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The 518 yard second hole at 2012 Wisconsin State Amateur Championship, The Club at Strawberry Creek.

I think everyone should go to college and get a degree and then spend six months as a bartender and six months as a cabdriver. Then they would really be educated.

By Marquette University, Head Basketball Coach, Al McGuire, 1928-2001

This quote by McGuire reminds us of the importance of interaction with people from all walks of life.

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Attitude, It's Your Choice

By Jeff Millies, Certified Golf Course Superintendent, Edgewood Golf Course

The 2012 golf season sure started off with a bang. Many of us were short handed back in March with the unusually warm weather. I can't remember ever having to do so much mowing that early in the season. April then brought us back to reality with the colder temps and frosty mornings.

It seems the weather continually keeps us on a roller coaster. Sometimes making us sick to our stomachs yet always forcing us to react and adjust our schedules based on yesterday's weather or tomorrow's forecast. Time after time we hear how people hate

change but few Superintendents or golf courses find themselves in any type of steady state at the moment. A challenging economy, external demands, and a highly competitive environment are making change a necessity rather than a choice.

I believe most Superintendents unknowingly crave change. Most of us appreciate everyday being different and need new challenges to keep things interesting. If everyday was the same it would seem like we are on auto pilot, and it wouldn't be long before work might seem boring and we start looking for that next project. I realize many of us right now might be wishing for a boring week of routine daily tasks, but remember, it's really about your attitude.

“Attitude can change everything. Each day with every opportunity you have a choice of being either positive or negative.”

Attitude can change everything. Each day with every opportunity you have a choice of being either positive or negative. It's amazing how many people surrender that choice to other people or other things. Realize that every interaction with someone leaves that person feeling either better or worse, there are no attitude neutral interactions.

If your crew is starting to have a less than positive attitude, the first place to look for their attitude is in the mirror. Their attitude is most likely a reflection of yours. Our attitudes are contagious whether good or bad, the choice is yours. So choose wisely this summer and notice the difference in you and your crew.

Congratulations to the team of students from the University of Wisconsin Madison for coming in fourth place in the GCSAA 18th Annual Turf Bowl. The team of Dustin Bernau, Joe Betcher, Ben Luedtke, and Brian Huiras brought in \$300 for their placing. It is a great showing and with a little more studying the Badgers can unseat the Cyclones from Iowa State. Iowa has taken first place 12 of the past 14 years. That is a dynasty any team can be proud of.

Upcoming events include June 25th the WGCSA Golf Tournament Meeting at Oshkosh CC, July 31st is the Summer Field Day at OJ Noer Center, and August 20th is the WGCSA Golf Meeting at Lake Arrowhead GC.

Make plans to attend these events and enjoy a day of fellowship and networking. I look forward to seeing everyone's smiling faces.



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The Incredible Disappearing Fungicide

By Paul Koch, Turfgrass Diagnostic Lab Manager, O.J. Noer Turfgrass Research and Education Facility

It is considered by many one of the most uninteresting aspects of being a turfgrass manager. Right now, most of you are thinking of that one thing you dread from an interest standpoint more than anything else. Some of you are thinking of board meetings, others of sitting through an 8 hour educational session at the Golf Industry Show, others still of trying to listen to one of the faculty or staff talk at the WTA Summer Field Day while the brats are grilling mere feet away. All those things may be tough to beat, but what I'm thinking of is sprayer calibration. I see this first hand as one of the instructors, along with Dr. Jim Kerns and P.J. Liesch, of the Turf and Ornamental Pesticide Applicator Safety Training Sessions. I imagine calibrating sprayers is the sole reason many superintendents hire interns, and even I fully admit pulling out the calculator and the graduated cylinder containers doesn't get my juices flowing either, and

I'm supposed to really like this stuff.

But let me tell you why it's important, and not the normal reasons that I coax with such effort out of the crowds at the Pesticide Training Sessions. Yes it saves you money and it's the law and it's critical for effectively controlling disease; all very important things. But the main reason you should calibrate is because even the best calibrated machine is still going to lose upwards of 90% of the fungicide between the time you put it in the tank and 1 hour after the fungicide has been applied to the turf. When the margin for error is this small, even an extra percentage or two of fungicide lost due to improper calibration can be the difference between disease control and disease breakthrough.

As part of my fungicide degradation research, I measured the concentration of chlorothalonil and iprodione in the initial water mixture in the tank, at the spray from the nozzles, and finally on the leaf

blades one hour following the application. A 2 nozzle research boom was used, and both fungicides were sprayed using 8004 Flat Fan nozzles. Chipco 26GT (iprodione) at the rate of 4 fl oz/1000 ft² in 2 gallons of water per 1000 ft² and Daconil WeatherStik (chlorothalonil) at the rate of 5.5 fl oz/1000 ft² in 2 gallons of water per 1000 ft² were initially analyzed by the Pesticide Analysis Laboratory with the Wisconsin Department of Agriculture, Trade, and Consumer Protection (WDATCP). WDATCP also analyzed solutions of both pesticides after they were sprayed into plastic receptacles. WDATCP analyzed the initial solution and the spray solution using a method known as Gas Chromatography/Electron Capture Detection (GC/ECD). In a separate experiment, both fungicides were applied to turfgrass and then the turfgrass was analyzed for fungicide concentration 1 hour later in our lab. Our lab used an enzyme-linked immunosorbent assay (ELISA) method to measure the concentration of both iprodione and chlorothalonil on the leaf blades.

What we found was that the concentration of both fungicides drops a minor amount from the solution in the tank to the spray coming out of the nozzles, but then drops a tremendous amount between the solution emanating from the nozzles and the leaf blades one hour following application (Figure 1). From our analysis, the concentration of iprodione drops from 3635 parts per million (ppm) in the tank, to 3090 ppm coming out of the nozzles, to just 350 ppm on the leaf blades one hour following application. The concentration of chlorothalonil shows a similar drop, from 7370 ppm in the tank to 6590 coming out of the nozzles to 1000 ppm on the leaf blades. This amounts to a 90% drop in fungicide concentration from tank to leaf 1 hour later for iprodione and an 85% drop for chlorothalonil. No matter how you slice it, those are significant numbers.

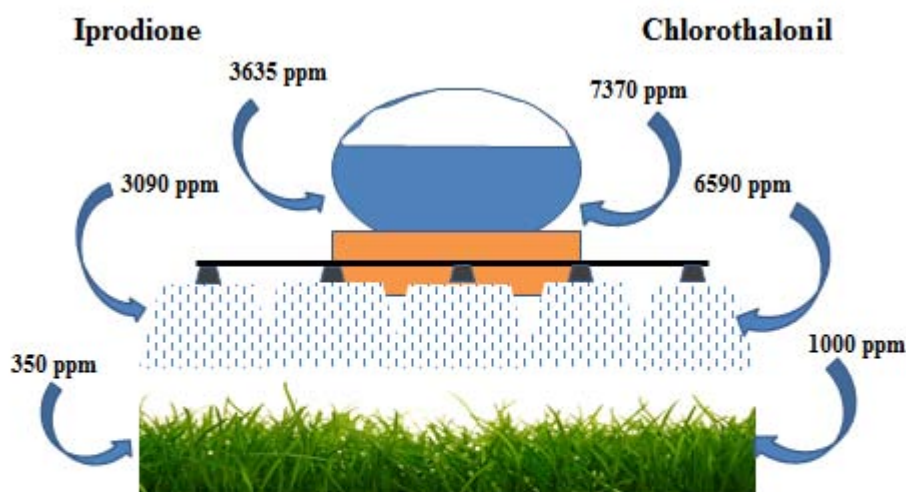


Figure 1. The drop in concentration of both iprodione and chlorothalonil can reach 90 and 85%, respectively, from the tank to the turfgrass leaf blades one hour following the fungicide application.

TURFGRASS DIAGNOSTIC LAB

The 10-15% drop in concentration from the tank to the spray solution is fairly minor and can likely be explained by escape of small fungicide particles into the atmosphere. But what can explain the further 75-80% drop in concentration from there to the leaf blade 1 hour later? This is an interesting, complex question without an answer at present. There is almost certainly a significant portion of the spray that never reaches the turf, blowing off into the atmosphere as drift. There is also probably a minor degree of volatilization of each fungicide shortly after it reaches the leaf blade, which may be more significant in warmer temperatures. A significant portion may transform into non-active molecules due to chemical reactions with other molecules or organisms on the leaf blade. In addition, each fungicide may break down in the presence of sunlight (photodegradation) while each fungicide is still in a liquid solution on the leaf blade. Our research has shown that photodegradation plays a minor role in fungicide degradation in a winter en-



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vironment on a relatively dry leaf blade, but other research has shown that pesticides in liquid solution break down fairly rapidly. Plant and microbial metabolism may also play a role, though how much can be broken down in just one hour remains to be seen.

Clearly, the loss of so much fungicide in such a short period of time has large consequences for disease control. Determining the degree of influence that these factors have on turfgrass fungicide degra-

dation could lead to methods for mitigating those losses, and potentially towards reducing the amount of fungicide we add into the tank. Years of research will need to be implemented to investigate each of these factors individually under a variety of conditions before any general recommendation can be made. In the meantime, make sure the intern knows how to calibrate this summer, every percent counts.



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Factors Affecting Fungicide Performance

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

As summer approaches so to does the battle between diseases and golf course superintendents. Although in a perfect world it would be nice to manage fungal diseases without using a pesticide, yet we do not currently have that option. Fungicides are necessary in order to maintain the quality playing surfaces golfers demand, but it never hurts to understand the factors that affect fungicide performance. With an understanding of these factors, I believe that golf course superintendents could maximize their fungicide programs and possibly even extend residuals of some of their applications.

The primary factors that affect fungicide performance are what Rick Latin refers to as deposition factors, depletion factors, disease pressure and fungicide resistance. Dr. Latin discusses these factors extensively in his book *A Practical*

Guide to Turfgrass Fungicides, which in my humble opinion is by far the best Turfgrass text I have ever read! Deposition factors refer to deployment of the fungicide, which includes application rate, application volume, application timing and application interval. Depletion factors refer to the removal of a fungicide either through degradation processes, mowing or rainfall. Disease pressure refers simply to the disease triangle- there are some circumstances when the pressure is so intense that more frequent and higher rates of products are required to maintain suppression. Finally fungicide resistance is essentially the natural selection of tolerant individuals through the repeated use of a fungicide, especially ones with single site modes of action. The remainder of the article will examine these factors in a bit more detail.

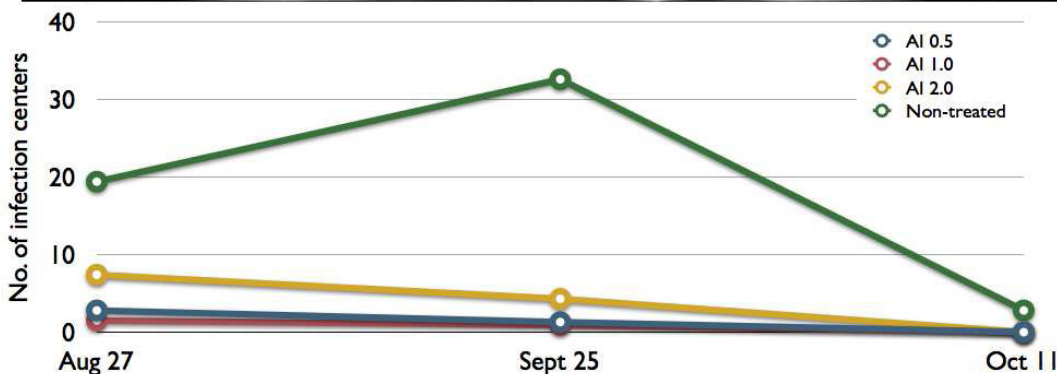
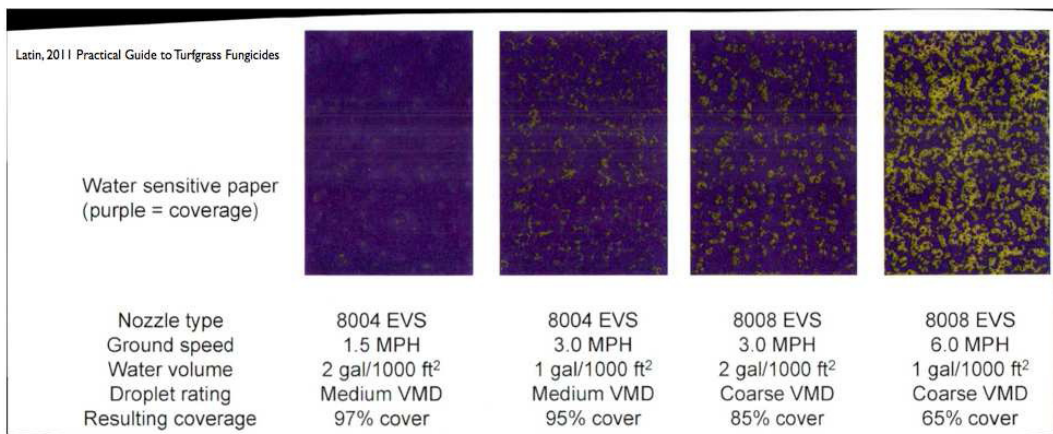
Deposition Factors:

Fungicides are typically applied using water as the carrier and one of the most controversial topics is how much water should I use. Most researchers apply fungicides in 2-gallons/1000 ft², yet most golf course superintendents try to limit that water volume for efficiency during the application. Do you run the risk of losing performance when the water volume is cut from 2 gallons to 1.5, 1 or even lower? Coverage is not ideal when spraying fungicides from a sprayer traveling at 6 mph so why reduce water volume too much (Figure 1A). Most of the current research has focused on evaluating different water volumes for the control of dollar spot. Research conducted at Kansas State University demonstrated that water volumes could be reduced without sacrificing dollar spot suppression when using chlorothalonil (Figure 1B).

Figure 1.

A. Various coverage on water sensitive paper when applied with different nozzles, at different speeds and in different water volumes. Notice the coverage when applying at 6 mph at 1 gal/1000ft².

B. The graph depicts the effect of water volume on the control of dollar spot with chlorothalonil.



Kennelly, 2009 Applied Turfgrass Science



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These applications were conducted biweekly, which probably demonstrates that frequency of applications are important when lowering water volume.

The question I pose is what happens if we use a DMI or another product and expect more than 14 days of control? Does the residual control change with increasing water volume? I ask these questions because we routinely get exceptional control in our dollar spot trials with limited breakthrough, yet I rarely hear of the same control from golf course superintendents. Yes I know we do not have traffic and golfers at the OJ Noer and most certainly an argument could be made about how this influences disease pressure. However, keep in mind that we as plant pathologists are morbid and we do everything possible to induce disease development, so it's unlikely that the pressure observed at any particular golf course is higher than the pressure at the OJ Noer. We plan to deploy our own water volume experiment this summer looking at residual control of dollar spot, in other words can we extend intervals just by increasing water volume? If you are interested come to the Wisconsin Turfgrass Association Summer Field Day on July 31st for the results.

Depletion Factors:

Once a fungicide is deployed into the environment there are many factors that remove it from the plants we applied them to. One of the biggest factors is mowing. Constant mowing is an excellent way to remove or dilute fungicides from the targeted area. No-

tice the word dilute because in some cases we are removing protected tissue and as the new growth emerges it may or may not be protected. Another factor that we have worked on extensively is the degradation of fungicides in response to temperature. Paul Koch has focused his PhD research on how fungicides persist in the environment and has found that fungicides degrade rapidly when temperatures increase from 50 to 68 to 86oF (Figure 2). It is interesting that by 14 days we cannot detect iprodione on turf when temperatures are at 86oF. Based on this particular research, we think that microbes are the main entities degrading iprodione in the environment. Therefore as temperatures increase so to will the degradation of iprodione. This is why Paul and I say increase rates and intervals during the summer months and when disease pressure is highest.

Another question I commonly receive is how long does it take for a fungicide to be absorbed. To answer this question, Pete Dernoeden's group did a very nice study that applied water 30 minutes after fungicide application. They used four different fungicides, Emerald, Chipco 26GT, Daconil Ultrex and Banner MAXX in this experiment and used dollar spot to evaluate the efficacy after rainfall. Emerald and Chipco 26GT were not affected after rainfall, but Daconil Ultrex and Banner MAXX were. This tells us that Daconil and Banner's performance can be affected if a rainstorm occurs within 30 minutes after application.

However, typically fungicides dry quickly and once they do, it is difficult to dislodge them. Therefore it is imperative to water-in fungicides immediately after application when targeting take-all patch and fairy ring.

Disease Pressure and Fungicide Resistance:

Like the past two summers, sometimes the summers are perfect for diseases. When conditions are quite conducive, it can be difficult to manage diseases even with the best fungicides. As disease pressure increases so to must the fungicide rate and interval in order to successfully manage turf diseases. For example, the past two summers have been perfect for Pythium blight especially in creeping bentgrass fairways. When conditions are ripe for Pythium, this is not the time to use low rates. Also it seems like the tendency is to assume fungicide resistance when fungicides fail to perform during the summer. While this can be a real and difficult problem to manage, it is imperative to have this tested before assuming that you have an insensitive population. I think many failures can be attributed to lack of protection because the fungicide has been degraded. I find it suspicious that fungicide resistance is typically alleged when extreme disease pressure occurs and when it is hot. I think we forget that our fungicides do not last very long in the environment or at least that's what our research shows. Before applying a fungicide this summer, I hope you consider these factors in order to maximize performance!



Iprodione Concentration Overtime in 2011

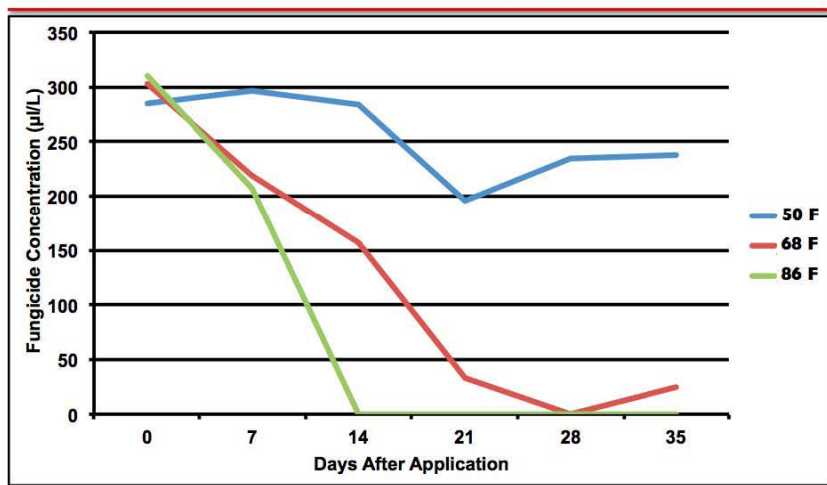


Figure 2.

The effect of temperature on the degradation of iprodione in 2011. Iprodione was applied once and plugs were brought to the lab 0, 7, 14, 21, 28, and 35 days after application to incubate at 50, 68 or 86oF. Fungicide concentration was measure using a commercially available ELISA kit.