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ABOUT THE COVER

The San Diego Conference Center from the harbor. Petco Field is visible on the right side. San Diego's famous Gaslamp District starts right across the street from the field.

“Three things in human life are important: the first is to be kind; the second is to be kind; and the third is to be kind.”

By American Writer Henry James, 1843-1916

This quote by James was used by WGCSA Historian Monroe Miller to describe the career of DSA recipient Tom Harrison and can be considered by all of us to improve our lives and communities.

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THE GRASS ROOTS

is the bi-monthly publication of the Wisconsin Golf Course Superintendents Association. No part of the THE GRASS ROOTS may be used without the expressed written permission of the editor.

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What is Important?


By Chad Harrington, Golf Course Superintendent, Autumn Ridge Golf Course

With the hustle and bustle of today, it is hard to believe that this time of year is considered the “off season.” I often get asked by golfers and others that are not in the golf industry, what do you do this time of year, it must be nice with all of that time off? My wife tells me to say “nothing”...it would be a much easier answer. I must be doing something really wrong, because I sure don't seem to get the all of the time to reflect that the general public thinks we get in our field. I will admit much of the pace is of my own doing. There are the obvious distractions of trying to get a Golf Course ready for the upcoming season with equipment needs, golf shows, event planning, and let's not forget snow removal this year. When it is time away from the course, with two young boys at home, there is never a shortage of something to do and be a part of. If it isn't coaching football, it is the school board, or maybe it is the wrestling club meetings and the weekly tournaments, and maybe a little downhill skiing on the side. Between all of the golf course projects and extra activities we

give ourselves, it can be very easy to forget what is really important. For a lot of us, that is family. During the Golf Season I hate to admit that there may be days that I don't get to even see my boys unless they come out to the course. I think that is why I try to get involved in a coaching, tutoring, or a leadership role in everything they do. Our time is in short supply and I don't want to miss what is important.

The topic of what is important for our profession in our State was offered to us at our Spring Business meeting this year by our newest recipient of the Wisconsin Golf Course Superintendent Association Distinguished Service Award, Tom Harrison. It is a great honor to be member of WGCSA board during this time and I would like to thank Tom and congratulate him on joining an extremely elite group of individuals to receive this award. Tom has been extremely active member of our Association for many years and has been an advocate for turfgrass research and the O.J. Noer Center in Madison. I especially appreciated his sentiment about remembering what is important in our profes-

sion.

As Tom gave his inspiring acceptance speech, I could help but think about everything that the previous leaders of our association have done to build and promote the turfgrass profession in our State. The fact that we have research facility with the quality of the O.J. Noer Center could be easy for us to take advantage of. Some of us probably think it has always been there and always will, but the reality is that there are many individuals that worked and gave of themselves tirelessly to insure that we would have access to some of the best testing and research in the country. They had the vision to know what was important for our industry. It is now up to each and every one of us to help make sure that the Turfgrass Research tradition of excellence in Wisconsin continue and be recognized by others in the golf community. Be an advocate of what we have. Make sure that your members, board of directors, owners, and fellow employees know about the facilities we have in Wisconsin and how important it is to our profession that we keep them. 

WGCSA MISSION STATEMENT

The Wisconsin Golf Course Superintendents Association is committed to serve each member by promoting the profession and enhancing the growth of the game of golf through education, communication and research.

WGCSA VISION STATEMENT

The Wisconsin Golf Course Superintendents Association is dedicated to increase the value provided to its members and to the profession by:

- Enhancing the professionalism of its members by strengthening our role as a leading golf organization in the state.
- Growing and recognizing the benefits of a diverse membership throughout Wisconsin.
- Educating and promoting our members as leaders in environmental stewardship.
- Offering affordable, high value educational programs at the forefront of technology and service.
- Being key to enjoyment and the economic success of the game of golf.

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Soils Under The Microscope

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

Did you know there are between ten and one hundred times more bacterial cells in your body than your own cells? The composition of these organisms play a huge role in everything from how nutrients are absorbed in your body, to whether or not you get ulcers, or how susceptible you are to ear infections. Microbiology is one of the most active and exciting research areas in science today and scientists are making new discoveries everyday that are shedding light on how much influence those little critters have on our lives. The award for the most interesting and disgusting advance goes to the practice of “fecal transplanting” where the doctor, well... you can imagine. Fecal transplanting has been used with great success to cure or treat some intestinal disorders because the composition of the bacterial community in your gut has a large effect on how your plumbing works (or doesn't).

The point here is that microbiology is a poorly understood, but hugely important aspect of our lives. It is not a stretch to imagine the same applies to your soil and the turf that you grow on it. You are likely to encounter an increasing number of products that claim to alter or improve the microbiology of the soil to the benefit of “plant health”, whatever that means. I hope to share some information with you that will help you make good decisions and keep your expectations realistic.

Your Soil is Not Sterile

Biological additives (i.e. compost tea) are often marketed to turf areas using the idea that the fertilizers and pesticides applied to the soil sterilize it, and disrupt important functions of the soil. Below is a figure I grabbed off the internet that shows one incarnation of this idea. But in fact, even in sandy soils that have been fertilized and treated with pesticides, researchers have consistently found high populations of microbial activity (Zuberer, 2012; Elliot et al., 2007; Bigelow, 2000). The scientific consensus is that fertilizer (synthetic or organic) actually increases microbial



Figure 1. A marketing figure from a soil biological testing laboratory showing the mistaken idea that fertilizers and fungicides lead to a sterile soil.

activity because the fertilizers stimulate plant growth, which in turn stimulates soil microorganisms (Bunemann et al., 2006). In terms of the impact of pesticides on microbial activity, Dr. Eric Nelson and colleagues at Cornell University studied the effects of repeated fungicide applications to soil organisms on a golf green. They hypothesized that the fungicide applications would dramatically change the soil microbial community, but that turned out not to be the case at all (Harman et al., 2006). Bacteria and fungi in the soil were similar regardless if fungicides were applied or not.

Not only is your soil not sterile, but is the most diverse microbiological habitat on earth. There are approximately 4,500 mammal species, 20,000 birds species, maybe 250,000 plant species, and somewhere around 1,000,000 insect species. In a spoonful of soil there are estimated to be 8,000,000 species of bacteria (Gans et al., 2005), and maybe as many as one billion species in the soils around the world. That is an incredible amount of diversity. As you might guess, we have very little understanding of the function of the majority of these species let alone names for

them. But in general, we know bacteria are responsible for the cycling of nutrients by converting one form of nitrogen, or sulfur, or carbon, etc. to another; but we would be stretching the facts to say that we know exactly what each of those millions of species are doing and which ones we should be promoting and which ones we should be discouraging.

Testing for Microbes

Unfortunately, you will likely come across a person who will try to tell you just that. There are a growing number of laboratories that test for the amount of bacteria, fungi, protozoa, and nematodes in your soil and give interpretations telling you if levels are “high” or “low”. I like to use this quote from O.J. Noer’s ABC of Turf Culture (1928) on the utility of testing for nutrients in the soil:

“There is a tendency to place undue emphasis upon the value of chemical soil tests. This is true of some technical workers as well as salesmen. These methods have a promising future but their present usefulness is limited by imperfect [methods] and for a lack of definite correlation with field experience.”

Just replace the word “chemical” with “biological”, and you’ll be up-to-date. Soil testing for anything requires a great deal of time and effort. We are still working to refine nutrient soil tests 85 years after O.J.’s statement. So until we can look to research that can validate the interpretations of “low” bacteria or protozoa, I consider these new biological soil tests simply a gimmick or a novelty designed to sell you something you probably don’t need.

The Dilution Problem

Microbial products are designed to change the community of organisms in the soil by adding “beneficial” organisms. This sounds great. However, let’s take a minute to address the amount of product added in comparison to the native communities. We’ll start with a compost tea that might have 40,000,000,000 colony forming bacterial units per gallon. That sounds like a lot!

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You might apply this compost tea solution at a rate of 1 gallon per thousand square feet. Even though you are adding 40 billion or so bacteria, you're adding them to a soil that likely has about one quadrillion (10¹⁵) bacteria per thousand square feet. That is one bacterial cell from compost tea for every 250 million native cells. Not very good odds for changing the microbial make-up. Here is another example of a bacterial additive that we've tested at the O.J. Noer (which had no visual effects). The label says to apply 0.8 oz/1000 sq. ft. The product contains about 80,000,000 bacteria per oz. This means we are adding 64 million bacteria per thousand sq. ft. which is about one applied bacterial cell per 156 million native cells. These products might have pronounced effects if we apply them at levels where the added amounts can begin to compete with the native levels. But this is not going to happen at labeled rates.

A Promising Future?

This is where Dr. Jenny Kao-Kniffin comes in. Jenny is an assistant professor in Horticulture at Cornell University with a doctorate in Soil Science from UW-Madison. At Cornell, she is working on using artificial selection to breed microbial communities (called microbiomes) that can improve turf growth. She does this by growing dozens of genetically identical turf plants in pots, then selecting the few pots that have the best and those with the worst growth. Since the grass is identical, and the physical and chemical properties of the soil are identical, the growth difference is related to the biological properties of the soil. She then extracts the microbes from the best and worst soils and adds them separately to a sterilized soil with turf seeds. She waits until those plants grow and again selects the best and worst looking pots and extracts the microbes and inoculates a new set of soils. Over time the poor performing selections get worse, and the good performing selection get better. This is similar to how grass breeder would develop new grass varieties, but in this case, Dr. Kao-Kniffin is breeding the soil. After several "generations" she can get differences in growth shown in **Figure 2**.

The plants in Figure 2 are genetically identical, but are showing different growth characteristics because they have

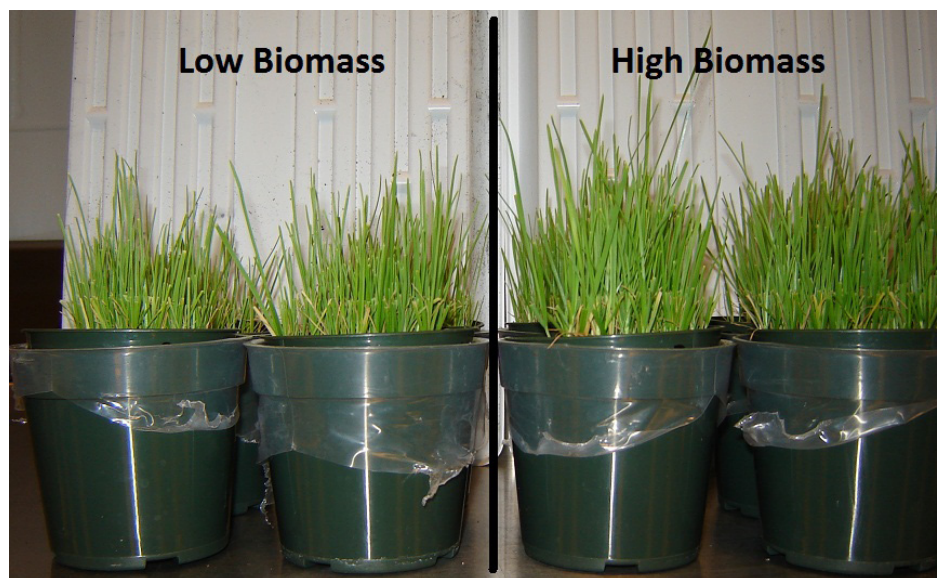



Figure 2. Two genetically identical grasses grown in pots where the only difference is the make-up of the soil microbial communities. The soil microbes on the right have been selected to positively influence grass growth, while the communities on the left interact with the grass to produce less growth. Photo courtesy of Dr. Kao-Kniffin.

different soil microbiomes. She's also using the same technique develop microbiomes that discourage weeds. She tells me this same concept can be applied to insect and disease control too. We have a long way to go before this information can be used to make a difference on your golf course, but work like Jenny's will lead to an increase in our understanding of the soil microbial community that will eventually result in something useful. The primary challenge, of course, will be translating this information from a greenhouse trial with initially sterile soils to a field setting that is already teeming with life. If it was easy, it would already have been done, but I remain optimistic.

In summary, our general increased understanding of the importance of the microbial communities in our bodies and elsewhere will likely stimulate an increase in products and services revolving around soil microbes. However, the vast diversity of microbes in the soil make or primitive tests almost useless, and products on the market seem to be too dilute to make a difference. However, advances in our understanding may one day results in new and useful approaches to managing your microbes. 

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New Fungicides For The Turfgrass Market In 2013

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

A few years back I had a conversation with a golf course superintendent where he lamented the lack of new fungicides coming to the turfgrass (ie golf) market. His frustration was along the lines that there were new herbicides coming to the market, new insecticides, even new wetting agents and plant growth regulators. But when it came to fungicides, the primary protectant applied to golf course turfgrass, all that was coming was pre-mixtures of old active ingredients. This lack of new fungicides wasn't due to any decision by the primary fungicide companies or any lack of investment in research and development. Rather, a myriad of factors inhibited new development including natural ebbs and flows in new fungicidal molecules, increased regulatory requirements and cost associated with bringing a fungicide to market, and the pressure to

make sure that a new fungicide will bring a novel addition to the fungicide industry and hence produce the hundreds of millions of dollars needed to recoup the costs of developing the fungicide.

For those left wanting for something new, something exciting, some new toys to play with... well the recent past, present, and near future will provide you with that expanded toybox. For others, however, the large influx of new products in the past couple years and the several products just hitting the market right now have led to confusion, consternation, and skepticism. For some this rather guarded view is the result of living through previous hype machines ('I just can't keep Imprelis on my shelves!' said one sales representative to me in the spring of 2011), for others it's more the belief that 'if it ain't broke, don't fix it' and the comfort in their current fun-

gicide programs. In this article I will try and satisfy both those groups, not with a hype machine or shiny pamphlets, but through research completed here at the University of Wisconsin in the past couple years. One important disclaimer: the following descriptions are NOT an endorsement of any product or company, but simply reflect our research results with mostly new active ingredients (not new pre-mixtures...a few exceptions). All the primary companies that we test with were contacted for any new fungicides they may be bringing to the market soon, and the following products are the ones those companies responded with.

The T-DMI's

Alright, so many of these products aren't terribly new, but it seems another one or two comes to the market every couple of years or so. While in the same chemical class as earlier demethylation inhibitors (DMIs) such as propiconazole and triadimefon, this new group that includes triticonazole (Trinity® or Triton FLO®), tebuconazole (Torque®), and metconazole (Tourney®) also has some distinct characteristics. First and second, they generally are quite affordable and have lower growth regulatory characteristics compared to earlier DMIs. Most importantly, they are generally more effective at managing anthracnose and snow molds than earlier DMIs (Figure 1). Unfortunately, they are also generally less effective at managing dollar spot than earlier DMIs, namely propiconazole.

Plant Defense Stimulators

While reports of natural plant defense stimulation has been around since the introduction of Chipco Signature and other related fungicides, the mechanisms behind this stimulation has been difficult to determine. However, the introduction of Daconil Action® (chlorothalonil + acibenzolar-S-methyl) and Civitas® (mineral oil) in recent years that have more well-defined plant defense stimulation mechanisms has led to increased attention to this potential disease management strategy.

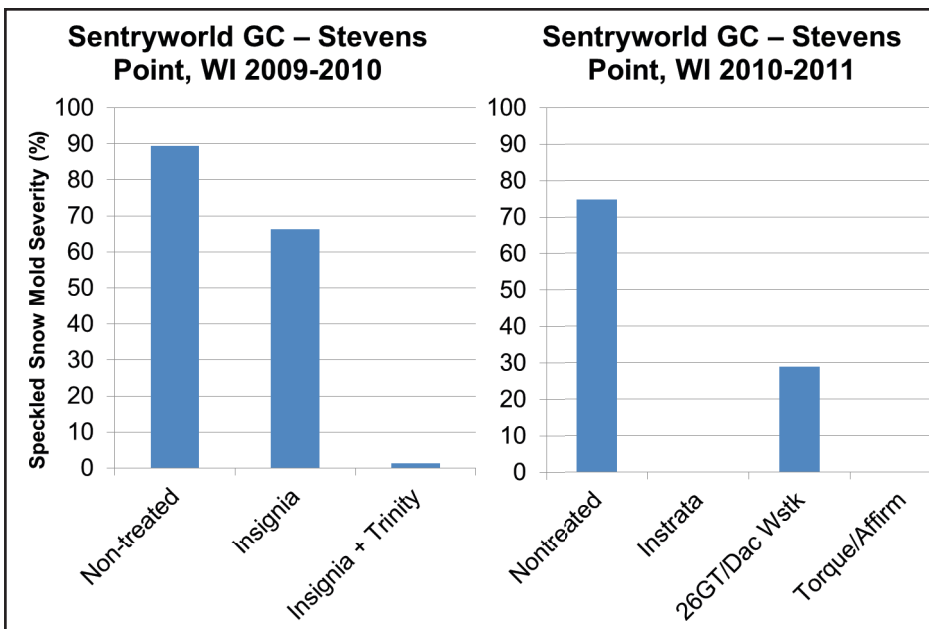


Figure 1: The graphs show speckled snow mold (*Typhula ishikariensis*) severity against a small sample of fungicide treatments from the 2009-2010 and 2010-2011 University of Wisconsin Snow Mold Fungicide Trials at Sentryworld Golf Course in Stevens Point, WI. Note the effectiveness of Trinity® and Torque® when mixed with other fungicides under this heavy disease pressure.