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Names in bold are $1000 contract members

Abbey Springs CC	Agrium Advanced	Antigo Bass Lake
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Brown County GC	Bulls Eye CC	Chenequa CC
Eagle River GC	Eau Claire CC	Edgewood GC
Fox Valley GC	Frontier FS Coop	Green Bay Packers
Hayward Golf & Tennis	Heritage Seed Company	Horst Distributing
House on the Rock Resort	Koshkonong Mounds GC	La Crosse CC
Lake Arrowhead GC	Lake Geneva CC	Lurvey Farms
Maple Bluff CC	Milwaukee Brewers	Milwaukee CC
Minocqua CC	New Berlin Hills	New Richmond GC
North Hills CC	**North Shore CC**	North Shore GC
North Shore Mosquito	Oconomowoc CC	Oneida Golf & CC
Oshkosh CC	Paul's Turf and Tree Nursery	**Pine Hills CC**
Portage CC	**Pro Gro of Illinois**	**Reinders**
Rhinelander CC	Rolling Meadows GC	Sentryworld GC
South Hills CC	**Spring Valley Turf**	Stano Landscaping
Summit Seed	**Syngenta**	Reliable Golf
The Legend at Bristlecone	Tripoli CC	Tuckaway CC
Twin River Turf	Two Oaks North GC	University Ridge GC
Watertown CC	Wausau CC	Weed Man Lawn Care
West Bend CC	West Bend Elevator	Westmoor CC
Whispering Pines GC	**Whistling Straits GC**	Zimmerman Kettle Hills

Mineral Deposits In Sand Putting Greens

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

On Halloween this year, graduate student Glen Obear dressed up as a very busy guy and stood up in front of a fairly large audience to defend his Master's research in Soil Science. In a few more weeks, he'll do the same thing for his Entomology degree under Dr. Chris Williamson. Many of you know Glen from his three years here as a graduate student in the UW-Madison turf program. Glen's given several talks at Field Day and other educational events. He's also visited many golf courses around the state to collect soil samples or evaluate on-course research trials.

Glen's work in Soils covered a wide range of topics revolving around the central theme of soil chemical problems in sand root zones. I won't attempt to summarize all of his findings, but will report on a few bits and pieces that I find very interesting.

The first time I met Glen, he was standing by my office door with a chunk of iron-cemented pea gravel from the bottom of a USGA green that he brought back from his internship in Hawaii. He wanted to know exactly what it was, how it formed, and how to get rid of it. He found answers from me and other professors unsatisfying, so I told him he might get the chance to research it himself as a graduate student. About two years later, that's exactly what he did. His graduate studies were largely funded by the USGA and Wayne R. Kussow Wisconsin Distinguished Graduate Fellowship endowed by the Wisconsin Turfgrass Association.

Figure 1. Red iron and black manganese accumulating at the sand/pea gravel interface of a USGA putting green. (Image: Obear)

At first, we figured this iron cementation was a rare problem that was specific to the tropics because the only other case that we knew of was from a club in Vietnam. However, after randomly sampling greens from all over the US, Glen estimates that 25% of all USGA greens will show some evidence of iron cementation at the pea gravel/sand interface. Glen selected five of the most developed iron layers for further study and found that the layers are indeed composed of iron and manganese oxides **(Figure 1)**. The iron and manganese move down from the top layers of soil and horizontally from upslope areas. As a consequence, the iron layers are usually most severe at the lowest laying areas in putting greens.

Glen also identified a handful of cases where the iron layer developed in the root zone around a depth of three or four inches **(Figure 2).** In these cases there always was a textural discontinuity where the layer formed. A textural discontinuity is just a fancy way of describing the place where finer particles sit on top of coarse particles, or vice versa. For example, we normally find the layer right where the sand sits on the pea gravel, but have also seen it where fine topdressing sand sits on top of the original, coarser root zone mix. This finding highlights the importance of matching your topdressing with your root zone mix.

There is still a lot of work that needs to be done to figure out why these layers form in some cases and not others. We don't know how much iron fertilizers contribute, but if it were me I'd be very conservative with iron applications on my USGA greens. Also, we do not know if anything can be done to reverse the layer formation that won't also kill the turf. I expect Glen will continue to investigate this throughout his career.

While studying the iron layer, Glen was also investigating the influence of high bicarbonate water on sand root zone quality. It is thought by some that bicarbonate is a problem because after entering the soil, it will react with calcium to form calcium carbonate. If this occurs, some fear that the calcium carbonate will clog soil pores. A few prominent turf scientists have written about high bicarbonate water having the potential to cause "surface sealing of pores" which will reduce air and water infiltration. The solution to the supposed problem is to treat the water to remove the bicarbonate, or treat the soil to dissolve the calcium carbonate.

However, I am quite skeptical of this being a serious issue because irrigation water in southern and eastern WI has some of the highest bicarbonate levels in the country. If bicarbonate was such a problem, you'd think we'd all be in agreement about it and solutions would be in place. This doesn't seem to be the case. Some folks treat for high bicarbonate and swear by the results, others don't and are perfectly happy with conditions.

So Glen attacked the issue from two fronts. He sampled USGA greens and irrigation water from all over the US and analyzed and compared the results. The hypothesis was that areas water high in bicarbonate will have soils rich in calcium carbonate. But this turned out to be false. Instead Glen found that if soil pH was less than 7, there was little chance of finding calcium carbonate in the soil. If soil pH was >7, you may or may not find calcium carbonate in the soil. The implication here is that if you maintain soil pH below 7, there is no need to worry about bicarbonate in the water or the potential for pore clogging.

However, we really don't know if the high pH soils with calcium carbonate build up had a problem with reduced pore space. So Glen designed a greenhouse study where he irrigated bentgrass with pure water (no bicarbonate) and water nearly saturated with bicarbonate. After about three years' worth of evapotranspiration and no drainage, he found a small amount of calcium carbonate build up, but no evidence for clogging of pores. In fact, the pure water was found to have a higher degree of clogged pores. The exact reason for this is unknown, but we think it may have something to do with the pure water causing the peat moss in the soil to expand to a greater extent than happens with the bicarbonate water.

Figure 2. An iron layer is beginning to form at about four inches down because of a textural discontinuity where fine topdressing sand sits on top of the original root zone mix. (Image: Obear)

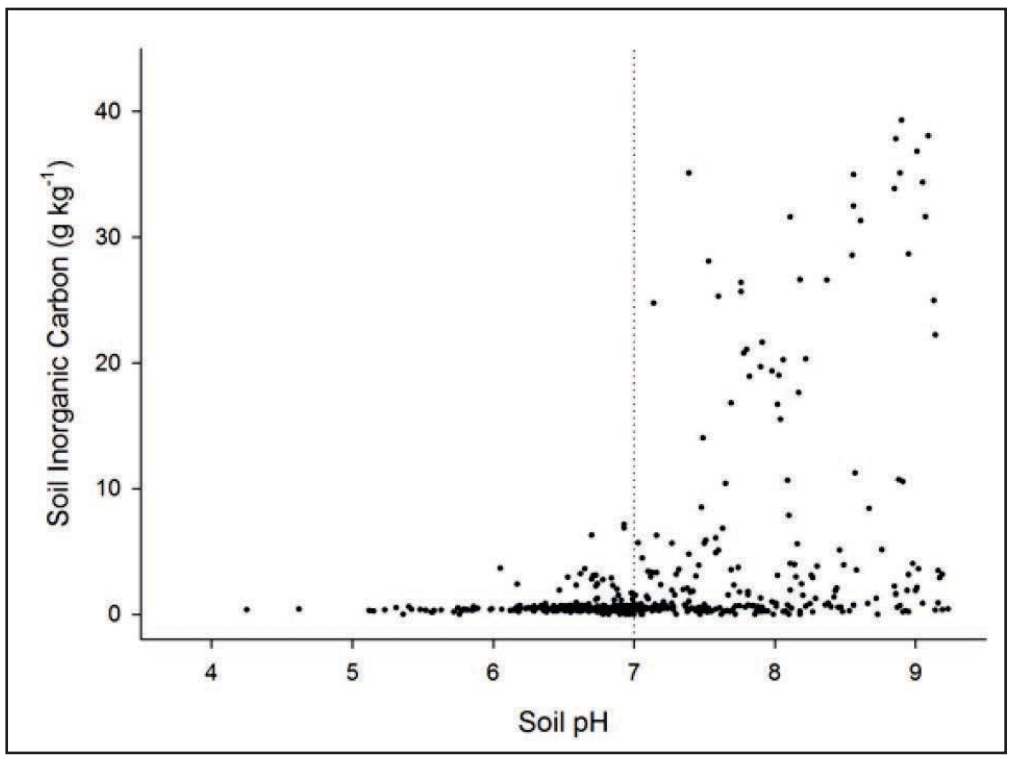

Figure 3. Soil inorganic carbon (AKA calcium carbonate) is really only found in soils where the pH is above 7. If your pH is below 7, you'll never have to worry about bicarbonate from the irrigation water precipitating.

Many of us have seen the white crust that develops on thin or dead spots on putting greens. Glen tested it at the O.J. Noer Research Facility and found that the white crust was indeed calcium carbonate. However, the calcium carbonate crusts we found were always associated with an algal crust. When the turf thins, the algae quickly fills in and forms a crust, and the high bicarbonate irrigation water reacts with the algae to form a white crust on top of the algal mat. So our hypothesis is that the white crust is often mistaken as the cause of the problem when it is simply an artifact of the algae and the water. The real problem is whatever caused the turf to thin so the algae could proliferate and form a mat (shade, compaction, scalping, heat stress, etc.). Like the iron issue, there is much more to learn about bicarbonate, but right now, we think you're much better off spending money to correct drainage and shade problems to prevent turf thinning rather than an acid injector to treat your irrigation water.

In May, Glen will be packing up and moving to Lincoln, Nebraska with his wife, Lisa, their son Eli. There, Glen will pursue his Ph.D. at the University of Nebraska with former Badger Dr. Bill Kreuser. I know Glen and Bill will do some really great work together and make us proud. We will be sad to see Glen leave Wisconsin, but are excited for him and his family on their new adventure.

Figure 4. A white crust of calcium carbonate is starting to form on top of the algal mat. (Image: Obear)

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The Next Chapter

By Dr. Paul Koch, Department of Pathology, University of Wisconsin - Madison

More so than most years, 2013 was a year of change for the University of Wisconsin's turfgrass program. We saw the departure of Dr. Jim Kerns, angst over whether his or Dr. John Stier's positions would be filled, questions over the future of the program, and even a change at the Turfgrass Diagnostic Lab as Bruce Schweiger was brought on to manage the day-to-day operations. As we close the book on 2013 and look towards 2014, I think it's safe to say we can stop thinking whether our program will survive, and focus now on how it can thrive. Though this is not news to many of you, I am happy to report that I have accepted the position of Turfgrass Pathologist in the Department of Plant Pathology at the University of Wisconsin – Madison. I am immensely grateful for the opportunity to remain in Wisconsin and serve the turfgrass industry, and it is my great honor to step into the role that has been filled in the past so ably by Drs Worf, Maxwell, Jung, and Kerns (Figures 1-3). I look forward to working with all of you for many years to come, and am excited about the direction our program and our industry is headed.

Which begs the question, where are we headed? Will I be Kerns 2.0? Sadly, no, my golf game just isn't good enough (just kidding Jim). There will be differences, however, if only because the position is structured differently than the one Jim filled so well. In contrast to past turf pathologist positions here at UW, my position will have a teaching component, responsible for teaching the introductory and advanced turfgrass classes taught in the past by Dr. Stier. While I look forward to teaching these classes, it will likely limit the time available to make site visits and give seminars, especially during the fall months when class in session.

This, however, does not mean you will be underserved. Most of my position remains based in extension, meaning that the majority of my time will still be focused on interacting with you. In fact, both Bruce and I are developing new platforms to stay connected with you at all times whether you like it or not. Despite being massively technologically challenged, both of us have joined Twitter® (my handle is @uwpaul and Bruce's is @BruceTdlbruce) and are tiptoeing our way into the social media waters. Bruce and I will also be developing Facebook® pages for both the TDL and Turf Pathology in the coming months and periodic blog posts posted on the TDL website discussing issues pertinent to turfgrass managers. In addition, look for the development of a more mobile-friendly TDL website (tdl.wisc.edu) and hopefully the development of a TDL 'app' for your mobile device in the months ahead.

As important as connections are, the foundation of any faculty position at the University of Wisconsin lies with its research. With the support of you in the industry, we have been able to conduct research investigating rust development on Kentucky bluegrass, pesticide fate on golf course turfgrass, the impact of winter covers on snow mold development, and the ability of bentgrass seed to serve as a source of dollar spot inoculum. Moving forward, we will continue to be responsive to the needs of the industry and will rely on direct and indirect communications with you for developing research studies in the future.

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With that said, my experience managing the TDL for 8 years has made me aware of how little we really know about certain diseases important to us as turf managers in Wisconsin. Diseases such as take-all patch, necrotic ring spot, and gray/speckled snow mold will all receive renewed attention so that we can more efficiently manage these diseases in the future. In addition, we will continue to conduct research focusing on the environmental impacts on pesticide efficacy to ensure that every pesticide application made is effective to its full ability.

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- **Twitter: @uwpaul**

With all this talk about where we're going, it's important to take a quick moment to discuss how we got here. With a low undergraduate enrollment, turfgrass faculty positions at UW (or any university for that matter) are not ones that are automatically refilled by universities looking to make the biggest impact with the fewest dollars. So it is no exaggeration to say that this position would not have been refilled without the support provided by the Wisconsin Turfgrass Association, the Wisconsin Sod Producers Association, the Wisconsin Golf Course Superintendents Association, the Northern Great Lakes Golf Course Superintendents Association, and numerous other individuals and organizations who wrote letters of support to the college urging the position be refilled quickly. If you have doubted the usefulness of these organizations, or wonder what benefits you truly get from them, this is a perfect example the power these organizations have to initiate positive change for the industry. I, for one, am grateful for all they have done in working to get this position refilled in such a timely manner.

Let me close my first *The Grass Roots* article as turf pathologist by expressing my immense personal gratitude to all of you for your support over the past 8 years. As a 22-year-old kid with only a summer's worth of diagnostic experience, it took a couple years to be comfortable providing you with confident diagnoses. Your patience and continued support allowed me to grow personally and professionally, and I believe has prepared me to take over as the turfgrass pathologist. In addition, the level of support I received from the industry for my candidacy for the turf pathologist position was humbling and overwhelming. I feel forever indebted to you in the turf industry for providing such support both now and in the past, and I will work my tail off to make sure we provide you the support you need to do your job. The UW turf team is now in place for years to come, and I can't wait to see what we can accomplish with your support. Time to get to work.

The author Dr. Paul Koch speaking at the 2013 Wisconsin Turfgrass Research Day

Figure 1: The modern history of turf pathology at UW can be traced back to Dr. Gayle Worf (middle) in the 1980's doing much of the early work on necrotic ring spot. Dr. Doug Maxwell (left) and Dr. Steve Millett (right) conducted turf pathology research on gray snow mold in the 1990's and also started the Turfgrass Diagnostic Lab.

Figure 2: Dr. Geunhwa Jung brought conducted genetic-based research on gray snow mold and dollar spot in the early 2000's, and also convinced me to come to graduate school and manage the Turfgrass Diagnostic Lab. In hindsight, I'm glad I followed his advice.

Figure 3: Most recently, Dr. Jim Kerns brought an applied aspect to the position and a great ability to communicate with the industry. As my major advisor, I learned an immense amount from Jim.

Diamonds In The Rough

By Bryan Bergner, Golf Course Superintendent, Westmoor Country Club

Dr. Martin Luther King Jr. once stated, "Life's most persistent and urgent question is, 'What are you doing for others?'" I came across this quote about a year ago and it made me ask myself what it was I was doing for others, and in particular, what I was doing for people in my own community that are in need of a helping hand. The answer, sadly, was not much. So, I decided I had to do something to change that. But what?

Months passed, and I struggled with finding a cause or an organization that really moved me to action. And, I had lots of excuses. Then, one night, as I sat at the dining room table working on my hiring plan for the 2013 season, my wife (knowing that I sometimes recruit high school students) asked me if I had ever tried to recruit grounds crew applicants from City of Milwaukee schools. I had not, for no reason other than it had not been done before. My wife pressed me on that and encouraged me to think more critically about not only my hiring plan, but about my participation as a superintendent within the larger community. You see, my wife is a lawyer, so her "encouragement" is more like an interrogation, which meant I was not able to get up from that table until I had good answers to those questions. But, sometimes that is what it takes, and because of her "encouragement," the "Diamonds in the Rough" internship at Westmoor Country Club was launched.

The concept was simple: commit several summer positions to high school students who come from disadvantaged circumstances, but who demonstrate an interest in achieving success despite those disadvantages. But finding those "Diamonds in the Rough" was not so simple. After developing the concept for the internship program, I spent weeks (unsuccessfully) canvassing guidance counselors, writing letters, and trying to make connections that could help me find my first "Diamonds in the Rough." By this time it was the end of February, so I was not only discouraged by the lack of progress but also anxious because I had to finalize my crew.

Just as I was about to give up, I connected with the Operation Dream organization in Milwaukee. Operation Dream is a nonprofit that serves young males, ages 4-17, whose environments put them at particular risk and for whom similar organizations are out of reach due to poverty and lack of transportation. Like similar mentoring organizations, Operation Dream provides programming designed to build leadership, academic, and social skills. But unique to Operation Dream is a program called Operation Work, which is a hands-on, incentive-based program for young men ages 11 -17 in which they learn the basics of work, employment and self-sufficiency. The fact is, many of these young men have never known a man who works, so the program helps them to develop the "soft skills" so many of us learned by simply growing up around good male role models. High school students in the Operation Work program are then encouraged to go out and find employment. This, of course, is where the Operation Work program dovetailed perfectly with my Diamonds in the Rough internship concept.

The Operation Dream staff prepared the candidates well for their first job interviews. They came ready to impress, with positive attitudes and well thought out questions. From those interviews, we hired two young men from the Operation Work program to join our summer crew — Antwan and Demetrius. The boys started with little knowledge of the game of golf let alone what goes into maintaining a high-quality golf course. Although Westmoor is only 14 miles west of downtown Milwaukee, from the perspective of these kids, it might as well be a different planet.

Antwan Powell mowing his 1st green at Westmoor CC.

Even without a background in golf, Antwan and Demetrius came eager to learn. They learned how to mow greens and fairways and how to rake bunkers. We also worked on soft skills, such as the importance of a firm handshake and looking a person in the eye when you talk to them. The boys quickly became an integral part of our crew and that allowed them to develop a sense of importance and responsibility they were not always familiar with.