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TABLE OF CONTENTS

THE PRESIDENT'S MESSAGE
April (snow) Showers! 4

CHAPTER CONVERSATION
Communication is Important. 7

WISCONSIN SOILS REPORT
How I Would Manage Potassium on Cool Season Turf:
Part 1 8

WISCONSIN ENTOMOLOGY REPORT
Cold and Wet: What Does This Mean For Insects This Year
. 14

GAZING IN THE GRASS
Costs and Benefits And Structure of the UW-Madison Turf
Program 16

WISCONSIN PATHOLOGY REPORT
Patch Disease Refresher 20

TURFGRASS DIAGNOSTIC LAB
Endocrine Disruption and Turfgrass Pesticides 24

MADTOWN MUZINGS
Par 7 28

STUDENT RESEARCH
Have the Noer Facility In Your Backyard 30

WGCSA
April Golf and Educational Meeting at Geneva National .. 39

MISCELLANY
Defending the Profession 40

BADGER STATE TURF CLIPPINGS 44

EDITORS NOTEBOOK
The Spring That Never Was 46

NOTES FROM THE NOER
WTA Field Day Offers Something For Everyone 48

COVER STORY
Maple Bluff Hosts WSGA Amateur Championship 50

ABOUT THE COVER

The 6th Hole at Maple Bluff Country Club, Host of the 2011 WSGA Amateur Championship by Julie Moyer.

"In the spring, I have counted 136 different kinds of weather inside of 24 hours".

By Mark Twain, American Humorist and writer, 1835-1910

This quote by Twain sheds light on the oddities of Wisconsin Spring Weather and the fact we are not alone in our suffering.

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THE GRASS ROOTS

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

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April (snow) Showers!

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

I am still waiting for spring to arrive. I can't remember the last time one of our spring meetings golf was cancelled due to snow. About 55 members did still attend the educational meeting and lunch where Dr. Stier provided the insights of the inner workings of the University and how it relates to turfgrass research.

We are all very fortunate to be working in a state that has one of the best turfgrass research facilities, the O.J. Noer Turfgrass Research and Educational Facility. Let us not take it for granted, but realize the significance of this facility to our industry. The research not only benefits you and your course, but it is needed to help educate others who are reluctant to see the beneficial value of turfgrass.

Last week I had the pleasure of speaking with a couple of our Waukesha County DNR representatives. In our discussion they informed me that turfgrass is the worst of all ground covers, the only thing worse is bare soil. Their reasoning was because turfgrass has a shallow root system compared to other native species.

I spoke to them in regards to some of the research and they seemed willing to review this research and hear what the turf professors had to say at UW Madison. These professors not only provide us with the latest research results, but can also be our voice when it comes to environmental issues.

Next time when the opportunity to support turfgrass research presents itself, consider being part of it. Here

are a few ways you can be involved, attend the WTA Summer Field Days on July 26th, support the Par4Research by offering a foursome of golf, and donate the extra \$5 to the TDL when attending one of our events.

You may or may not have noticed, but April's and May's event did include the \$5 donation to the TDL in the price of the event. The reason for this is with our current online registration process, we cannot offer the option of an additional payment choice, only one fixed payment cost. This has resulted in a significant decrease in donations.

After some complaints, we hope to have the online registration page updated for the July event where once again this will be an option. I apologize to those of you who took offense of the donation being included in the price.

Thank you to all that helped make the Par4Research online auction a success. Over \$10,000 was raised for turfgrass research thanks to the 59 WGCSA member clubs who donated. The revenue vs. expenses for this year's event shows a 20% increase in funding over last year. Thank you to all the courses who donated and I hope we can count on your continued support.

I hope the coming months are much more favorable for golf and growing turf. I look forward to seeing you all of you this summer at our upcoming events. If any of you have comments or concerns, please give me a call or send me an email.



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Communication Is Important

By Brett Grams, WGCSA Chapter Manager

One common interest all members of the WGCSA share is the weather. Collectively speaking everyone I talked to this late winter and early spring agree it has been very cold and wet... Most every conversation conveyed a sense of frustration as we had late start to the golf and growing season here in WI. As most of you struggled with the spring weather in trying to get your course and operation going you also had to answer your members or golfers main question. "When are you opening the course?" How did you communicate the answer? Did you use word of mouth, a sign in the pro shop, or by informing other club employees? Did you send out emails? How about the newer forms of electronic communications that are referred to as Social Media?

I know some members now have websites; others use Face Book or Linked In, and report these updates via Twitter. If these terms are not familiar to you, and all your cell phone does is make and receive calls do not be alarmed. The majority of our members do not "tweet" or "blog", but some do. They have learned a new skill and are using the technology to communicate the "who, what, where and why" of their Maintenance Departments and operations to the golfers of their facilities. How much information is shared and how it is shared is a tough question. Some golfers are more curious or questioning than others. They want to know HOC's of the greens and the reasoning for topdressing them while others could care less as long as the play well. The challenge is how to supply these communications to some without overloading others.

As your Chapter Manager I struggle with the same issue. How do I effectively and efficiently communicate the information to the membership in a timely manner without becoming annoying or provide too many updates? As technology and communication continue to evolve we need to evolve with it. We are all familiar with *The Grass Roots*. You are provided 6 issues per year and I know most

of us read the magazine cover to cover as we find the time. However some information like meeting updates, job opportunities, and time sensitive information needs to be presented more often and updated much more quickly. Our website is updated weekly (and sometimes daily) to provide members with the latest information we can provide. I also try to send out emails when I have information that I or our Board of Directors think is important to you. What if you do not check the website or read your email? I have now begun sending "tweets" via Twitter when I send out email updates. These can be received via computers, smartphones, and some text messages. However, I do not want to be a burden so I am trying to send out updates (and the reminders) once or twice a week.

Are you getting the latest information from us? To do so please consider providing the WGCSA with the following:

1. Review and update your physical addresses when you move or change positions.
2. Provide a valid and current email address (and check it as you can).
3. Using your valid email address you can log onto the members side of our Website.
 - a. The members only side has links to archives at the TGIF at Michigan State
 - b. Links to all past editions of the Grass Roots
 - c. Job Opportunities and resumes of people looking for employment
4. Follow and request updates via Twitter (Brett Grams, WGCSA @WGCSA)
5. Link to me in Linked In (Brett Grams)

If you would like to learn more about our communications please contact me direct as well. I would be happy to help you via email (bgrams@wgcsa.com) or by phone at 920-643-4888.



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How I Would Manage Potassium on Cool-Season Turf: Part 1

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

"There is something fascinating about science. One gets such wholesale returns of conjecture out of such a trifling investment of fact." – Mark Twain

Such. Sometimes the truth hurts. But, I feel this quote is often appropriate for our field of turfgrass science. Comparatively, there has been so little research done on turfgrass, and so many questions that remain to be answered that many of our recommendations are mostly conjecture based on a small number of highly specific studies that may or may not apply to your particular situation. For some, this may be frustrating; others may simply accept this as the way things work. Knowledge is a moving target, and the ability to reach a good decision based on the available information (some of it reliable, some of it less so) is the mark of an educated mind.

Education researchers tell us there is a progression to learning. We begin our lives learning facts and always trying to see issues as black and white. But at some point, we begin to realize that most of the problems we encounter do not fit the "black and white" model of thinking very well. While this realization comes to people in different ways and at differ-

ent times, it is the goal of higher education to facilitate this paradigm shift. Most professors don't aim to simply fill the students' heads with facts, but to teach the students how to learn – so when the facts change (and they always do), the students will be just fine.

All this applies to turfgrass education as well. We need to start somewhere, so we start with simple black and white facts and generalizations. For example, potassium is a primary macronutrient and one of the top three nutrients implicated in less than optimal yield in food production. It doesn't have a structural role in the cell or form any significant organic molecules. Potassium is primarily involved in osmotic regulation of cells and as a co-factor in enzymes. While all of that is true, it probably doesn't help you do your job any better. So regarding the relevance of potassium to turf management, our black and white model says applying potassium improves cold, heat, drought, and wear stress. But when you try to get specific, things get complicated quickly. For example, when and how does potassium produce these benefits?

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WISCONSIN SOILS REPORT

Does more potassium applied mean more stress tolerance? Is there a difference among the grasses in response to potassium? Does potassium increase cold tolerance, drought tolerance, and stress tolerance equally, or are some benefits more tangible than others?

So putting aside our black and white understanding of potassium, let's take a look at some of the research and try to understand potassium at a slightly deeper level. With few exceptions, the research described below was limited to a keyword search of peer-reviewed publications on Michigan State's Turfgrass Information File (TGIF) or from the Nutritional Requirements and Fertilization chapter of the American Society of Agronomy (ASA) Turfgrass Monograph (1992).

Cold Tolerance

The ASA Turfgrass Monograph (which is intended for researchers, not undergraduates) gives a more nuanced perspective of the role of potassium than we find in the standard textbooks: "Potassium plays a role in drought and heat tolerance, and especially cold tolerance of warm-season grasses". I'm intrigued by the possibility that the "winterizer" perception only applies to warm-season grasses. The authors (Drs.

Tom Turner and Norm Hummel) go on to cite five studies that found potassium increases winter hardiness in warm-season grasses, but only found one study out of three that support the claim that potassium increases winter hardiness of cool season grasses (Table 1). More recently, Webster et al. (2005) provided evidence that potassium applied at 5-8 lbs/M (N ranged from 1-3 lbs/M) increased cold tolerance in perennial ryegrass. However, after studying this paper closely, I agree with the statistical conclusions but find the evidence practically insignificant – that is, not compelling enough to convince me that potassium should be used at those rates to improve cold tolerance in most situations.

In fact, our view of potassium as a "winterizer" may be due in part to Scotts. Marketing is more efficient when done on a national scale rather than a regional one, and so the winterizer fertilizers that are beneficial for warm season grasses were also marketed to the north, despite only weak evidence that potassium plays a role in cold tolerance for cool-season grasses. Unfortunately, I was unable to find a history of the use of the word winterizer before 1982, to this theory remains speculative for now.

Table 1. Summary of research on cold tolerance on cool season grasses.

Increases Cold Tolerance	No Effect on Cold Tolerance
Webster and Ebdon et al., 2005 (P. rye, when applied at 3-5x of N rate)	Turner, 1980 various
Beard and Rieke, 1966 (various, when applied at 0.5x of N rate)	Cook and Duff, 1976, tall fescue

Wear Tolerance

My literature search for peer-reviewed articles on the relationship between potassium and wear also turned up very few results (Table 2). This clearly shows how little research there is that specifically addresses how potassium affects wear. In fact, the source most often referred to when wear tolerance is cited as a benefit of potassium is an abstract (~170 words long) from a scientific conference in 1975. In that abstract Drs. Shearman and Beard reported that wear tolerance increase with increasing K applied, with maximum wear tolerance between 7 and 9 lbs K₂O/M. Interestingly, all other wear tolerance studies have concluded that potassium has little to no effect on wear tolerance (Table 2). Yet, textbooks and popular press articles continue to list wear tolerance as a benefit of potassium, while ignoring the fact that the overwhelming majority of studies have not supported this conclusion. I attribute the staying power

of the abstract to two things: 1) the authors are giants of turf research; 2) the conclusion is something that people want to hear (i.e. there's something easy you can do to improve wear tolerance). I do not question that the findings reported by Shearman and Beard were real for their particular situation. However, before putting wear tolerance firmly in the category of "benefit of potassium" and applying 7-9 lbs K₂O/M/yr, I am going to need more evidence. For my money, the two papers by Hoffman et al. (2010a, 2010b) are the most conclusive work on potassium and wear to date. If you want the details, you'll need to read the papers, but they basically found wear tolerance and recovery were primarily (~95%) associated with nitrogen management, and had little if anything to do with potassium management. The biggest drawback of that study: it was only done for perennial rye, so we have to take a leap of faith to apply it to annual bluegrass, etc.

Table 2. Does potassium influence wear tolerance on cool season grasses?

Increases Wear Tolerance	No Effect on Wear Tolerance
Shearman and Beard, 1975, bentgrass	Hoffmann et al., 2010a, 2010b, p rye
	Carroll and Petrovic, 1991, Kentucky bluegrass and creeping bentgrass
	Hawes and Kecker, 1977, bentgrass

WISCONSIN SOILS REPORT

Heat and Drought Tolerance

So far, we've been unable to find strong evidence that potassium increase cold hardiness or wear tolerance. It's time for some good news. It appears that most of the research on the effect of potassium on heat or drought stress has come up positive, with only one study reporting no effect (Table 3). However, as you can see by the table, there are also relatively few studies on this issue and only one in the last 30 years (yikes). Many good questions remain to be answered, specifically: at what level(s) in the tissue does K convey these drought/heat benefits? Additionally, can this level be predicted by soil tests, or can we only get the appropriate

drought benefit with supplemental applications? We simply don't have these answers yet. However, Dave Moody and Frank Rossi's recent research (building on previous work from Micah Woods) is finding that we've been measuring tissue potassium levels incorrectly. We normally look at the amount of potassium in the leaf per amount of dry tissue. But because the amount of potassium in the leaf is closely tied to the amount of water in the leaf, we should actually be looking at how much potassium relative to the amount of water in the leaf. This probably sounds trivial or esoteric, but I bet it will be critical to answering many of the remaining mysteries about potassium and drought tolerance.

Table 3. Does potassium influence heat and drought tolerance of cool season grasses?

Increases drought tolerance or recovery	No effect on drought tolerance or recovery	Increases heat tolerance
Haug, 2001	DiPaola and Engel (1976)	Pellet and Roberts (1963) - but only when N rate is high
Schmidt and Breuninger, 1981		
Waddington et al., 1978		
Escritt and Leff, 1970 - but only after 20 years of no K		

Disease Incidence/Severity

Finally, we come to diseases where there have been three flurries of activity over the past 40 years (Table 4). The first flurry, in the late 60s, reported that potassium applications decrease the incidence or severity of several diseases, including dollar spot. In the early 1980s, we find several studies that report no effect of potassium on several diseases, including dollar spot.

Recently, we've seen three reports of excessive applications of potassium (≥ 8 lbs/M/yr) increasing the gray snow mold pressure. It is my view that if soil test levels are sufficient and potassium applications are reasonable (not too much more than your N rate), then potassium has no influence on disease pressure. It is probably only at the extreme ends of the spectrum where you'll find trouble.

Table 4. Does potassium influence disease incidence or severity of cool season grasses?

Increases disease incident / severity	Decreases disease incidence / severity	No effect
Gray Snow Mold, annual bluegrass, (Moody and Rossi, 2010)	Red Thread, Take All, Fusarium, (Goss and Gould, 1968, Goss, 1969)	Red Thread, P.rye, fine fescue (Turner, 1980; Cahill et al., 1983)
Snow Mold (species not identified), creeping bentgrass, (Woods et al., 2006)	Dollar Spot, bentgrass (Markland et al, 1969)	Leaf Spot, Kentucky bluegrass (Turner, 1980)
Gray Snow Mold, P rye (Webster and Ebdon, 2005)		Dollar Spot, bentgrass (Waddington et al., 1978)
Brown Patch, bentgrass (Waddington et al., 1978)		