professional golf course manager. From your viewpoint, I attempt to prioritize and follow through on a wide variety of topics and issues including educational material, legislative action, membership promotion, institutional support and public relations.

There is a lot going on in the industry and having a full time representative has proven quite effective in the enhancement of your profession. Through me, "we" are represented upon the USGA Green Section Committee, the MDA Pesticide Management Committee, the PMC Education and Promotion Team, the DNR Groundwater Management Planning Committee, the MDA Pollinator Strategic Planning Committee and of great importance, the MPCA, DNR, MDA and the Bureau of Water and Soil Resources Golf Course Environmental Stewardship Committee. "We" communicate regularly with the MGA, MN Section PGA, Midwest Golf Course Owners Association, Club Managers Association, the UMN, MNLA and the MTGF. "We" are always available for insight into the industry.

As your liaison with the GCSAA, "we" last year pursued and received a grant to enhance membership promotion. This lead to, and emphasized, our summer exposure and winter outreach, both of which are open to both member and non-member professionals. In 2014 "we" have applied for a $10,000 grant from the GCSAA to support the financial requirements necessary to further the Minnesota Golf Course BMP and Environmental Stewardship Program. As "we" continue to promote the program with our state agencies we have found some agency challenges will require funding to overcome. For example, funding necessary for the creation, implementation and tabulation of golf courses assessments, a requirement put forward by the

MDA.

"We," however, are not all about advocacy. Member networking is also important. Annually, the MGCSA plans and participates in over two dozen social and educational opportunities. From the Beer and Pretzel Bash at the NGE to the Assistant's Professional Forum in late November and the ten outstate Outreach/Exposure events; there are many chances for you to get a flavor of the social advantages associated with the MGCSA. That is roughly two events each month touching every membership level from Equipment Managers to our Affiliates.

Oh yes, "we" mustn't forget about communication…if you are not 'touched' by the MGCSA through electronic media, Twitter, The Stimpmeter, The Hole Notes, Facebook and e-blasts, at least twice per week, you must have 'accidently' added MGCSA to you "junk" mail! Indeed, I do pester you a bit through electronic networking, but that is because I had, as a superintendent, perceived the need for more current communication.

All this talk of autonomy doesn't mean I wouldn't like a call or two, an email or note of suggestion. In truth, I savor those too few comments as they keep me in touch with you, the professional turf manager base of the golf industry. Never do I want to take you for granted and I will always maintain an open mind and appreciation of your time-bound desires to be an active member.

What have I done for you recently I ask? Well, I'd like to think that this question doesn't cross your mind at all as I attempt to project myself into your shoes and anticipate and implement your demands. Thank you for the opportunity to serve as your professional administrator.

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Early Physiological Changes Associated in Cold Deacclimation of Annual bluegrass and Creeping bentgrass

Michele DaCosta, Lindsey Hoffman, and Xian Guan
University of Massachusetts

Turfgrass and Environmental Research Online
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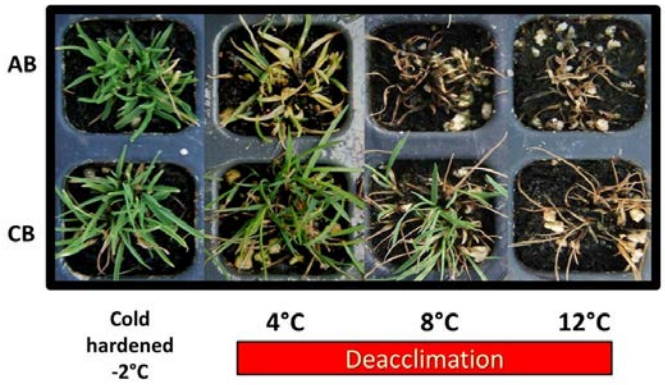
Objectives:

1. *Determine the effects of different above–freezing temperature and duration combinations that result in a loss in freezing tolerance of creeping bentgrass and annual bluegrass*
2. *Examine early physiological changes associated with deacclimation sensitivity of creeping bentgrass and annual bluegrass, with a focus on carbon and protein metabolism parameters*

Premature deacclimation associated with warming periods during winter and early spring can negatively impact turfgrass freezing tolerance and lead to winterkill. Some limited research suggests that annual bluegrass (Poa annua L.) (AB) and creeping bentgrass (Agrostis stolonifera L.) (CB) differ in their capacity to resist deacclimation, which can contribute to interspecific differences in winter injury potential. Therefore, research is necessary to understand the factors that trigger deacclimation in grasses and to identify plant traits that contribute to enhanced deacclimation resistance and freezing tolerance. The specific objectives of our research were to (i) determine the effects of different above–freezing temperature and duration combinations that result in deacclimation of CB and AB, and (ii) examine early physiological associated with deacclimation sensitivity of CB and AB, with a focus on carbon and protein metabolism parameters.

In Experiment 1, we compared one AB ecotype (previously shown to exhibit sensitivity to freezing temperatures) and one CB cultivar ('L–93'). Plants were exposed to a cold acclimation regime of 2°C for 2 weeks, followed by subzero acclimation –2°C for 2 weeks in controlled environment chambers. Following cold acclimation, plants were then exposed to one of six deacclimation treatments that consisted of the following temperature degree and duration combinations: 4°C for 1d or 5d, 8°C for 1d or 5d, and 12°C for 1d or 5d. Changes in freezing tolerance (lethal temperature at which 50% of plants were killed, LT50) for each species were monitored during cold acclimation and deacclimation. We found that CB achieved higher freezing tolerance at the end of the cold acclimation period (LT50 of –21.2°C) compared to that of AB (LT50 of –17.7°C). When plants were exposed to 4°C for 1 day, both species exhibited a small loss in freezing tolerance compared to that at –2°C. However, AB deacclimated to a greater extent compared to CB in response to most deacclimation treatments (Figure 1). As expected, the greatest deacclimation potential for both species was observed at higher temperatures (i.e., 12°C) and greater duration (i.e., 5 days).

Figure 1. Losses in freezing tolerance and resulting injury to annual bluegrass (AB) and creeping bentgrass (CB) following exposure to deacclimation temperatures of 4, 8 and 12° C for 5 days.



To better understand the underlying causes for differences in deacclimation resistance among the two species, we conducted a second experiment to examine early physiological changes of AB and CB in response to deacclimation, with a focus on carbon metabolism

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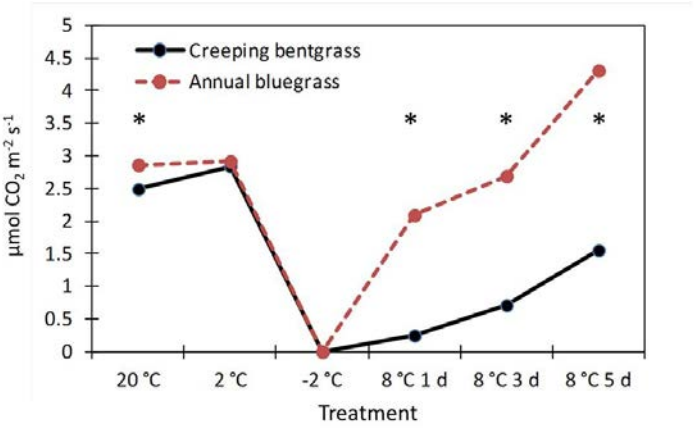
parameters. For Experiment 2, one AB ecotype (freezing sensitive) and one creeping bentgrass cultivar ('Penncross') were exposed to a cold acclimation regime as in Experiment 1. Plants were then exposed to a deacclimation treatment of 8°C for up to 5 days. During cold acclimation and deacclimation periods, we measured canopy photosynthesis and respiration rates, leaf chlorophyll fluorescence parameters, and leaf and crown carbohydrate contents. As found in Experiment 1, CB achieved higher freezing tolerance compared to AB in response to cold acclimation, and CB also maintained higher freezing tolerance following exposure to 8°C for 5 days. During deacclimation, AB restored carbon metabolism parameters more rapidly compared to CB, as exhibited by a greater increase in canopy photosynthesis and respiration rates and higher photochemical yield components (Figure 2). Although more rapid up–regulation of carbon metabolism may provide AB with a competitive advantage during spring recovery, these responses may also lead to greater susceptibility of AB to freezing injury in response to mid–winter warming events.

An additional experiment is currently underway to further evaluate early changes in the metabolism of important carbon and nitrogen metabolites involved in freezing tolerance, including carbohydrates, amino acids, and proteins, that may be responsible for differences in deacclimation resistance between AB and CB. In our preliminary work, we determined that CB maintained higher levels of fructans during deacclimation compared to AB. Furthermore, CB and AB exhibited distinct differences in their soluble protein profiles and presence of dehydrins proteins during deacclimation. The experiment is currently being repeated to confirm initial observations.

Figure 2. Changes in canopy photosynthesis of an–nual bluegrass (AB) and creeping bentgrass (CB) in response to different cold acclimation (20, 2 and –2°



Summary Points

- Annual bluegrass (AB) generally exhibited a greater loss in freezing tolerance at lower temperatures and shorter durations.
- In response to deacclimation, AB exhibited a more rapid capacity to restore carbon metabolism compared to CB, based on higher canopy photosynthesis, respiration, and photochemical yield components.
- Preliminary results from current experiments also suggest that differences in the metabolism of specific carbohydrate fractions and proteins, such as dehydrins, may also account for differences in deacclimation sensitivity among the two species.
- The more rapid shift in AB carbon and nitrogen metabolism may lead to greater susceptibility of this species to freezing injury in response to mid–winter warming events.

The MGCSA appreciates the opportunity to reproduce this report with full acknowledgment from the USGA. Their support of our industry through research and The Green Section Reports is valued greatly.

Thank you to the United States Golf Association

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The GreenJacket, A Humble Beginning in a Frigid Environment

Garry Sullivan, GreenJacket

The GreenJacket® project was started 18 years ago in the spring of 1996. At the time, we knew very little about how turf is protected, handled, dies or lives during winter, only about how big the divots we made were and that somebody was not going to be too happy about it. Our family business, Sto-Cote Products, Inc., was established 66 years ago in 1948 and over the years has been very involved with the flexible plastics industry. We have maintained a complete line of engineered flexible plastics for a wide array of creative applications. Most turf professionals went to school to learn all about turf sciences. At GreenJacket®, we have been in the process of learning hands-on from our worldwide clients and university professors as we go. After eighteen years of GreenJacket®, I can assure you we now know a lot more than we thought we ever would about turf protection and continue to learn each and every day.

Back in 1996, Roger Kisch from SouthView CC called us to see if we had a material to fit a "need" to protect golf course turf during the winter. I told him about our NiceRink outdoor ice rink division and the type of white liners we produced to make the rinks work. I had explained to Roger how my grass came through each year after having 18" of ice on it for 3 months and told him "sure this particular product should work, but don't call me if your green dies, it's your idea!" So, we gave him the plastic to try, and Roger called me when he was pulling the cover the first spring of 1997, and said "You need to come up here to Minnesota right away to see how it worked.", I did, and thus began the GreenJacket®. As other area courses in the Twin Cities heard of what was going on with Roger's trials at SouthView CC, they too wanted to try the new covers.

Things progressed rather quickly

with very few issues, and a lot of positive results. With those positive results came more interest and demand for the new impermeable product. We knew we had something new and unique, looked and could not find anything like our impermeable GreenJacket® cover, and we were right. The impermeable GreenJacket®, along with its systems and associated products, have been awarded several Patents of protection and trademarks with more pending as we continue to enhance the GreenJacket® Cover System and develop new products and ideas for the turf industries.

With over 15,000,000Sf of turf successfully protected worldwide, we look forward to the opportunity to let you see our products, explain how they can help you, and add you to our ever growing list of GreenJacket® clientele.

The GreenJacket is an impermeable cover that provides a true barrier protection to the crown of the plant. We have studies available by well know universities that confirm that by keeping the moisture away from the crown we increase the positive results needed to avoid Ccrown Hhydration, Iice Ddamage and Ddessication. You can read them at our Website http://www.greenjacket.com

The GreenJacket also has a light transmission property (UV resistant) that blocks out approximately 30% of the sunlight. This helps to keep the turf dormant during those temperature fluctuations we have been experiencing these past few years.

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Honey Bees and Golf Courses, One Sweet Partnership Part 3

Rebecca Masterman, UMN Bee Squad Coordinator

When the University of Minnesota Bee Squad opened Somerset Golf Club's hives yesterday, they found, beneath thick coatings of healthy-looking bees, good stores of honey. They added supers to both last year's "parent" colony, and to this year's "divide," so the bees will have more room to take advantage of the mid-July nectar flow and continue making and storing honey. Like last year, the hives' sponsor Brian Smith will be doling out some of this bounty to members at the end of the summer. Of course, harvesting honey is a privilege only practiced when hives are doing well, and have more than enough food for the bees' own wintering.

Brian and golf course superintendent James Bade joined squad members on the roof the other day to see for themselves how well the hives were doing. Brian took photos, and James helped lift the heavy deep boxes to reverse their order. Reversals are done so that the queen always has room to move up in her hive, which encourages her to keep