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ABOUT THE COVER

WGCSA member Josh LePine hosted the 2007 WSGA State Am at Bristlecone Pines CC. Our tradition of featuring the favorite hole of the host superintendent of the State Am on the Grass Roots cover for the July/August issue continues again this year. Josh is really in love with the 6th hole at Bristlecone Pines. It is a 218 yard, par 3 hole and its sandy waste areas, ornamental grasses and both Mugo and Bristlecone pines make it unique. The Bristlecone pine is nature's oldest living thing, and this natural setting for it has great appeal to Josh. Our cover artist, Bev Bergemann, has certainly captured the beauty of this golf hole for all of us to enjoy.

"After you have exhausted what there is in business, politics, conviviality, and so on - have found that none of these finally satisfy, or permanently wear - what remains? Nature remains."

– Walt Whitman

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THE GRASS ROOTS

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EDITOR AND PUBLISHER
Monroe S. Miller
Blackhawk Country Club
P.O. Box 5129
Madison, WI 53705
groots@charter.net

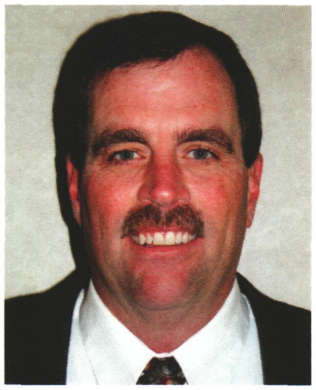
EDITORIAL STAFF AND BUSINESS AFFAIRS
Dave Brandenburg
P.O. Box 314
Theresa, WI 53091

Front Row: L-R: Matt Schmitz, Brian Zimmerman, Mike Lyons, Dustin Riley, and Jeff Millies.
Back Row: L-R: Chad Harrington, David Swift, Jim VanHerwynen, David Oberle, Marc Davidson.

2007-2008 WGCSA OFFICERS AND DIRECTORS

Rain Please!!!

By Mike Lyons, *Golf Course Superintendent, Old Hickory Country Club*



Summer is in full swing. I'm not sure how everyone else is doing, but here in Dodge County the first part of summer has been really dry although for the most part the temperatures have been relatively comfortable. We have pulled hoses and hand watered more this season than all of last year and we still have the dog days of August to deal with.

Thank you to everyone who has been able to attend our monthly meetings. The turnouts have been good. Big Fish Golf Course in Hayward was a long travel but well worth the trip. Tod Blankenship had the place looking and playing great. It was interesting to play with a gentleman from the U.P. and hear how on the 9th of June he was just getting it going. Unfortunately he and others in some northern parts of the midwest had some winter damage this past year. Interesting how one guy's June is another guy's April. Not sure if I could contend with such a short season.

Thank you also to Matt Kregel and his staff at The Club at Strawberry Creek for hosting our Superintendent's Tournament. We had over a hundred golfers and the course was in incredible shape. We had a little rain delay but were able to finish our round. Then Reinders put on a great spread of tenderloin sandwiches and all the fixings. Thank you Craig and everyone at Reinders.

From what I have heard, and saw, congratulations are due to Mike Lee and Dave Swift for hosting this year's U.S. Senior Open. I took the kids to a practice round and it was a real treat for them and myself. Also, congratulations to Brian Zimmerman and Tim Wegner for another great job at this year U.S. Bank Championship at Brown Deer. I heard the place looked and played great. All of you and your staff should truly be proud.

I hope those who had to complete their renewal process for Class A status did so and 2008 will be the final year of the five year cycle. I am up next year and just by attending the Symposium, Expo and a few other educational or monthly meetings, my requirements are met. It has been pretty painless.

I am looking forward to upcoming events; Member Guest at Brynwood CC and the Wee One at Pine Hills. I hope everyone tries to get away and attend one or all of these events. But most of all I am really, really looking forward to a little rain.

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Geneva National Hosts Opening of WGCSA Summer Meeting Schedule

By Jim VanHerwynen, *Golf Course Superintendent, South Hills Country Club*

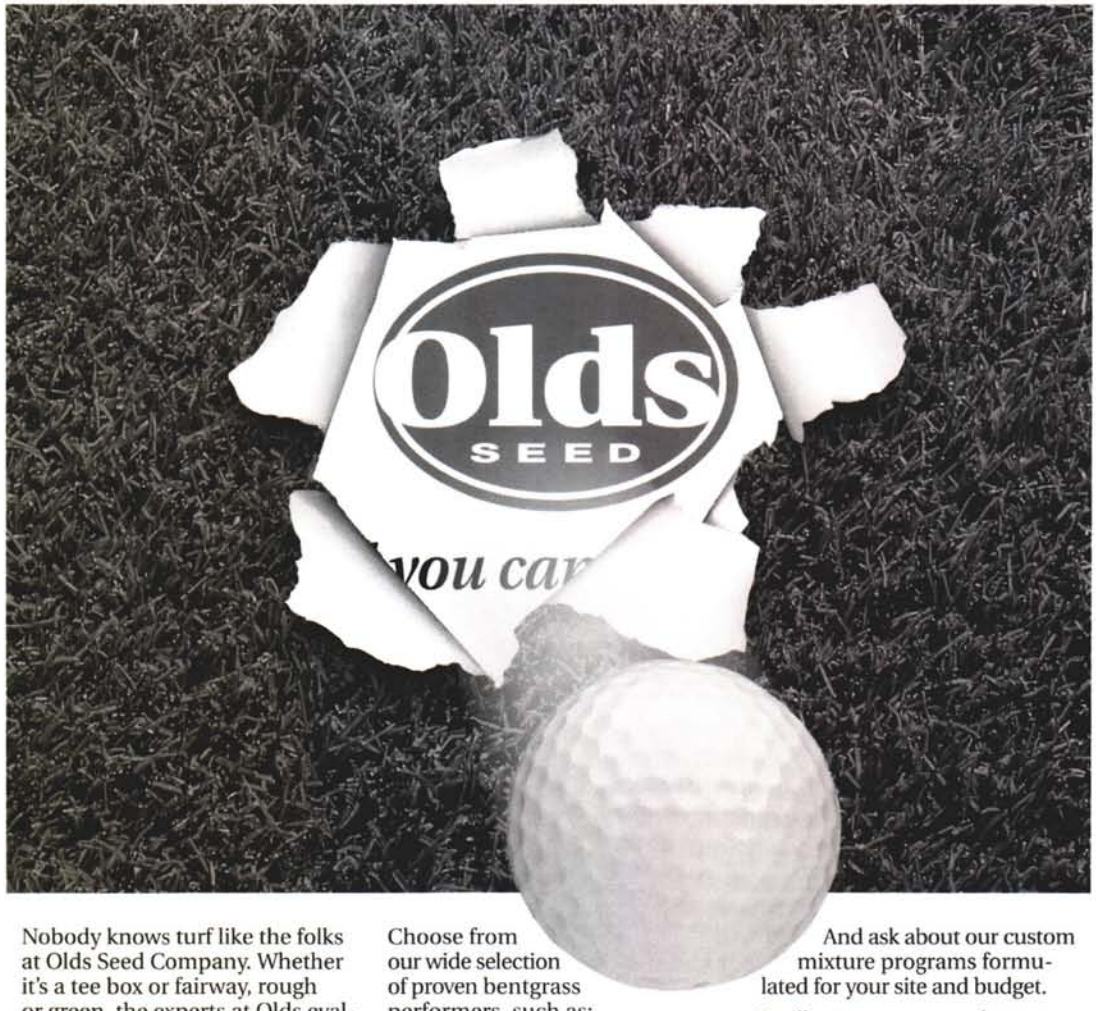
The Wisconsin Golf Course Superintendents Association kicked off the 2007 monthly educational meetings at Geneva National Golf Club on April 23, 2007. Host superintendent Jeremy Amosson and his staff did an outstanding job preparing the Lee Trevino signature golf course to tournament ready conditions when just ten days prior the course received six inches of snow! After playing in the event I think we should consider changing his name to Jeremy Amazingone – what a great job!

The day began with an educational presentation entitled "Memory Training" by Roger Seip of Freedom Speakers and Trainers from Madison, WI. Roger specializes in corporate training and the development in the areas of memory, goal setting, attitude, time usage, communication and sales. I believe everyone learned many useful skills from his presentation and we may want to consider using his services in the form of a one-day seminar in the future. I think we could all benefit from training our minds in a more efficient manner.

After education and a superb buffet style lunch everyone hit the links and enjoyed this beautiful property nestled in the Lake Geneva area. At the end of the day the first place winners with a 58 were: Steve VanAcker (Crystal Lake CC), Paul Schaefer (Prairie Isle GC), Brad Legnaoli (Highland of Elgin) and Al Pondel (Rockford CC). In second place with a 59: John Feiner (Johnson Park Golf Course), Skip Willms (Onwentsia Club), Bruce Worzella (West Bend CC) and Ed Devinger (Midwest Turf). Hole event winners included; closest to the pin hole #3 Al Pondel; closest to the pin #6 Jeremy Amosson (Geneva National GC); Closest to the pin hole #13 Mark Hjortness (H&H Fairways); closest to the pin #17 John Feiner (Johnson Park) and longest drive on hole #8 Chad Harrington (Autumn Ridge).

Congratulations to all of you and thanks to all of the vendor sponsorships who helped make this event possible. One more year at this beautiful property in 2008!!

TURF PROS



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Managing Salts on Sand Putting Greens in Wisconsin

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

Salt problems are not common on Wisconsin soils; however, increasing restrictions on potable water supplies will make the use of poorer quality water for irrigation a more attractive option for golf course superintendents. The use of reclaimed (or effluent) water is standard practice for not only superintendents in many western states, but also for those in humid states like Florida where over half of the golf courses are irrigated with reclaimed water (Cisar et al., 2006). Communities such as Green Bay and Waukesha are already encountering difficulties in supplying high quality drinking water to their citizens. These types of situations typically lead to restrictions on the use of potable water for golf course irrigation. Thus, it's fair to say that the arrival of mandated irrigation with effluent water is inevitable in some parts of the state. When that happens, superintendents will have to become very knowledgeable about the problems that can arise from irrigation with low quality water.

A recent survey of the state's golf putting greens and the irrigation water being used gave no indication of excessive levels of soluble salts at present or that salts will become a problem in the future unless superintendents are using irrigation water with high salinity or an elevated sodium adsorption ratio (SAR) as defined in tables 1 and 3, respectively. Effluent water, or treated municipal wastewater is typically of low quality, but can be used with success by altering management practices.

Soil solution contains many soluble salts; including calcium, magnesium, potassium, sodium, chloride, sulfate, bicarbonate, and nitrate. The concentration of soluble salts in the soil solution increases as pure water evaporates

from soil and transpires through the plant into the atmosphere. Evapotranspiration, the sum of evaporation and transpiration, creates a suction gradient pulling water from deeper layers towards the soil surface. When this water evaporates or is taken up by the plant, soluble salts are left behind. Heavy irrigation cycles or rainfall dissolve accumulated salts and move them into deeper soil layers or into drains where they are removed from the root zone. However, efficient removal of salts depends entirely on good drainage. Salinity problems can develop where salts are continually added through poor quality irrigation and drainage is poor. Most areas with poor drainage remain unaffected by salt problems because water quality is suitable.

A number of years ago, I had the opportunity to work at a golf course in Northern Illinois that switched from a surface water source to effluent water because the effluent water was more reliable (the stream would occasionally run dry) and had a lower salt content during the summer months. So obviously, water quality problems are not confined to effluent water sources alone. Salt-related problems can occur from poor quality groundwater, but problems are more common with surface water sources in Wisconsin. Surface water sources tend to be more variable than groundwater sources and therefore will require more intensive monitoring. Salts can enter surface water bodies during the early spring runoff of road salt, and salinity of surface water will usually increase from spring to summer.

The abnormally dry conditions probably led to a recent Noernet thread on flushing sand greens. Leaching, charging, or flushing are three terms that are used loosely to describe a variation on the practice of moving large amounts of water through a sand-based root zone in response to the real or perceived accumulation of salts in the root zone. This practice has become popular on sand greens that were designed to handle movement of large amounts of water. The practice of moving vast quantities of water through sand greens varies from running irrigation heads all night, to closing the drain valve, saturating the root zone, and then opening the valve. Researchers at Ohio State University define "charging" as the practice of applying water until drain flow reaches a constant (maximum) level. For recently constructed USGA greens this number ranged between 1.9 and 3.4 inches. For new California greens (sand root zone with no gravel blanket) 3.7 - 6.2 inches of water was required to "charge" the root zone (Prettyman and McCoy, 2000).

However, purifying as this practice may sound, potential pitfalls exist. Aging sand root zones accumulate organic matter which increases the water holding capacity and decreases the infiltration rates. A flushing, or charging event on a sand green with poor drainage could intensify summer stress symptoms during a hot, humid summer. Excess water that does not infiltrate will runoff and saturate the lowest points in the surrounds, creating additional problems in those areas. Therefore, flushing, or charging a sand root zone should not be done on instinct alone. It would be beneficial to have information suggesting that the grass is experiencing symptoms from salinity stress before applying a large volume of water.

Management of high salinity levels on soils with limited infiltration capacity requires a different technique. On these areas small excesses of water should be applied when soil salinity builds up to unacceptable levels. The easiest way to accomplish this is to irrigate at 100% of estimated evapotranspiration (ET). Evapotranspiration estimates are based on climatic conditions. Measurements of ET from turfgrass areas have found the actual ET is around 80% of estimated ET. Therefore, irrigating at 100% of estimated ET will result in a small

amount of drainage, and will help to slowly move salts out of the root zone. If ET is not used, leaching salts can be a guessing game. For daily ET readings visit: http://www.soils.wisc.edu/wimnext/et/wimnet.html. You can also get daily emails of local ET by sending in your coordinates.

Evidence of salt stress can be gathered by monitoring the quality of the water itself via field or laboratory testing. Soil properties can also be monitored in the field and lab.

Monitoring irrigation water and soils that are suspected to be affected by salts are important practice regardless of the irrigation water source. Two important aspects of irrigation water quality, salinity and sodium hazard are discussed below. Practical field and laboratory monitoring techniques to be used diagnostically are also considered.

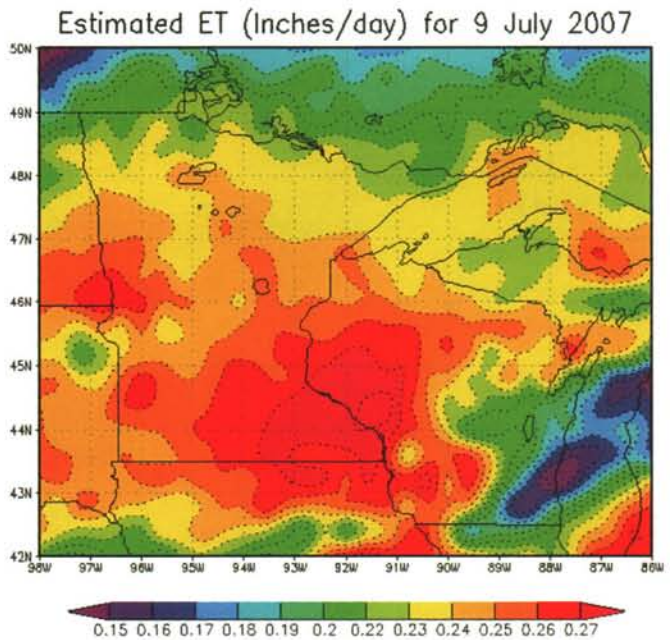

Figure 1. Map of Estimated ET for Minnesota and Wisconsin. Actual ET for turfgrass areas is usually 80% of the estimated ET, irrigating to 100% of the estimated ET will result in 20% excess (drainage).

Water and Soil Salinity

High levels of salt in the soil solution can cause a condition known as physiological drought. Physiological drought occurs when salt accumulation in the soil inhibits water uptake by the turf. The accumulation of salts occurs as pure water is lost through evapotranspiration. Salt accumulation occurs more rapidly when high salt-content irrigation water is used. Fertilizer burn and dog spots are two specialized cases of physiological drought.

The salt concentration, or salinity, at which physiological drought occurs is different for different species and cultivars, and varies with management practices such as mowing height. In general, annual bluegrass, colonial bentgrass, and velvet bentgrass are more susceptible to salinity stress than creeping bentgrass. Modern creeping bentgrass cultivars like 'L-93', Penn G-2, A-1, A-2, and A-4 are more tolerant of high salinity than 'Penncross' (Marcum, 2001).

Electrical conductivity (EC) is a reliable estimate of the potential for salinity problems with irrigation water. Electrical conductivity is often converted to total soluble salts (TSS), also called total dissolved salts (TDS), by multiplying the EC value by a conversion factor of 640. For simplicity, only EC guidelines are reported. Table 1 illustrates two sets of interpretations for evaluating irrigation water for potential for salinity problems. Over the past several years, Dr. Kussow collected and analyzed water samples from 63 golf courses in Wisconsin. Of the 63 water samples the average EC was 0.49 dS m^{-1}, low or medium depending on whose interpretations you consult in Table 1. The highest EC was 1.22 dS m^{-1}. At that level, keeping a close eye on EC throughout the year is warranted - if this sample was a surface water sample, we might anticipate the EC to fluctuate throughout the year.

If the prospect of salt accumulation keeps you awake at night, it's probably a good idea to invest in a portable EC meter. This tool will allow for the instantaneous assessment of EC. Coupled with the guidelines shown in Table 1, you can get a feel for whether or not it's reasonable to assume salinity as an issue that requires attention. In addition, soil EC can be measured via a saturated paste

Table 1. Salinity guidelines of irrigation water based on electrical conductivity (EW). Adapted from Carrow et al. (2001).

Salinity Hazard	Comments	Westcot and Ayers (1985)	Richards (1954)
		EC - dS m^{-1}	
Low	No detrimental effects on plants or soils are expected.	<0.75	<0.25
Medium	Salt stress may occur on sensitive plants, preventable with moderate leaching.	0.75 – 1.50	0.25 – 0.75
High	Salt stress on most plants, leaching and good drainage necessary.	1.50 – 3.00	0.75 – 2.25
Very High	Unacceptable for most plants, good drainage, frequent leaching required.	> 3.00	>2.25

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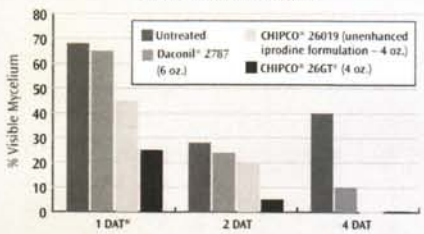

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