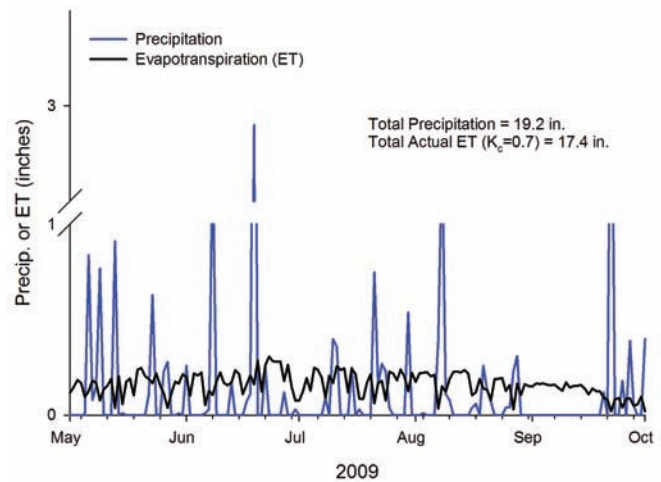
# Wetting Agent Research Update: Wetting Agents in Wet Conditions

By **Dr. Doug Soldat**, Department of Soil Science, University of Wisconsin-Madison

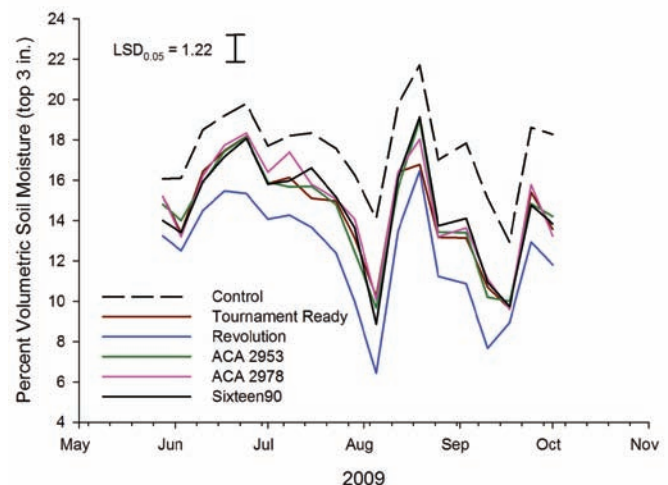
Golf course superintendents have a plethora of wetting agents to choose from, and each product comes with a relatively non-descript list of proprietary ingredients but a long list of potential benefits. Only 13% of superintendents surveyed by Karnok and Tucker (2009) indicated that they felt all wetting agents were basically the same in terms of performance. In addition, 72% felt that some wetting agents tend to hold water in the surface of the soil while others tend to keep the soil surface dry by moving water deeper. Indeed, some wetting agents manufacturers claim their products move water down through the root zone, while others claim to hold it near the surface, but others promise to do both. While the claim of doing both seems a bit like double-dipping, it's probably the closest to the truth.

Water has three properties that control its behavior in the soil and elsewhere. First, it has a high degree of **cohesion**, and therefore, water molecules have a tendency to “stick” to other water molecules. You can see this property the next time you are driving somewhere in the rain. Take a look at a raindrop as it runs down the windshield; it will veer off course from a straight line to gobble up other smaller rain drops on the window. Water's cohesive properties give rise to the second important property: **surface tension**. Surface tension is a measure of how hard it is to break through the surface of a liquid. The high surface tension of water allows some bugs to walk across its surface. The final important property, adhesion, describes the attraction of water to other materials. Adhesive forces between water and a material like wax paper are very low. When this is the case, cohesive forces overwhelm the adhesive forces and water forms a fairly round droplet (think car wax). However, when adhesive forces between a material and water are high, the adhesive force overcomes the cohesive force of the water, and the droplet will flatten out across the wettable surface.

In general, wetting agents do two things; first they decrease the surface tension of the water, thus (to quote an oft-used marketing term) making “water wetter”. In a soil with only wettable surfaces, decreasing the surface tension should lead to less water being held in the soil pores (remember, it will be flatter). The second thing most wetting agents do is prevent soils from becoming hydrophobic or non-wettable. Therefore, in a hydrophobic soil, using wetting agents



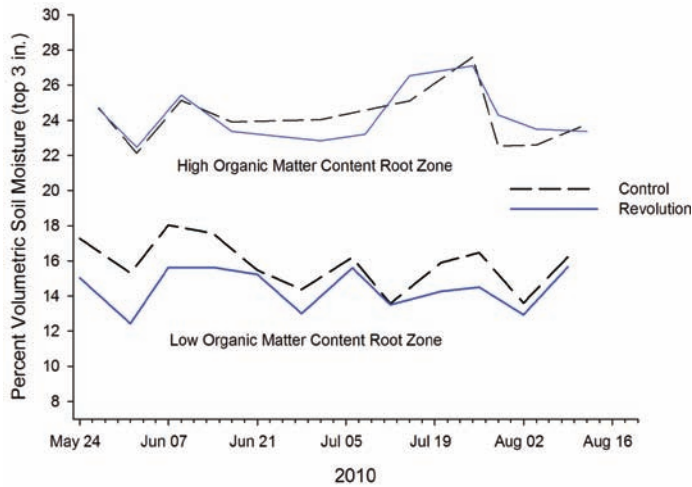
**Figure 1. Rainfall and evapotranspiration data from the research site in Madison, WI**



**Figure 2. Season-long soil moisture content in the upper three inches as affected by various wetting agents applied to a one year old 'A4' creeping bentgrass sand putting green with 0.7% soil organic matter. 2009 was a very wet season as shown in Figure 1.**

will increase the moisture holding capacity of the soil compared to an untreated, hydrophobic control area. However, if the soil does not become hydrophobic, using wetting agents can lead to slightly lower soil moisture than untreated areas. This phenomenon was observed and described in the August 2010 issue of GCM (Soldat et al., 2010), when a putting green soil treated with wet-





**Figure 3. Soil moisture content in the upper three inches as on the same site (low organic matter content) and another higher organic matter content sand putting green in 2010 as affected by Revolution, the only wetting agent re-tested from the 2009 group. 2010 has been wet as well, but results are much less pronounced than those seen in 2009 (Fig. 2).**

ting agents (Aquaduct, Primer 604, or Revolution) had lower moisture content than the untreated control early in the season under wet conditions, and greater moisture content than the control later in the season under dry conditions. Hence, the marketing experts can have their cake and eat it too: some wetting agents can decrease moisture under wet conditions and increase it under hydrophobic conditions.

So far, we've been very general in our discussion of how wetting agents work, and for even more information see (Karnok et al., 2004). But now let's take a closer look at some differences among different products during two very wet years in Wisconsin. We definitely learned that the behavior of wetting agents can be site specific (soils, weather, etc.) from the 2004 GCSA Wetting Agent Evaluation (Throssell et al., 2005a, 2005b). With this in mind, the following results are from a one-year-old 'A4' creeping bentgrass USGA putting green with no amendment. The organic matter content of the root zone averages a paltry 0.7%. The putting green was mowed six days a week at 0.125" with a Toro 1000. To this putting green, five wetting agents were applied and compared to a non-treated control. Each treatment was replicated three times in a randomized complete block design. We measured the volumetric soil moisture content in the upper three inches every week with a TDR probe.

The wetting agents evaluated in 2009 included Tournament-Ready® (proprietary blend of nonionic carbohydrate surfactants, polyoxyethylene-polyoxyethylene-polyoxypropylene glycol, polydimethylsiloxane) from KALO, Inc. and four compounds from Aquatrols: Revolution (a patented methyl capped block polymer), Sixteen90 (propoxylated polyethylene glycols), and two experimental products, ACA 2953 and ACA 2978.

In 2010, the same study was repeated on the same 'A4' putting green using other surfactants with only Revolution being the same from 2009. We also put tested Revolution versus a control under the exact same conditions except on an eight year old "L-93" sand-based putting green with about 4% organic matter.

The weather during 2009 was a golf course superintendent's dream. We seemed to have a quarter inch of rain every 4 or 5 days (Fig 1.) with below average temperatures. I'm sure nobody is looking for a reminder of what the summer of 2010 was like, but for anyone who didn't experience it first hand, let's just say it was very hot and wet which led to lots of dead annual bluegrass all over the state.

Figure 2 shows clear and consistent differences in soil moisture between the wetting agent treatments and the untreated control. For most of the season, the wetting agent treatments had significantly lower soil moisture than the untreated control. While Tournament-Ready, ACA 2953, 2978, and Sixteen90 tended to group together in soil moisture content,

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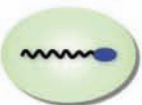
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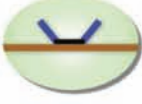
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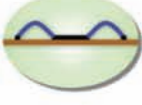
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