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Management

Unfortunately, ant control in turf is so simple, managing ants can be challenging. Throughout much of the growing season the queen ant, eggs and larvae (young) are located in chambers or nests about 2-3 feet underground. Consequently, surface applications of contact insecticides are effective only in controlling workers on the turf surface, such insecticide applications have little to no impact on the queen safely protected below the turf surface. So, unless the queen is eliminated, additional worker ants will continue to be produced.

Currently, there are three different recommended approaches for managing mound-building ants (Table 1): 1) insecticide applications of relatively short-residual, contact insecticides in the spring when ant mounds first appear (only workers are affected); 2) applications of long-residual insecticides; and 3) the use of granular ant baits. Because ants are sensitive to the

Throughout much of the growing season the queen ant, eggs and larvae (young) are located in chambers or nests about 2-3 feet underground.

freshness of the bait, it is theorized that moisture often renders most baits unattractive, likely due to staleness of the bait. Therefore, it is critical to apply baits to dry turf, avoid applications before anticipated rainfall events, and to make sure to withhold irrigation for approximately 48 hours. Non-bait insecticide should be watered-in immediately following treatment application with no more than 0.1 inches water (e.g., a syringe cycle).

To further complicate the difficult challenge of controlling mound-building ants, during the late summer and early autumn, ants have a distinctively different behavior where swarmers (i.e., winged adults) begin to emerge from their nests in the late afternoon. In this situation, the most effective ant management approach is to apply a short-residual contact insecticide to the turf surface with the intention of controlling the swarming ants before they have an opportunity to make and construct new brood chambers.

Table 1. Insecticide treatments for ant control and appropriate timing

	Short-residual Insecticide (controls only workers/foragers)	Long-residual Insecticide	Ant Bait	Swarming Ants in late-summer – early fall
Insecticide **(active ingredient)**	Bifenthrin Chlorpyrifos Cyfluthrin Deltamethrin Indoxacarb Lambda-cyhalothrin	Clothianidin Thiamethoxam * either insecticide can be combined with bifenthrin or cyfluthrin to enhance performance	Hydromethylnon	Bifenthrin Chlorpyrifos Cyfluthrin Deltamethrin Indoxacarb Lambda-cyhalothrin

Decreased Pink Snow Mold Associated with Low Soil Potassium

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

Potassium is an essential plant nutrient that plays an important role in osmotic regulation and stomatal movement (water relations), cell elongation, protein synthesis, enzyme activation, and photosynthesis. It is often described more simply as a "stress" nutrient that is important for minimizing traffic stress, heat stress, cold stress, and disease stress, among others. I wrote a two-part series in 2011 in the Grass Roots on the scientific evidence supporting each of these claims (part 1) and how I'd fertilize turf based on the weight of that evidence (part 2). In this article, I'll report on some interesting observations on the effect of potassium on pink snow mold (Microdochium nivale) incidence over the winter of 2013-14 from our ongoing soil test potassium calibration trial at the O.J. Noer Facility.

Here is a brief overview of the study methods. In 2011, we began a trial to attempt to identify the lowest level of soil potassium that would still provide high quality putting green quality. We also wanted to create severe potassium deficiencies to document those symptoms for teaching purposes. We used an 'A4' creeping bentgrass putting green on a 100% sand root zone. The green was previously used for the phosphorus soil test calibration study (Kreuser and Soldat, 2012). We mowed five days per week at 0.125", and fertilized with 0.2 lb urea N per 1000 ft2 every two weeks, and irrigation was applied as needed based on soil moisture.

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The treatments are different levels of potassium, including no potassium, and 0.1, 0.2, and 0.6 lbs K2O per 1000 ft2 every two weeks. An additional treatment of 0.2 lbs per 1000 ft2 of calcium sulfate was also included in the treatment list and was intended to decrease potassium in soil and tissue even more rapidly that the control. Liquid fertilizer treatments are sprayed every two weeks during the growing season in two gallons per 1000 ft2.

Beginning in 2012, we used a golf cart simulator to provide traffic stress three times weekly. Fungicides have not been applied since 2011 in order to quantify potential differences in disease. Each month, we collected data on turfgrass color, quality (1-9, 6 being acceptable), clipping mass, Mehlich 3 soil potassium, and tissue potassium content.

Visually, this study has been about as boring as it gets. In three seasons, we have yet to observe any statistical differences in color, quality, or clippings (Table 1). However, after the snow melted this spring, differences among the treatments in pink snow mold damage were apparent.

I counted infection centers in each plot and had Dr. Paul Koch estimate the percent of plot area affected by the disease. While disease pressure was low, it was clear that the snow mold damage was influenced by the potassium treatments. Treatments receiving no potassium were essentially free of damage, and treatments receiving 0.2 - 0.6 lbs K2O/1000 ft2 biweekly had roughly 10 infection centers per plot, covering about 3.5% of the turf.

The treatment receiving 0.1 lbs of K2O/1000 ft2 biweekly had statistically similar damage as the controls. As you'll notice in Table 2, as potassium in the leaf tissue increased, the calcium in the leaf tissue decreased. Magnesium was less affected by potassium than calcium was. Snow mold damage (infection centers or % damage) was positively correlated (r^2=0.95) with tissue potassium and negatively correlated with tissue calcium (r^2=0.91).

We do not yet understand the mechanism, but it is possible that the effect of potassium is to lower the calcium levels to a point where the plant becomes susceptible to fungal infection.

Table 1. Average turfgrass color, quality and daily clipping mass for the three study seasons. Color is measured using the Spectrum CM-1000 on a scale from 1-999 (greenest) and quality is rated using the NTEP scale of 1-9 (best). Results followed by different letters within each column are statistically different according to Fisher's Least Significant Difference (alpha=0.05).

Treatment	-------------- 2011 --------------			-------------- 2012 --------------			-------------- 2013 --------------		
	Color	Quality	Clippings	Color	Quality	Clippings	Color	Quality	Clippings
	1-999	1-9	g	1-999	1-9	g	1-999	1-9	g
0.2 lb Ca/M (gypsum)	219 A	6.31 A	2.5 A	239 A	6.17 A	2.9 A	238 A	6.15 A	2.3 A
Control (no application)	217 A	6.06 A	3.1 A	227 A	6.21 A	2.9 A	236 A	6.10 A	2.4 A
0.1 lb K_2O/M (K_2SO_4)	215 A	6.28 A	2.4 A	229 A	6.08 A	2.0 A	232 A	5.80 A	2.0 A
0.2 lb K_2O/M (K_2SO_4)	217 A	6.38 A	2.7 A	235 A	6.13 A	2.2 A	231 A	5.85 A	2.2 A
0.6 lb K_2O/M (K_2SO_4)	214 A	6.13 A	3.1 A	235 A	6.21 A	2.7 A	232 A	5.90 A	2.1 A

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Table 2. Pink Snow Mold (PSM) Infection rates as a count of infection centers and percentage of plot area occupied by infection from 4/2/2014. Tissue and soil nutrient content data was collected on 9/28/2013, the most recent sampling date prior to winter. Results followed by different letters within each column are statistically different according to Fisher's Least Significant Difference (alpha=0.05).

Treatment	PSM Infection Centers	PSM Damage	9/28/2013 Tissue Content			9/28/2013 Mehlich 3 Soil Test		
	#/plot	-------%-------	--- % K ---	--- %Ca ---	--- %Mg ---	K (ppm)	Ca (ppm)	Mg (ppm)
0.2 lb Ca/M (gypsum)	0.5 B	0.0 B	1.42 D	0.69 A	0.46 AB	21.5 C	934 A	243 A
Control (no application)	1.0 B	0.5 B	1.45 D	0.61 B	0.48 A	26.2 BC	875 A	248 A
0.1 lb K_2O/M (K_2SO_4)	6.0 AB	2.5 A	1.81 C	0.57 B	0.47 AB	33.6 B	803 A	233 A
0.2 lb K_2O/M (K_2SO_4)	9.8 A	3.3 A	2.02 B	0.51 C	0.43 BC	33.1 B	930 A	252 A
0.6 lb K_2O/M (K_2SO_4)	8.8 A	3.5 A	2.19 A	0.48 C	0.41 C	45.9 A	848 A	234 A

Other researchers have observed increased snow mold with increasing potassium applications (see Soldat, 2011a for a list), so this finding is another brick in the wall of that body of work. Interestingly, researchers at Rutgers reported decreased anthracnose as potassium increased (Schmid et al., 2013). Details from that study have yet to be fully reported in the literature. However, these findings suggest that the optimum way to manage potassium on a sand root zone is to allow the soil potassium levels to drop near the PACE Turf/Asian Turfgrass Center's MLSN level of 35 ppm, then begin spoon feeding potassium in spring through summer, and stopping in August to allow the tissue levels to decrease and calcium levels to rise (which will happen naturally). I intend to continue managing the study until the point where the turf begins to show visual symptoms of potassium deficiency. I hope that happens sooner than later, but for now the study has finally yielded a piece of information that I hope you'll find useful as you plan your fertilizer programs for 2014. See you at field day!

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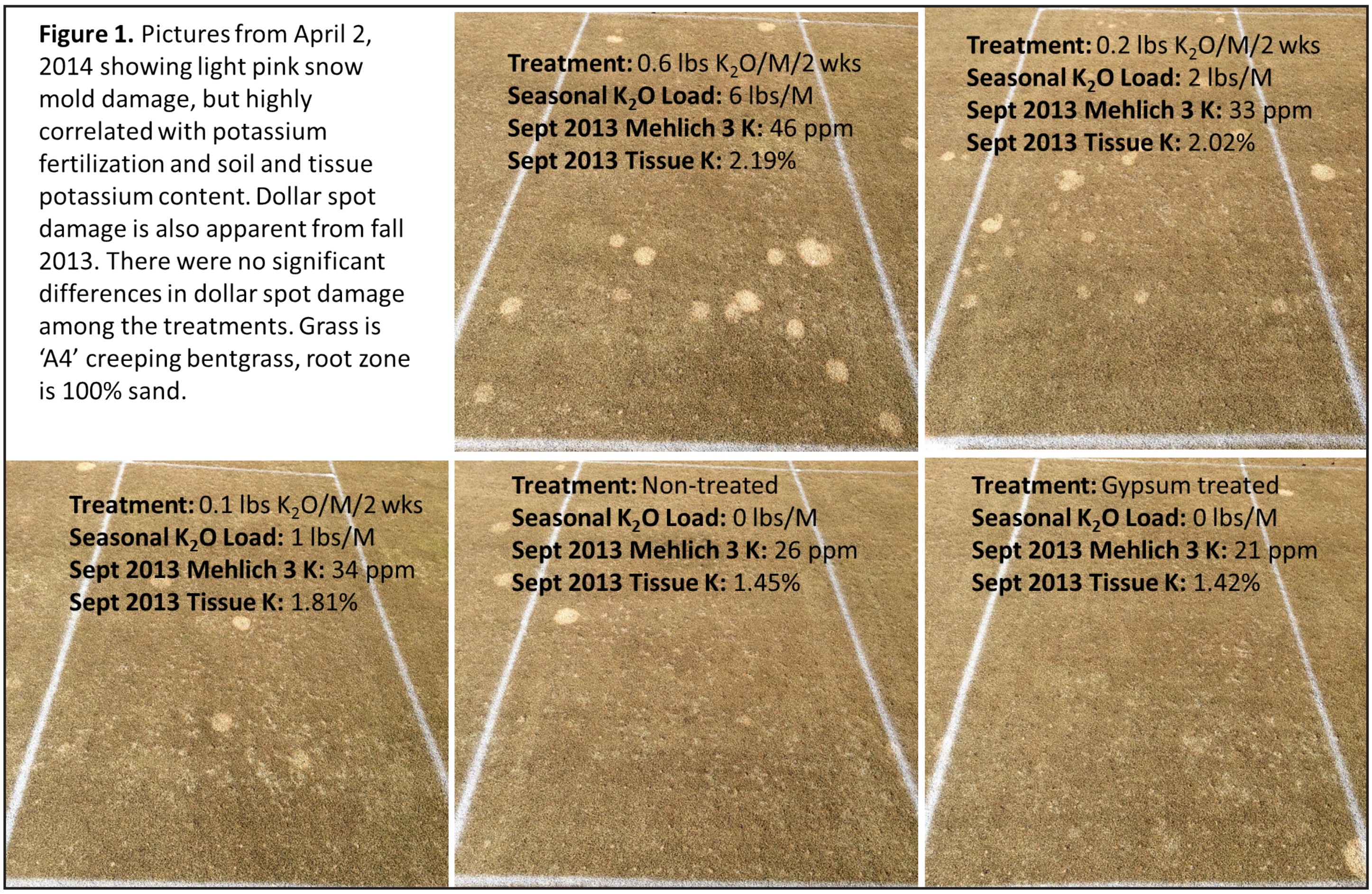

Figure 1. Pictures from April 2, 2014 showing light pink snow mold damage, but highly correlated with potassium fertilization and soil and tissue potassium content. Dollar spot damage is also apparent from fall 2013. There were no significant differences in dollar spot damage among the treatments. Grass is 'A4' creeping bentgrass, root zone is 100% sand.

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Lab Updates and Projects

By Bruce Schweiger, Turfgrass Diagnostic Lab Manager, O.J. Noer Turfgrass Research and Education Facility

By the time this article is read I will have celebrated my one-year anniversary as your Turfgrass Diagnostics Lab Manager. Yes one year in and hopefully all prepared for the next one. I am constantly asked what I do in the winter, this is a question I have been answering my entire career, as all of you have. After snow mold trail applications were finished I was looking forward to the coasting season, winter.

My thoughts leaned toward no disease samples maybe I could talk Paul into sending me to Florida to recruit for new contract members. This did not happen, so what was I going to do. My new boss, Dr. Koch, started his new position January 1, congratulations to him. I wondered what that would mean in my world. As I expected Dr. Koch came out of the gates swinging with some fresh new ideas and projects.

The biggest project of the winter was re-modeling to lab. With a little help from my friends we removed virtually everything in the lab and had the floors re-finished. As this was happening Dr. Koch and I began re-designing the lab and our office space and adding ergonomics to the equation. I encourage anyone that may be in the area to stop by our lab and see our new set-up. Change can be good and from what I remember the lab has been the same since before Steve Abler was here. Time will tell but so far the lab is functioning very efficiently.

The next big project was to re-build the tdl.wisc.edu website. With the help of Dixie in the IT Department there have been many changes. The new website is much easier to manage than the old site. To make changes to the old website we had to actually go down to campus and Russell Labs to get access through a secured server.

The new website allows us to make changes remotely. This will allow us to post updates and keep everything very current. All of the research will continue to be posted, that will not change. With the more user friendly access Dr. Koch is looking at adding some new additions to the site, more on those at a later time. I feel the biggest upgrade is that all the sample submission forms are available online. You can now open the forms from a computer, tablet or your smartphone and fill them out. Once filled out they will be automatically sent to me. This alerts me that a sample is coming to the lab.

My request is when you fill out the form please fill them out completely so when the samples arrive I can match the proper form to the proper sample, we do receive more than one sample in a day. If you have pictures you can send them to me at bschweiger@wisc.edu or text them to me at 608-445-5490. The new system will allow me to know ahead of time when samples are arriving and if for some reason I am out of the office, I can notify you or contact the reserve personnel (Dr. Koch) to have them process your sample. Dr. Koch has some great ideas on how we can utilize the website to enhance our service to homeowners and growers alike. Stay tuned for more on these ideas as he rolls them out.

One of my new assignments is that of the trainer for the Pesticide Application Training class offered over the winter by DATCP. These training sessions are team taught by Dr. Koch, PJ Liesch and me. In January prepping for these classes started in earnest. Even though I have been a Certified Applicator for many years, I had much to learn. With the guidance of Dr. Koch and PJ Leisch (Phil Pelliteri's temporary replacement) I was able to be ready for our first class in late January in Madison. The day arrived and I was a little nervous to get up in front of the huge crowd and give my sections of the training. As usual with winter classes the snow came and attendance dwindled to 12 attendees. The day went well and I was ready for the next 5 classes over the next 2 months all over the state. Many of our training sites had 100+ attendees. There were a few of you at the trainings and to date I was never booed or had any rotten fruit thrown at me, so for year one I consider that a huge accomplishment.

Spring has been slow to come to Wisconsin and as I wrote this I was in Missouri visiting my new Grandson while Sam Soper and Dr. Koch were traveling in the arrowhead of Minnesota finally doing the last of our snow mold ratings. No we had not just been lazy and not made the trip north, they have been getting snow and every time we planned a trip north they would get 4+ inches of snow. We did however sneak in Snow Mold field Days at Wausau CC April 23rd. The week before even Wausau was covered in snow. The results at Wausau were amazing. The data is posted on the tdl.wisc.edu website. If you want the nickel tour of the results and see the snow mold pressure at Wausau you can go to the tdl.wisc.edu website and on the main page click on the link to GCSAATV.

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This year's Snow Mold Field Day was filmed by Epic Creative and is being hosted on GCSAATV. The video is under 9 minutes and Paul is a natural, we hope Network news never see this video. We know that it is hard for people to take the time early in the season when courses are opening and staff is limited to join for Snow Mold Field Days, so we partnered with GCSAA to have the day filmed and posted on GCSAATV. Please let us know if you found this helpful and beneficial.

Sample submission to the lab this spring have been slow. This I am sure will change with the cool, wet weather, perfect for root pathogens. When the weather breaks I assume to rest of the diseases will begin in earnest. Snow Mold questions have been the most prevalent issues, why did this not work or homeowners curious about Microdocium nivale (pink snow mold) in their yards. The top questions this spring has been how do I re-seed my lawn, what type of grass do I plant and can I still reseed after the pre-emergent application has been made?

Well that was my winter and early spring. I am ready for warmer weather and the season to start. If you get a chance please remind Paul that we need to find more contract members and Florida is begging for a good Diagnostics Lab. As I always I am willing to sacrifice my time for the success of the program.

Summer Research Preview

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

After a brutally cold winter and frustratingly cold spring, summer is finally upon us. The summer season is the busy season for most of us, and here at the university it is no different. Samples are flowing into the diagnostic lab, fungicide testing is in full swing, and much of our research is 'in the ground.' Turfgrass research can take on many forms, from research that is conducted entirely in the laboratory to research that is done entirely in the field. Most of the research that we will conduct in the years to come will have some element of both, but to get started in my first summer as a faculty member we will conduct several projects that are completely field-based (or 'highly applied' in academic lingo). A brief summary of each project is below, and all of them will be available for viewing at the Turfgrass Summer Field Day on July 29th.

Reduced-risk disease management

Fungicides are an integral part of any successful disease management program on golf course turfgrass. That is not an inherently bad thing, as the majority of research suggests there is relatively little risk to the general public and the environment when pesticides are used properly. However, that doesn't mean that toxicological improvements can't be made, and that they won't be mandated in future years. This small research project will include four treatments, 1) a non-treated control, 2) a traditional fungicide program designed for golf course fairways, 3) a reduced-use program basing fungicide applications on the Smith-Kerns dollar spot prediction model, and 4) a reduced-use AND reduced-risk program basing fungicide applications on the same Smith-Kerns dollar spot prediction model. While treatments 3 and 4 will both base their application timings on a mathematical model developed by Dr. Damon Smith and Dr. Jim Kerns, there is one key difference. Treatment 3 will employ a rotation of conventional fungicides currently available for use on dollar spot, while treatment 4 will only use those fungicides labeled as reduced-risk by the Environmental Protection Agency (Table 1). As table 1 shows there aren't a lot of options for initiating a completely reduced-risk program, but reduced risk products are available that will control the vast majority of turfgrass diseases we see in Wisconsin. The primary objective of this research is to determine whether exclusively using reduced risk fungicides in cooperation with a disease prediction model will yield acceptable disease control with a significantly lower environmental impact.