Use of Soil Moisture Sensor's To Conserve Water

By Jon Sass, Brian Horgan and Van Cline
University of Minnesota

The importance of proper irrigation on the playability of high performance golf turf cannot be overstated. Besides being a basic requirement for plant growth, water management plays a critical role in turfgrass health, ranging from its interaction with compaction and root decline to its effects on fungal disease pressure and efficacy of fertilizer, pesticide, and other chemical applications.

In 2003, research will continue to evaluate the use of data captured from ECH2O soil moisture sensors to conserve water and define best management practices for turf irrigation. This research will utilize the most recent version of the Penman-Monteith model for evapotranspiration estimation, commonly referred to as FAO 56, to compare water use and efficiency of different irrigation regimes and their impact on turf quality on our sand-based bentgrass/poa research green. FAO 56 crop coefficients for turf, currently unavailable for this area, will be developed. Evapotranspiration estimates produced using climate data from the University of Minnesota weather station and software from The Toro Company will be used to guide irrigation inputs on test plots.

An irrigation program based on volumetric water content data obtained using Decagon's ECH2O soil moisture sensors will also be developed and tested. In contrast to the empirically derived FAO 56 irrigation model, which attempts to replace estimated water losses, the soil moisture based irrigation program should be grounded on the actual water needs of the turf as indicated by the sensors: projected estimates vs. real-time, tangible data. In a series of 2-3 week interval trials, these two irrigation regimes will be compared to the traditional "eyeball and footprint" irrigation program employed, in most cases very effectively, by many experienced superintendents. Lysimeters will also be used to measure sub-surface losses and actual evapotranspiration and to compare the volume of water "lost" to internal drainage between different irrigation regimes. Water use differences with respect to species (Kentucky blue and perennial rye), height of cut (green vs. fairway), and soil (sand vs. native loam), will also be studied.

The goal of this research is to not only promote water conservation in turf systems, but more importantly to better understand turfgrass water use trends and identify irrigation practices which result in optimum plant-soil-water relations. Using technologically advanced tools such as these sensors will benefit the turfgrass industry immensely in the future.

As a former "water rat", I find this project and its implications very exciting and hope the information obtained will benefit area turf managers through a better understanding of turfgrass water use and irrigation. I would like to thank the members of the MGCSA for their past and present support of turf research at the University of Minnesota.

* * * *

(Editor's Note: Jon Sass is a graduate student and Dr. Brian Horgan is an Assistant Professor in the Horticultural Science Department at the University of Minnesota. Dr. Van Cline is an Agronomist with the Toro Company.

Home Course Knowledge Carries Valley High Team To Spring Mixer Win in Houston on May 19

As most of the state of Minnesota was enduring rain showers, southeast Minnesota was dry for the MGCSA's opening Mixer on May 19 at Valley High Golf Club in Houston, Minnesota.

The threesome of Brian Brown, Ferndale Country Club; host Superintendent Jeff Normandt, Valley High Golf Club, and Stephen Kimball, Bayer Environmental Science shot a 16-under-par score. Finishing in second place was the Kate Haven Golf trio of John Stapp, Pete Grover, Tom Lundgren along with Dennis Salwei, United Horticulture Supply, who finished seven strokes back at 9-under par.

Host Superintendent Jeff Normandt was a busy man, he had Valley High Golf Course in lush condition, cooked the steak lunch for the attendees and covered the Pro Shop for anything the players needed.

Jack Hauser gave a talk on Bluebirds and the different houses that can be used to attract them. Jack also discussed the problems that can occur when dealing with bird houses and the different birds that can make their home in the Bluebird house. He strongly suggested that the houses must be monitored to keep attracting the Bluebirds. When an unwanted bird makes its home you must get rid of it.

SPRING MIXER WINNERS AT VALLEY HIGH GOLF COURSE were, from left to right, host Superintendent Jeff Normandt, Stephen Kimball and Brian Brown.

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Water Coolers –

(Continued from Page 8)

(Editor's Note: The following excerpts are from MGCSA members concerned about the water cooler issue. The following comments were posted on the University of Minnesota's Turf Talk at www.turf.umn.edu. If you haven't checked out this website yet, you're missing out on terrific education!)

Wondering what everyone is doing this year regarding drinking water on the golf course. With the Norwalk virus incident in Arizona last Fall, it seems that a substantial number of golf courses around the country are removing their portable water coolers. I was not too concerned until I had a recent conversation with Randy Allen from Tartan Park GC (Randy, please chime in). The Washington County Health Department is now enforcing very tight procedures for sanitizing and handling water coolers. Tartan Park has removed their coolers and golfers must buy bottled water. I am interested if other facilities will be following in their footsteps. Anyone?

-- Paul Diegnau, CGCS, Keller GC

Paul:

We are using a sprayable sanitizer after each use and using a special food grade hose to fill. We do not have the capacity to do the full "recommendation" by Washington Co, just doing the best we can. This is per our owners decision.

-- Kevin Clunis CGCS, Tanners Brook GC

Kevin:

We are doing the same as you are. We purchased a food grade hose (very expensive) and a case of foam disinfectant spray which my staff will spray on the spout of the cooler when they bring it to the cooler stands. Sanitizing every day is impossible, so we to will do what we can and make a better effort than we have in the past. *-- Jeff Johnson, The Minikahda Club*

Jeff or Kevin:

Where did you purchase the sprayable sanitizer & food grade hose? Would Sysco carry those things? *-- Norma O'Leary, Silver Springs Golf Course*

Norma:

They should. We got our sanitizer from Upper Lakes Food. Don't know the price. The hose we got from Northern. Once again memory is shot on $. Doing anything better than last year is good. *-- Kevin Clunis CGCS, Tanners Brook GC*

Kevin:

Thanks. Are the recommendations (or whatever they are) from Washington Co. posted anywhere? My water jugs fit in our dishwasher, which needless to say sanitizes. Do you suppose that would fulfill the requirements that Washington Co. is suggesting? *-- Norma O'Leary, Silver Springs Golf Course*

Kevin and Norma:

Just received a letter this morning from the Wisconsin Golf Course Superintendents Association on Guidelines for caring for water coolers. It comes from John Archer of the State of Wisconsin, Department of Health and Family Services, Bureau of Communicable Diseases. It has been adapted from the guidelines provided by the Maricopa County (Arizona) Environmental Services Department. The guidelines have been prepared by the Marathon County Health Department and the Wisconsin Division of Health and Communicable Diseases. A 3 or wiofFamiyou need further information. *-- Guy Lohman, Voyager Village, Wisconsin*

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Using Somaclonal Variation to Develop New Kentucky Bluegrass Cultivars

By N.J. Ehlke, D.L. Wyse, and D.J. Vellekson
University of Minnesota

The highly apomictic nature of Kentucky bluegrass has limited the development of new cultivars that are different from existing cultivars. Apomixis is a form of reproduction where the genotype of the maternal parent is identically reproduced in the progeny. The majority of the older Kentucky bluegrass cultivars were "found" by plant breeders, often during collection trips. The newer cultivars of Kentucky bluegrass have been developed through plant breeding programs using hybridization or mutation breeding. Our research program has employed mutation breeding through the development of a successful tissue culture program. Tissue culture causes a disruption in plant growth and development often resulting in genetic changes being observed in regenerated plants. This type of variation caused by tissue culture is called somaclonal variation. Our research objective is to evaluate progeny from plants derived from our tissue culture program for the presence of somaclonal variation to develop new cultivars of Kentucky bluegrass. Our initial results show there are progeny from regenerated plants that appear to have a higher level of disease resistance and improved turf quality including better turf color, leaf texture, and growth habit from the original parental source. We have identified 36 plants from tissue culture that warranted further evaluation. Large turf plots were established in 1999. Currently, we have selected five Kentucky bluegrass lines in seed increase in northern Minnesota for potential release.

We restarted our tissue culture program in 1996 to continue to develop potential new cultivars of Kentucky bluegrass. Approximately 3500 regenerated plants were transplanted to the field in 1998 for a preliminary evaluation of turf quality and seed production potential. In 1999, approximately 400 plants were selected for further evaluation and seed was harvested in 2000 from the selected plants. The seed from the selected plants was seeded into rows for further evaluation of turf and seed production potential. In 2002, seed was harvested from approximately 80 of the best rows based on uniformity, turf quality, and seed production. Turf plots were seeded in August, 2002 for a better evaluation of turf quality and disease resistance. The potential new cultivars of Kentucky bluegrass will be entered into the 2005 NTEP trials with a potential release date in 2007.

* * *

(Editor's Note: N.J. Ehlke and D.L. Wyse are Professors and D.J. Vellekson is an Assistant Scientist in the Department of Agronomy and Plant Genetics at the University of Minnesota.)

Selection for Improved Winter Hardiness In Perennial Ryegrass

By N.J. Ehlke, D.L. Wyse, D.J. Vellekson, and K.J. Betts
University of Minnesota

Efforts are underway to increase the winter hardiness and herbicide tolerance of turf-type perennial ryegrass. Developing elite turf-type perennial ryegrass varieties would expand Minnesota's grass seed producer's options and extend the options for turf professionals to home owners. Elite perennial ryegrass varieties and experimental lines were crossed with NK200, an older variety with acceptable winter hardiness but poor turf quality. Progeny from the crosses were evaluated and plants which combined winter hardiness and turf quality were selected for further evaluation and breeding activities. Turf plots were established in 1999 of experimental populations selected for excellent turf quality and increased winter hardiness. Our evaluations indicate that winter hardiness was improved to levels higher than is currently available in ryegrass cultivars. To date, we have two populations of perennial ryegrass with superior winter hardiness that are currently being released by the University of Minnesota and seed should be commercially available to turf managers in 2004 or 2005.

Research is also focused on using traditional plant breeding methods to develop herbicide tolerant perennial ryegrass using a naturally occurring, herbicide tolerant gene. The first herbicide tolerant variety was released by the University of Minnesota in 2001 and is called P101. Commercial seed production was initiated northern Minnesota with seed potentially being available in Fall, 2003. P101 has a moderate level of winter hardiness and turf quality, but improved rust resistance. Current plant breeding efforts include continued improvements in turf quality and winter hardiness to produce a cultivar with superior turf performance and herbicide tolerance. Additional plant breeding activities in perennial ryegrass include the development of potential new cultivars with a spreading growth habit for improved wear tolerance and the incorporation of resistance to gray leaf spot, a devastating new disease of perennial ryegrass.

(Editor's Note: N.J. Ehlke and D.L. Wyse are Professors and D.J. Vellekson and K.J. Betts are Assistant Scientists in the Department of Agro.)

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