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Topics for Everyone in the Turf Industry

WTA TURFGRASS RESEARCH DAY – JANUARY 5TH, 2016

By Aaron Goninen, WTA Board Member & Winter Conference Chair

By the time you read this, 2015 will be almost over and planning for the 2016 season will be well underway. Hopefully when you think about the new year, you start with some great education at the WTA Turfgrass Research Day Conference and Webinar. The conference takes place on Tuesday, January 5th, 2016. Once again the event will be held on the shores of Lake Mendota in downtown Madison at the Pyle Center. The Pyle Center is located on the UW-Madison campus near the Memorial Union.

The conference will be available by webinar for those who are unable to attend in person. We have worked hard to make this an enjoyable experience, and think that most people are excited to have this as an option. In addition, talks will be archived so if work responsibilities, family obligations, or winter weather surprises us, you will be able to go back and enjoy the talks at your convenience. We started offering the webinar and archived talks to create flexibility in everyone's very busy schedules. It is a very unique opportunity to support turf research in a flexible format.

This year's event provides an opportunity to hear a wide variety of topics from experts in many fields. Our goal is to offer talks that will appeal to a large variety of professionals in the turfgrass industry. This year we have talks from our expert staff at UW-Madison, which includes Dr. Soldat, Dr. Koch, and Dr. Williamson. Each of them will be talking about the research they conducted in 2015 and their plans for future research. In addition to our UW professors, Dr. Sam Bauer from the University of Minnesota will speak about weeds in sports turf. He will discuss specific topics both in golf and sports fields. Jeremy Nelson, a meteorologist and long range forecaster from Milwaukee, will speak about trending weather topics that affect all turf managers. Weather not only affects the way we manage turf, but it also affects our daily lives. Mike Boettcher, the manager of Miller Park, will present about challenges he encounters managing turf at Miller Park and handling a wide variety of events. We will also have a very interesting presentation from Dr. Glen Stanosz on managing tree risk and liability. Most turf managers have trees in and around their property, and this should be a very eye opening topic. To get more information and to register online, go to www.wisconsinturfgrassassociation.org.

We hope that you can attend the conference in person or via webinar. The WTA, the faculty, and everyone affiliated with the OJ Noer Turfgrass Research Facility truly appreciates your interest in learning and support of this event. On behalf of the Wisconsin Turfgrass Association Board of Directors, I wish you a great holiday season. Thank you for your continued support.

WTA Turfgrass Research Day Conference & Webinar Registration on pages 15 &16

The Wisconsin Turfgrass News is the official publication of the Wisconsin Turfgrass Association, edited by Tom Schwab. O.J. Noer Turfgrass Research and Educational Facility.

PRESIDENT'S MESSAGE

Recharge, Reflect, and Recognition

By Paul Huggett

Welcome to recharge time. I love this time of year when there is a sense of urgency to get things done before the season forces us to stop. Will I be able to get everything done before all my help leaves, will I be able to get that last spray on before the snow comes to stay? Golfers want that last round in, farmers want their fields as ready as possible for next spring. There is a tendency to work harder, smarter, and more efficiently. My senses are sharper when there is an eminent deadline in front of me. Hence, writing of this President's message is generally done on the last day. Procrastination might be the pessimist's word for it, I look at it as inspirational motivation to break the writer's block and find a meaningful message. This sense of urgency is a good thing. (If only the Packers could get that feeling a little sooner than the last 5 minutes of the 4th quarter.)

Now that our last outdoor plant care work is slowed to a halt, it's a great time to plan for the next rush. Spring! Waiting to the last minute to write down a few paragraphs is one thing, getting ready for the onslaught of spring is another. What are your goals for this winter? I know that my actions have already started. Seed, chemical, and fertilizer purchases have been made. Website, accounting software, and customer contact lists are updated. Equipment repairs and self-improvements are yet to come. One area that everyone can easily participate in for self-improvement is to attend or listen in and view the **WTA's Turfgrass Research Day Conference and Webinar held January 5th at the Pyle Center on the UW Madison campus**. WTA board member Aaron Goninen and the research day committee have done an impressive job putting together a great line-up of speakers and subjects that will enhance your turfgrass knowledge. For more information or to register online go to the WTA website www.wisconsinturfgrassassociation.org, or contact Audra at 608-845-6536 or audra.anderson@wisc.edu.

Winter season is upon us and as we are people affected by nature and attuned to the weather's influences, the shorter days and forced hibernation we all go through gives us time to reflect on the many blessings bestowed upon us. I am grateful for all the people that have positively impacted my life throughout the year. I look forward to meeting new people that will inspire me with new ideas. Additionally, the WTA is fortunate to receive a new donation to the Wayne Kussow Graduate Fellowship Endowment that will help UW-Madison Soil Science professor Dr. Doug Soldat fund future graduate students. A donation of $50,000 was made to the account by **Edna Huggett.** Yes, for those of you who don't know me, Edna is my mom and wife of WTA founding member James Huggett. Her generosity to the WTA is most appreciated. A heartfelt thank you was given by Dr. Soldat at a small presentation gathering held at the UW Foundation on campus with Barb McCarthy, a UW Foundation representative.

The UW Foundation currently has a donor, the Ab and Nancy Nicholas family, who is matching contributions that go towards endowments that support students. The Nicolas family has generously donated millions to be used as matching dollars. Edna Huggett's contribution to the Wayne Kussow Graduate Fellowship Endowment qualifies for that match. The total dollars invested will now equal **$100,000**. Thank you to Edna Huggett and the Nicholas Family for their generosity! Have a Great Winter Season, everyone.

Mrs. Edna Huggett and Dr. Doug Soldat.

Turfgrass Research Updates from Around the United States

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

Each fall, about 200 turfgrass researchers come together to give brief research updates as part of the Crop Science Society of America Annual Meeting, which is held jointly with the Soil Science Society of America, The Agronomy Society of America, and the Entomological Society of America. This year the meetings were in Minneapolis, MN. I really enjoy attending these meetings to catch up with my colleagues around the nation and see what they've all been up to. I always bring back good, new information that I incorporate into my research and extension program. This year seemed particularly fruitful, and below I have highlighted some of the most interesting things I learned.

Nitrogen Leaching as Affected by Temperature and ET Rate

My Ph.D. advisor, Dr. Marty Petrovic at Cornell University, presented the results of a study that investigated nitrogen leaching from Kentucky bluegrass as a function of temperature and ET rate. This study is of great interest to me because of the WTA- and WGCSA-funded work I did on fall-applied N when I was first hired. While we focused mostly on plant uptake (and found poor plant uptake in cool weather with low ET), we did not thoroughly assess nitrogen leaching in that study. Marty took columns of sandy loam soil with Kentucky bluegrass into a growth chamber and controlled both temperature and ET (using light). He applied 1 lb/1000 sq. ft. of nitrogen as urea and then measured ammonium and nitrate in the leachate. His results showed very clearly that nitrate leaching was greatest at low temperatures (~ 15 ppm at 50 °F vs 35 ppm at 32 °F) and also nitrate leaching increased as ET rate decreased. At 50 °F (a common time for applying late-season N), the nitrate concentration in the leachate was about 15 ppm for the highest ET treatments, but increased to 22 ppm for the low ET treatment. This work suggests that weather forecasting models that report both ET and temperature may be useful for reducing risk of nitrogen leaching from turf fertilized in the fall.

Dislodgeable 2,4-D Residues on Athletic Fields

Minimizing exposure to pesticides is always a top concern of turfgrass professionals. In this study, NC State graduate student Matt Jeffries rolled a soccer ball over a field sprayed with 2,4-D at various times after herbicide application to determine how much herbicide was picked up by a special cloth on the ball. The field was sprayed in the morning and 2,4-D picked up by the ball decreased as they day went on until less than 0.1% of the applied herbicide was picked up at 1 PM. Surprisingly though, the amount of dislodged herbicide increased again the next morning, to as much as 2% of applied. The researchers hypothesized that dew and guttation water re-suspended the herbicide in water. As the second day after treatment went on, the amount dislodged decreased to < 0.1% by 1 PM again. The re-suspension effect caused by morning leaf wetness was seen again on the third day after application, but was not observed at 6 days following application (no sampling occurred on days 4 or 5). This research is useful for creating ways to further reduce human exposure to pesticides.

Adding ammonium sulfate to tank mixtures containing hard water and 2,4-D will improve weed control

While we are on the topic of 2,4-D, Geoffrey Schortgen, a graduate student with Dr. Aaron Patton at Purdue University, investigated the efficacy 2,4-D in tank mixtures made with hard water (like we have in most areas of Wisconsin). They found that hard water significantly reduced 2,4-D efficacy but that antagonism could be overcome by adding 0.15-0.20 pounds of ammonium sulfate per gallon to the spray tanks. That comes out to about 0.03 lbs of N per thousand square feet if you are spraying at 1 gallon per thousand (50 gallons per acre) or 0.06 lbs of N per thousand square feet if spraying at 2 gallons per thousand (100 gallons per acre). If you are having trouble with your 2,4-D performance and have hard water, this is something you might want to try next season.

The Effect of Drought on Fine Fescue Mixtures

University of Minnesota graduate student Maggie Reiter made many trips down to Madison to collect data from our OJ Noer rain shelter for this project. Maggie also discussed her work at our 2015 Summer Field Day during the afternoon golf tour. Taking the top performing NTEP cultivars from the five major fine fescue species (Chewings, hard, strong creeping red, slender creeping red, and sheep) she evaluated 25 different mixtures of these grasses under drought stress. She found that the mixtures containing >33% hard fescue and sheep fescue performed best in drought conditions. The poorest performing mixtures contained high proportions of both slender and strong creeping red fescue. Her results will be useful for helping managers select fescue seed mixtures for low maintenance areas subject to drought.

Clay Accumulation at the Sand-Gravel Interface in Sand Putting Greens

Finally, Glen Obear (my former MS student now working on a Ph.D. under Bill Kreuser at University of Nebraska) took home a first place award in the graduate student competition for his research update on clay layering in a sand-based green. You'll remember Glen for characterizing an iron layer at the sand-gravel interface here in Wisconsin, and he was at it again but this time he identified a clay layer at that sand-gravel interface that caused the putting greens to fail in a golf course in Mississippi. The course was constructed with Profile, an inorganic amendment made from clay. There were concerns that the Profile was breaking down and contributing to that layer. But Glen's research using X-Ray Florescence found that the clay did not originate from the Profile or from the clay subgrade. He concluded that the clay was likely present as a contaminant in the original root zone mix and had migrated to the sand-gravel interface over time. This demonstrates the importance of ensuring a very low clay content when choosing a construction sand.

These are just a few of the dozens of turfgrass/soil science studies that caught my eye, and ones that I thought you would enjoy reading about. I have pages and pages of notes on these and other studies that I will use as we start planning out our research activities for 2016. Hope to see you at Turfgrass Research Day in January and at Field Day next summer!

Management of Mound Building Ants in Turf

By Dr. Chris Williamson, Department of Entomology, University of Wisconsin-Madison

Ants are incredibly great predators of certain insects that damage turfgrass, such as cutworms, armyworms, sod webworms and white grubs. These insects can also be problematic in low-mowed turf areas. The issue with ants in these areas is that worker ants excavate underground nest chambers, pushing up soil that creates volcano-shaped mounds. These mounds disrupt the smoothness and uniformity of playing surfaces, smother patches of turf which often leads to turf decline and eventual death. The mounded soil contributes to dull mower blades. Consequently, turfgrass managers typically make surface applications of fast-acting (i.e., quick knockdown) conventional insecticides to eliminate this nuisance pest. However, this approach may not be the best or most effective solution for managing mound building ants!

Lasius neoniger is native throughout the United States and Canada. It is a relatively small ant and is commonly referred to by turfgrass managers as the "turfgrass ant" (not a common name officially recognized by the Entomological Society of America). Like most ant species, *L. neoniger* are social insects that live in colonies that comprise thousands of sterile female workers and typically only one reproductive queen. Individual ant nests are commonly composed of multiple interconnected chambers approximately 2-3 feet deep. Each passage to the surface is commonly capped with a mound. Depending on the time of year (i.e., spring vs. summer), there can be a considerable fluctuation in the number of ant mounds per nest, ranging from 2 to 10. Generally, the number of ant mounds steadily increases from early spring to late summer, as the colony grows. Previously conducted research at the University of Kentucky has revealed that as food resources become more abundant in the spring, the queen steadily increases egg production; however, once peak production occurs, the offspring from this brood develop relatively slowly, starting in May and continuing into July. Shortly thereafter, adult workers (predominantly females) begin to emerge, after which mound-building activities intensify. As ant colonies begin to mature, by late summer and even into early autumn (late August–October), a sizable portion of the colony develops into winged reproductives (swarmers) consisting of reproductive females and drones.

Once the colony reaches this stage, reproductive females and drones typically swarm by the thousands, typically in the late afternoon on warm days. This event is especially common after rain and thunderstorms. During this swarming process, the reproductive females and drones partake in a nuptial flight in which they mate while flying. Soon thereafter, queen ants seek out new locations to build chambers, but before constructing a new chamber, the new queens chew off their wings. Oddly enough, most queens die before making a chamber; however, those

Continued on page 5

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

that do survive typically construct a small chamber in the soil. Surviving queens typically lay a relatively small number of eggs in the chamber. Within several weeks (<6), new worker ants (which are typically about half the size of normal workers) break open the chamber to forage for food. At this point, colony activity ceases as winter weather arrives. The ant colonies that survive the winter typically resume activity in the spring as the temperatures become favorable and food sources available.

Research at the University of Kentucky (Dr. Dan Potter Lab) suggests that each nest has only one queen, and the future of the colony is largely dependent on her. This is not to downplay the importance of workers; they too serve a crucial role both by protecting the colony and foraging for food for the colony. Different ant species have various food preferences, and Lasius neoniger appears to prefer foods that contain the three primary nutritional components: protein, carbohydrate (sugar), and fat (lipid). In turf, ants commonly forage on the surface for other insects and insect eggs, but they also feed on subterranean root aphids to obtain the sugary honeydew that the aphids produce. Because these mound-building ants are important predators of the eggs and small larvae of cutworm, armyworm, sod webworms, white grubs, and other insect pests, they are also considered beneficial insects.

Management

Unfortunately, managing ants in turf is not so simple. They can be challenging and difficult to control. 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 only effective in controlling workers on the turf surface. Such insecticide applications have little if any 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 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 typical 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 begin to emerge from their nests in the late afternoon. Consequently, 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. ■

What Three Years of Rust Research Has Taught Us

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

Rusts of cool-season turfgrasses are caused by many species of *Puccinia* and *Uromyces*. Traditionally rust diseases were thought to be cosmetic and of little concern to turfgrass managers. However, relatively recently, rusts have become a major problem for turfgrass sod producers, homeowners, K-12 athletic field managers, and golf course superintendents (Figure 1). The reason for this shift is largely unknown, but it is hypothesized that the varieties currently used in production were bred for resistance to stem rust (*Puccinia graminis*). Yet, the disease species we currently find associated with many cool-season turfgrasses, especially Kentucky bluegrass, is crown rust (*Puccinia coronata*). Typically breeders associated stem rust only with Kentucky bluegrass and crown rust with perennial ryegrass. A recent survey conducted by scientists at Rutgers University demonstrated that crown rust was the most prevalent rust pathogen associated with rust in Kentucky bluegrass. Although researchers at Rutgers demonstrated that the primary rust disease of Kentucky bluegrass was crown rust, they did not outline any means to manage this devastating disease.

Kentucky bluegrass is the most common cool-season grass used for home lawns, athletic fields, and golf course roughs and is grown in large supply by turfgrass sod producers. This particular turfgrass comprises over 2/3 of the turfgrass acreage in Wisconsin, which last estimated in 1999 was 1.2 million acres in total. During the past five years, the number of samples submitted to the Turfgrass Diagnostic Lab at the University of Wisconsin-Madison diagnosed with rust has increased dramatically, indicating that rust has become more prevalent in recent years despite vastly different environmental conditions in recent summers. Rust had become so severe that sod producers in Wisconsin couldn't sell large volumes of their product and homeowners and golf course superintendents have started spraying fungicides to control the disease. Considering the vast acreage covered with Kentucky bluegrass in Wisconsin, it was necessary to investigate this disease in more detail in order to develop management strategies that reduce the risk of harm to people and the environment.

In order to achieve improved management strategies for rust in Kentucky bluegrass, we proposed to identify the rust species associated with Kentucky bluegrass, evaluate current germplasm for relative resistance, evaluate mixtures of turfgrass cultivars and species as a means of rust management, and to investigate the influence of nitrogen sources on rust incidence and severity.

Figure 1: Rust can become severe in certain conditions, stunting plant growth and leading to visually unappealing turfgrass stands.

Table 1: Overall number of each rust species collected from 2013-Aug 31, 2015

Rust Species	Number Identified
Puccinia coronata	44
Puccinia graminis	267
Puccinia striiformis	1
P. coronata + *P. graminis*	42
N/A	90
No Rust DNA extracted	27
Total	471

Table 2: Rust species by type of grass collected from.

Grass	P. coronata	P. graminis	P. striiformis	P. coronata + P. graminis	N/A or No DNA	Total
Kentucky bluegrass	33	262	1	36	98	428
Perennial Ryegrass	8	3	0	2	7	19
Fine Fescue	1	0	0	1	0	2
Annual Ryegrass	0	0	0	0	1	1
Tall Fescue	0	1	0	0	1	2
Big blue stem	0	0	0	0	2	2
Unknown prairie grass	0	1	0	0	1	2
Creeping Charlie	0	0	0	0	1	1

Table 3: Rust species by state submitted or collected from.

State	P. coronata	P. graminis	P. striiformis	P. coronata + P. graminis	N/A or No DNA	Total
Wisconsin	28	249	1	37	99	413
Illinois	2	4	0	2	0	8
Minnesota	3	1	0	0	0	4
Ohio	4	6	0	3	0	13
Nebraska	0	0	0	0	1	1

Project I: Laboratory Identification of Rust Fungi

The qPCR technique used for identifying the various rust species took time to develop but currently is a rapid and effective tool for identifying rust species found on turfgrass from throughout the Midwest. Rust samples

Continued on page 7

are still being collected as of this report in 2015, but as of today the following tables illustrate the number of samples that have been collected and their species identification:

As is clear from these tables, there is diversity in the rust population on turfgrass throughout the Midwest. This study was conducted to confirm and expand upon findings from Rutgers University that *P. coronata* could be found on Kentucky bluegrass, which was not considered likely until that study. Our results were in agreement with those from Rutgers, indicating that Kentucky bluegrass in the Midwest can also be host to multiple rust fungi. In addition, our study found that perennial ryegrass can be a suitable host for not only *P. coronata* but also *P. graminis*. One last point of great interest of this portion of the study is that multiple samples tested positive for both *P. coronata* and *P. graminis*. To my knowledge, neither *P. graminis* on perennial ryegrass or both *P. coronata* and *P. graminis* occurring on the same plant at the same time has previously been reported in the literature.

Project II: Field Resistance of Kentucky Bluegrass Families to Rust

In addition to the laboratory assay development and identification, field assessment was performed on 29 different Kentucky bluegrass cultivars belonging to 7 different bluegrass families (Figure 2). Each cultivar was visually assessed for rust on a 1-6 scale with 1 < 10% rust, 2 = 10 – 30% rust, 3 = 31 – 50% rust, 4 = 51 – 70% rust, 5 = 71 – 90% rust, and 6 > 90% rust. Field studies were set up at 3 locations (OJ Noer Turfgrass Research Facility in Verona, WI; Paul's Turf and Tree in Marshall, WI; Jasperson Sod Farm in Franksville, WI) in spring of 2013. The OJ Noer site had ample disease in 2013 but none in 2014 or 2015. Paul's Turf and Tree had consistent rust in each of the three years of the field study. The Jasperson site has not had rust develop in any of the three years of the study. The results from OJ Noer in 2013 and Paul's Turf and Tree in 2013-2015 are shown here:

Midnight bluegrasses had the highest levels of rust in 2013 at both the OJ Noer and Paul's Turf and Tree sites (Figure 3). Midnight had comparatively less rust in both 2014 and in 2015, suggesting that rust resistance in Midnight bluegrasses increases over time. This is important information for sod growers who would typically harvest within 2 years of seeding. If Midnight types are especially susceptible to rust in the first year following seeding, they would require additional inputs of fertilizer and pesticides to make the sod suitable for sale to customers. Planting

Figure 2: The main field cultivar resistance project was conducted at Paul's Turf and Tree, Lurvey Farms, and Jasperson Sod Farms. This picture from Paul's Turf and Tree shows the study about one month after seeding.

Table 4: Rust resistance of seven different Kentucky bluegrass families at the OJ Noer Turfgrass Research and Educational Facility in Madison, WI in 2013

Family	Estimate ± Standard Error	Letter Group[a]
Midnight	3.05 ± 0.136	A
Compact	2.71 ± 0.136	B
America	2.68 ± 0.155	B
Hybrid Blue	2.38 ± 0.317	BCD
Shamrock	2.29 ± 0.136	C
Improved Common	1.63 ± 0.317	DE
BVMG	1.50 ± 0.317	E

[a]Means separated using Fisher's LSD test (P = 0.05).

Table 5: Rust resistance of seven different Kentucky bluegrass families at Paul's Turf and Tree Farm in Marshall, WI in 2013

Family	Estimate ± Standard Error	Letter Group[a]
Midnight	2.06 ±0.089	A
Compact	1.98 ±0.089	AB
America	1.78 ±0.105	BC
Improved Common	1.75 ±0.235	ABC
Shamrock	1.73 ±0.089	C
Hybrid Blue	1.38 ±0.235	CD
BVMG	1.00 ± 0.235	D

[a]Means separated using Fisher's LSD test (P = 0.05).

Table 6: Rust resistance of seven different Kentucky bluegrass families at Paul's Turf and Tree Farm in Marshall, WI in 2014

Family	Estimate ± Standard Error	Letter Group[a]
Hybrid Blue	4.25 ± 0.258	A
America	2.35 ± 0.158	B
Shamrock	1.89 ± 0.148	C
Compact	1.75 ± 0.148	CD
Midnight	1.54 ± 0.148	D
Improved Common	1.00 ± 0.258	E
BVMG	1.00 ± 0.258	E

[a]Means separated using Fisher's LSD test (P = 0.05).

Table 7: Rust resistance of seven different Kentucky bluegrass families at Paul's Turf and Tree Farm in Marshall, WI in 2015

Family	Estimate ± Standard Error	Letter Group[a]
Improved Common	2.00 ± 0.174	A
Shamrock	1.73 ± 0.070	AB
America	1.63 ± 0.081	BC
Hybrid Blue	1.50 ± 0.174	BCD
Compact	1.45 ± 0.070	CD
Midnight	1.38 ± 0.070	D
BVMG	1.00 ± 0.174	E

[a]Means separated using Fisher's LSD test (P = 0.05).

Continued on page 8

other bluegrass families, namely America or Shamrock, may allow for sod to be sold within the first two years of seeding without experiencing significant rust development.

Project III: Rust Management Using Fungicides and Nitrogen Fertilizer

A 'rust management' field study was seeded at Lurvey Farms in Whitewater, WI in April of 2014. A mixture of cultural (balanced 10-10-10 fertilizer and urea fertilizer) and chemical (systemic vs contact fungicides and preventative vs curative applications) rust control options were evaluated on a highly susceptible cultivar of Kentucky bluegrass (Midnight). Rust was slow to develop in 2014 but it was clear by the end of the season that those plots receiving the penetrant fungicide Bayleton had much lower levels of rust than either Daconil or Heritage TL (see table below). Differences between the fertilizer regimes were less apparent, suggesting that rust development is not particularly dependent on a balanced vs unbalanced nitrogen source. Rust did not develop at Lurvey Farms in 2015.

Part IV: Curative Rust Management With Fungicides and Fertilizer

An additional study was seeded on 'Midnight' Kentucky bluegrass at Paul's Turf and Tree in the spring of 2014 to determine the most effective curative management options for rust. Fungicides were applied in the fall of 2014 once significant rust had developed over the plot. The most effective fungicides for curative management of rust were clearly Bayleton and Banner MAXX, which are both from the demethylation inhibitor (DMI) class of fungicides. The balanced fertilizer treatment also significant decreased rust by the October 24th rating date.

Part V: Sod Industry Survey Responses

Ten questions were submitted to the Wisconsin and Illinois sod industry on March 27th, 2015 regarding the economic implications of rust management. The survey was designed and sent out once in 2015, and then again following implementation of rust management practices recommended as a result of this research. However, recommendations for integrated rust management have not yet been made to the industry because studies have either not yet been completed or they have only recently been completed. Eleven responses to the survey were received and are summarized on page 9.

Figure 3: A 'Midnight' cultivar on the left is next to a non-Midnight cultivar on the right. Though not all 'Midnight' cultivars were decimated by rust, in general 'Midnight' cultivars were more susceptible to rust than other bluegrass families.

Table 8: Rust severity on October 24th, 2014 on plots sprayed with either contact (Daconil WeatherStik) or penetrant (Bayleton and Heritage TL) fungicides and fertilized with either balanced (10-10-10) or unbalanced (46-0-0) fertilizer at Lurvey Farms in Whitewater, WI

Treatment	Rust Severity ± Standard Deviation	Letter Group[a]
Non-treated control No Fungicide or Fert	3.8 ± 0.64	A
Contact Fungicide (Daconil) Non-balanced Fert (46-0-0)	2.0 ± 0.64	B-E
Penetrant Fungicide (Bayleton) Non-banaced Fert (46-0-0)	1.0 ± 0.64	E
Penetrant Fungicide (Heritage TL) Non-balanced Fert (46-0-0)	2.5 ± 0.64	A-E
Contact Fungicide (Daconil) Balanced Fert (10-10-10)	2.0 ± 0.64	B-E
Penetrant Fungicide (Bayleton) Balanced Fert (10-10-10)	1.3 ± 0.64	E
Contact Fungicide (Heritage TL) Balanced Fert (10-10-10)	2.5 ± 0.64	A-E

[a]Means separated using Tukey's HSD test (P = 0.05).

Table 9: Rust severity on October 24th, 2014 following two applications of various curative fungicide and fertilizer treatments at Paul's Turf and Tree in Marshall, WI

Treatment	Rust Severity ± Standard Deviation	Letter Group[a]
Non-treated Control	4.5 ± 0.70	A
Daconil WeatherStik	4.0 ± 0.70	AB
Bayleton	1.0 ± 0.70	C
Banner MAXX	1.3 ± 0.70	C
Compass	4.3 ± 0.70	A
Heritage TL	3.5 ± 0.70	AB
Urea Fertilizer (46-0-0)	3.0 ± 0.70	AB
Balanced Fertilizer (10-10-10)	2.5 ± 0.70	BC

[a]Means separated using Tukey's HSD test (P = 0.05).

Continued on page 9

Part V: Sod Industry Survey Responses

1) Has rust been a problem at your facility at any point in the last 5 years?
   Yes □11 No □0 Unsure □0

2) Rust has been the most significant disease at my facility in the past 5 years.
   Strongly Agree □4 Agree □5 Neither Agree or Disagree □1
   Disagree □0 Strongly Disagree □0

3) Rust seems to be getting worse at my facility.
   Strongly Agree □1 Agree □5 Neither Agree or Disagree □3
   Disagree □1 Strongly Disagree □0

4) Approximately what percentage of your facility devoted to sod production has been affected by rust?
   <10% - 0 10-25% - 3 25-50% - 6 50-75% - 0 >75% - 1

5) Have you instituted any methods to control rust, such as using fungicides or altering fertilizer programs?
   Yes □9 No □1

6) If you answered yes to question 5, approximately how much did you spend on controlling rust in an average year?
   Responses: $5,000; $25,000; $1500; $5,000; $40/Acre; $1200; Minimal investment; Fertilizer & water & irrigation; $2,000

7) Approximately what percentage of your overall pest control budget (i.e. weed, disease, insect control) was devoted to rust control in 2014?
   Responses: 5-10%; 10%; 15%; 10%; 20%; 5%; 2%; $20,000; 5%

8) Was your program successful in controlling rust?
   Completely successful □0 Somewhat successful □8 No success- 1 No program - 1

9) Approximately how many acres of sod did you maintain in 2014?
   Responses: 650, 1200, 300, 100, 200, 110, 220, 400

10) What state is your facility located in?
   Responses: WI □5; IL □3; IN □1; Cool-season area - 1

What Three Years of Rust Research Has Taught Us
- continued

Rusts are traditionally a very difficult pathogen group to work with, and as a result there has been relatively little research conducted on this disease. However it is clear that as rust severity has increased across the region in the recent years, new research is required to provide both growers and homeowners with more information to successfully manage this disease. While the results presented here don't provide all the answers, they do provide important information that can aid in rust management and also provide more clarity on the future directions that rust research needs to go.

The research presented above was supported by the Wisconsin Sod Producers Association and the various projects were hosted by Paul Huggett at Paul's Turf and Tree in Marshall, WI; Mark Lurvey at Lurvey Farms in Whitewater, WI; and Randy Jasperson at Jasperson Sod in Franksville, WI. I would like to thank the Sod Producers Association and Paul, Mark, and Randy for their generous support of this research.

EDUCATIONAL OPPORTUNITY:

The 2016 Great Lakes School of Turfgrass Science Online (For Professionals) is set for January 6th – March 23th, 2016

By ???????

Any investment in quality continuing education opportunities benefits employees and employers alike. The 2016 Great Lakes School of Turfgrass Science Online is designed to help meet the continuing education needs of any individual or organization. This 12-week program will have training sessions accessible live online on Wednesday evenings from 6 to 8pm (Central Standard Time) or the option to view the recorded sessions. This 12-week certificate program aims to provide participants with thorough and practical continuing education in turfgrass management. The course is directed by educators from the University of Minnesota-Twin Cites and the University of Wisconsin-Madison, with 12 turfgrass scientists and educators from seven Land-Grant Universities.

Turfgrasses are a resource in our urban community environments and best management practices are aligned with environmental, economic & societal priorities. The Great Lakes School of Turfgrass Science provides participants with the science based principles needed to effectively manage turf for recreation, sport, aesthetics and environmental protection. The Great Lakes School of Turfgrass Science is a quality training opportunity for:

- Practitioners that establish and maintain turfgrass for athletic fields, consumer/commercial lawns, golf courses, recreation/ parks, and sod production
- Technical representatives from industry (suppliers of equipment, plant protectants, fertilizer, etc.)
- Those new to the industry - wanting to get trained and off to a great start
- Those with experience in the industry - to review/update their knowledge and practices

The registration deadline is December 31st, 2015. Students will have access to the course and materials at their convenience during the 12-week period via moodle class management system. The fee for the course is $495, which includes supplemental materials and a certificate after successful completion of the program. Visit this link to register: http://z.umn.edu/2016glts

Early registration is encouraged and pre-registration is required.

For Further Information: Contact Sam Bauer, Assistant Extension Professor - University of Minnesota Email: sjbauer@umn.edu Phone: 763-767-3518.

What a Treat!

By Tom Schwab, OJ Noer Turfgrass Research and Education Facility, University of Wisconsin-Madison

WTA members and friends were treated to an outstanding golfing experience on October 5, 2015. That is when the annual WTA Golf Fundraiser was held at Blue Mound Golf and Country Club in Wauwatosa. Golf Course superintendent Steve Houlihan and his staff had the course in outstanding condition, that is, if you like super true and NASCAR fast greens, which most of us do. I can't get over how fun those greens were! And the fairways, tees, rough, traps, and landscaping were second to none. Add to that the clubhouse, which you had to see to believe (see pictures).

Participation was just short of a sold out field, at 129 golfers, and hole sponsorships were at an all time high. Please see the list of golf hole sponsors and thank them for making the day a success. Their contributions helped the WTA raise $11,200 to support worthy turfgrass research initiatives well into the future.

The WTA definitely was a winner for the day but so were the 129 participants. They played a wonderful golf course on a spectacular autumn day in the low 60s with a mild breeze, overcast sky, and full autumn color. The course conditions, food, and hospitality were top notch, and everyone went home with a nice door prize. Many of those prizes were worth more than the cost of registration. A special thanks goes to the many generous door prizes donors (listed on page 12) who helped make the day even more memorable. (I'm sorry if I missed anyone).

Many participants also went home with golf skill and other prizes. One of those other prizes was a drawing for an Apple IPad that was won by Todd King from Deer Valley Golf Course. Todd was also in the winning foursome for the day. His team with Peter Meyer, Dan Wubbels, and Jeff Ellingson carded a score of 61 in the day's 4-person best-ball tournament. Second place, with a 67, went to Aaron Goninen, Chad Grimm, Nick Strain, and Dave Tilsen. A random drawing for another team went to the 24th place team of Kevin Green, Omar Zaldivar, Chris Nicolas, and Reed Meier. Each of these individuals won a $75 gift certificate to Blue Mound's pro shop. Also collecting $75 were the following individual skills event winners:

- Longest Putt on Hole #1 – Chris Zugel
- Longest Putt on Hole #4 – Rob Johnson
- Closest to Hole on #7 – Kerry Anderson
- Longest Drive on Hole #10 – Scott Verdun
- Closest to Hole on # 13 – Nick Strain
- Closest to Hole on #17 – Bill Schwantes

Congratulations to all the skills events, door prize, and random drawing winners. The day was surely a treat for everyone, and for the WTA. The WTA will continue to further its valuable research and education with the money raised. A special thanks goes to all the participants, door prize donors, hole sponsors, and volunteers. Other thanks go to the golf course, clubhouse, and pro shop staff, and the members of Blue Mound Golf and Country Club who graciously gave up their course for a day. The WTA was very fortunate to have everyone pull together to make this event a resounding success.

Hole Sponsors

Aquatrols
Bayer
Burris Equipment
Carl & Barbara Grassl
Clesen PROTurf Solutions
DHD Turf Products
Dow AgroSciences
John Powless Tennis Center
Lohmann Companies
National Golf Graphics
North Shore GC – Menasha
Oneida Golf & CC
Paul Koch
Pendelton Turf Supply
ProGro Solutions
SAS Management
SentryWorld
Helena Chemical Shawn Hilliard
SiteOne Landscape Supply
Syngenta
Tom & Sandy Schwab
Wausau CC

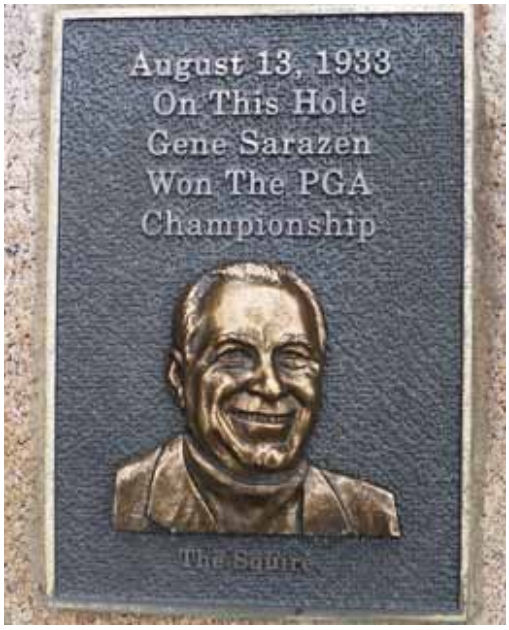
Continued on page 12

The troops lining up to do battle

Door Prize Donors	Company	Prize
Beth Duschak	Dow AgroSciences	Four golf umbrellas, Water bottle
Bill Rogers	Evergreen GC	Foursome of Golf w/ Carts
Bob Lohmann	Lohmann Golf Designs	Three jackets
Bruce Schweiger	SAS Management	Bike, trike, and 3 jackets
Chad Grimm	Blackhawk	Wedge
Chuck Schwab	Stoughton CC	Foursome of Golf w/ carts, golf shirt, 7 sleeves
Dan Quast	DHD	Golf bag
Dan Schuld	Portage CC	Foursome of Golf w/ Carts
Darren Dase	Delbrook	Foursome with carts
Dave Braasch	Glenn Erin GC	12 Titleist Pro V1 golf balls
Dave Groelle	Royal Melbourne	Shirt
Dave Kloss	JW Turf Equipment	3 golf shirts
Ed Witkowski	Pendelton Turf	Two 12 pack of beer, and 2 x $100 gift certificate
Erich Lange	Country Club Estates	Two golf shirts
Gary Huenerburg	Burris Equipment	4 hats, 2 shirts
Jeff Ellingson	Edelweiss GC	Foursome of Golf w/ carts
Jeff Rottier	Janesville CC	Foursome of Golf w/ carts
Jim VanHerwynen	South Hill CC	Foursome of Golf w/ carts
Joel Peterson	New Berlin Hills CC	Foursome of Golf w/ carts
John Turner	Bayer	Yeti mug, blue tooth speaker
Jon Hegge	Evansville GC	Two UW/NW football tix, wine, 12 pack
Kevin Knudtson	Geneva National	3 golf shirts
Mark Kienert	Bullseye CC	Whiskey, 2 hats, 2 sleeves of balls
Matt Kregel	Strawberry Creek	2 hats, 2 hoodies, 2 fleeces
Mike Kactro	Washington County GC	Twosome of Golf No Cart
Mike Krupke	ServCo FS	2 coolers, 2 hats, 2 tool sets
Mike Lee	Kohler	5 caps, 4 tee shirts, 15 golf shirts
Mike Lyons	Lawsonia GC	Foursome of Golf w/ carts
Mike Werth	ProGro	12 pack beer, $50 Cabelas gift certificate
Monroe Miller	ASGCA	Book
Neil Radatz	Hawks Landing GC	Fleece jacket
Nick Strain	Qualipro	6 Pack, $25 Home Depot gift certificate
Peter Meyer	National Golf Graphics	Golf shirt
Phil Spitz	Syngenta	Sunglasses
Randy Lusher	BASF	Four golf shirts, one windbreaker
Rob Johnson	Waupaca Sand	FitBit Flex Wireless Activity Wristband
Scot Anthes	Brown County GC	Foursome of Golf w/ carts
Scott Bushman	Fox Valley GC	Clothing
Shawn Hilliard	Helena	Fishing gear
Todd King	Deer Valley GC	Foursome of Golf w/ carts
Tom Schwab	OJ Noer Facility	130 WTA Hats

Aaron Goninen winds up for a winning swing

Our host superintendent Steve Houlihan poses with our friend and former superintendent Carl Grassl



A plaque commemorating Gene Sarazen's PGA Championship win at Blue Mound

Former Blue Mound superintendent Carl Grassl with wife Barbara joined the many generous hole sponsors

See more photos on page 11

Father/son duos of Brent and Rod Johnson with Steve and Tim Schmidt always come to support the fundraiser

Mount Mary College looms in the background of Hole #16

Dave Brandenburg about to send one to the moon

Do you think these guys had fun?
(Dave Groelle, Dr. Ed Nangle, Bruce Schweiger, and Erich Lange)

Chad Grimm develops some impressive club head speed

The WTA thanks all participants for a successful event in 2015

Mr. Smooth, Jim Van Herwynen, making another routine perfect hit

Kerry Anderson and Dr. Nangle sporting matching hats from the US Open

Each hole at Blue Mound was designed after a famous hole from around the world by architect Seth Raynor, this one of #17 at St. Andrews

The clubhouse wowed our visit!

CALENDAR OF EVENTS

Jan 5	**WTA Turfgrass Research Day**	**Pyle Center, UW-Madison**
Jan 6-Mar 23	Great Lakes School of Turfgrass Science	Online (For Professionals)
Jan 13-15	Northern Green Expo	Minneapolis Convention Center, MN
Jan 19-22	STMA Annual Conference and Exhibition	San Diego, CA
Jan ???	WGCSA Assistant Superintendent Seminar	Whispering Springs, Fond du Lac
Feb 3-5	iLandscape; the Illinois + Wisconsin Landscape Show	Schaumburg, IL
Feb 6-11	GCSAA Educational Conference and Golf Industry Show	San Diego, CA
Feb 10	GIS Wisconsin Room	Bootlegger, San Diego, CA
Feb 12-14	WPT Garden Expo	Alliant Center, Madison
Feb 17	WSTMA Winter Conference	Timber Rattlers Stadium, Appleton
Feb 22-25	TPI International Education Conference and Field Day	Houston, TX
Mar 1,2	NGLGCSA Annual Meeting and Educational Conference	Radisson, Green Bay
Mar 2	Pesticide Applicator Training (Turf and Landscape 3.0)	Comfort Suites, Green Bay
Mar 7	Pesticide Applicator Training (Turf and Landscape 3.0)	Olympia Resort, Oconomowoc
Mar 14	WGCSA Spring Business Meeting	South Hills CC, Fond du Lac
Mar 21	Pesticide Applicator Training (Turf and Landscape 3.0)	American Family Center, Madison
Mar 24	Pesticide Applicator Training (Turf and Landscape 3.0)	Olympia Resort, Oconomowoc
Mar 30	Pesticide Applicator Training (Turf and Landscape 3.0)	Metropolis Resort, Eau Claire
Apr 6	Pesticide Applicator Training (Turf and Landscape 3.0)	Olympia Resort, Oconomowoc
Apr 20	Pesticide Applicator Training (Turf and Landscape 3.0)	Olympia Resort, Oconomowoc
Apr 27	WGCSA Super/Pro Outing w/PGA	Hidden Glen at Bentdale Farm, Cedarburg
Apr 28	Pesticide Applicator Training (Turf and Landscape 3.0)	Stoney Creek Hotel, Rothschild
May 23	WGCSA Monthly Meeting	Blackwolf Run (Meadow Valley), Kohler
June ???	WGCSA Monthly Meeting	TBD
July 26	**WTA Summer Field Day**	**O.J. Noer Facility, Verona**
Aug 15	WGCSA/ NGLGCSA Joint Meeting	Thornberry Creek GC, Oneida
Sept 19	Wee One Foundation Golf Fundraiser	Pine Hills CC, Sheboygan
Oct 3	**WTA Golf Fundraiser**	**Butte des Morts, Appleton**
Nov 5	WGCSA Couples Dinner	Wisconsin Club – City Club, Milwaukee
Nov ???	WGCSA Turfgrass Symposium	American Club, Kohler

WTA Members -- If you have an important date you'd like to share with other members, Call 608-845-6895 or email tgschwab@wisc.edu to include it in the next calendar.

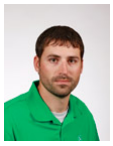
Contact Telephone Numbers

GCSAA/GIS	GCSAA Educational Conference and Golf Industry Show	800-472-7878
Great Lakes	Great Lakes School of Turfgrass Science Online	763-767-3518 or http://z.umn.edu/2016glts
NGLGCSA	Northern Great Lakes Golf Course Superintendents Assoc.	www.nglturf.org
Northern	Northern Green Expo	651-633-4987
iLandscape	the Illinois + Wisconsin Landscape Show	630-472-2851
PAT	Pesticide Applicator Training (Turf and Landscape 3.0)	608-262-7588
STMA	Sports Turf Managers Association Conference	800-323-3875
TPI	Turf Producers International	800-405-8873
Wee One	Wee One Foundation Golf Outing	630-457-7276
WGCSA	Wisconsin Golf Course Superintendents Association	920-643-4888
WGIF	Wisconsin Green Industry Federation	414-529-4705
WPT	WPT Garden Expo	www.wigardenexpo.com
WSPA	Wisconsin Sod Producers Association	262-895-6820
WSTMA	Wisconsin Sports Turf Managers Association	920-643-4494
WTA	**Wisconsin Turfgrass Association**	**608-845-6536**

Turfgrass Research Day Conference & Webinar

January 5th, 2016 Pyle Center, 702 Langdon St, Madison, WI

8:00am	Registration
8:30	Welcome and Scholarships
8:45 – 9:30	**Sam Bauer – University of Minnesota**
	Weed Control Programs for Sports Turf
9:30 – 10:15	**Chris Williamson – University of Wisconsin Madison**
	Strategies for Managing Earthworm Castings in Turf
10:15 – 10:30	Break
10:30 – 11:15	**Doug Soldat – University of Wisconsin Madison**
	2015 Research Review
11:15 – 12:00	**Jeremy Nelson – WISN Milwaukee / Meteorologist**
	Trending Meteorology Topics
12:00 – 12:45	Lunch
12:45 – 1:30	**Michael Boettcher – Milwaukee Brewers**
	The Odd Couple – Turf Management at Miller Park
1:30 – 2:15	**Glen Stanosz, PhD – University of Wisconsin Madison**
	Managing Tree Risk & Liability on Your Golf Course
2:15 – 3:00	**Paul Koch – University of Wisconsin Madison**
	The Danger Lurking Below; How Patch Diseases Can Ruin Your Summer



Sam Bauer is an Assistant Extension Professor at the University of Minnesota. He received his Bachelors and Masters degree at the University of Minnesota-Twin Cities. His research and extension objectives revolve around practical management strategies to improve turfgrass on sports fields, golf courses and general grounds.

Jeremy Nelson received his B.S. degree in atmospheric and oceanic sciences from the University of Wisconsin-Madison. He is a member of the National Weather Association and the American Meteorological Society. From 2004 – 2006, he was voted “best local TV personality” by readers of Madison Magazine.

Michael Boettcher will be starting his 3rd season as the Director of Grounds with the Milwaukee Brewers Baseball Club. He got his start in the Sports Turf Industry as a landscape intern in 2004 with the Brewers under the supervision of Gary Vanden Berg. He received his Bachelors degree from the University of Wisconsin-Madison.

Glenn Stanosz is a Professor of Tree and Forest Health at the University of Wisconsin-Madison and privately consults as an International Society of Arboriculture certified arborist. His university research involves tree diseases caused by fungi, and he teaches disease biology and management to students in horticulture, landscape architecture and professionals in forestry and the green industry.

Chris Williamson is a Professor of Entomology at the University of Wisconsin-Madison where he is an extension/research entomologist in urban landscape entomology including turfgrass. He received his B.S and M.S. degree from the Ohio State University. He received his Ph.D. in entomology from the University of Kentucky.

Doug Soldat is an associate professor and turfgrass extension specialist in the Department of Soil Science at the University of Wisconsin-Madison. He advises the turfgrass management students at the UW and teaches courses in the fields of turfgrass management and general soil science.

Paul Koch is an assistant professor in the Department of Plant Pathology as well as the Molecular and Environmental Toxicology Center at the University of Wisconsin-Madison, joining the faculty in January of 2014. His research has focused primarily on fungicide breakdown in the environment and snow mold diseases on golf course turfgrass.

Complete this registration form and mail with payment to
WTA / O.J. Noer Facility / 2502 Highway M / Verona / WI / 53593.
You may also go to www.wisconsinturfgrassassociation.org to register online.
All registrations must be received by December 30th, if not, add $10 per person.

If you are registering to attend via webinar, make sure your email is included.
You will receive the link to the webinar via email by January 4th.

Company_____
Mailing Address_____
City/State/Zip_____
Email & Phone Number_____
If attending at Pyle Center, list name of all attendees_____
_____

Webinar only – non WTA member	$40 ea X ___ =	$_____
Webinar only – WTA member	$25 ea X ___ =	$_____
Attendance at Pyle Center non WTA member	$50 ea X ___ =	$_____
Attendance at Pyle Center WTA member	$40 ea X ___ =	$_____
2016 WTA membership dues	$150 each	$_____
Total Amount Enclosed		**$**_____

Credit card #_____ **Exp date**_____ **Security code**_____

Return with payment to **WTA / O.J. Noer Facility / 2502 Highway M / Verona / WI / 53593.**
If you have any questions, contact Audra at 608-845-6536 or audra.anderson@wisc.edu.
All registrations must be received by December 30th, 2015.