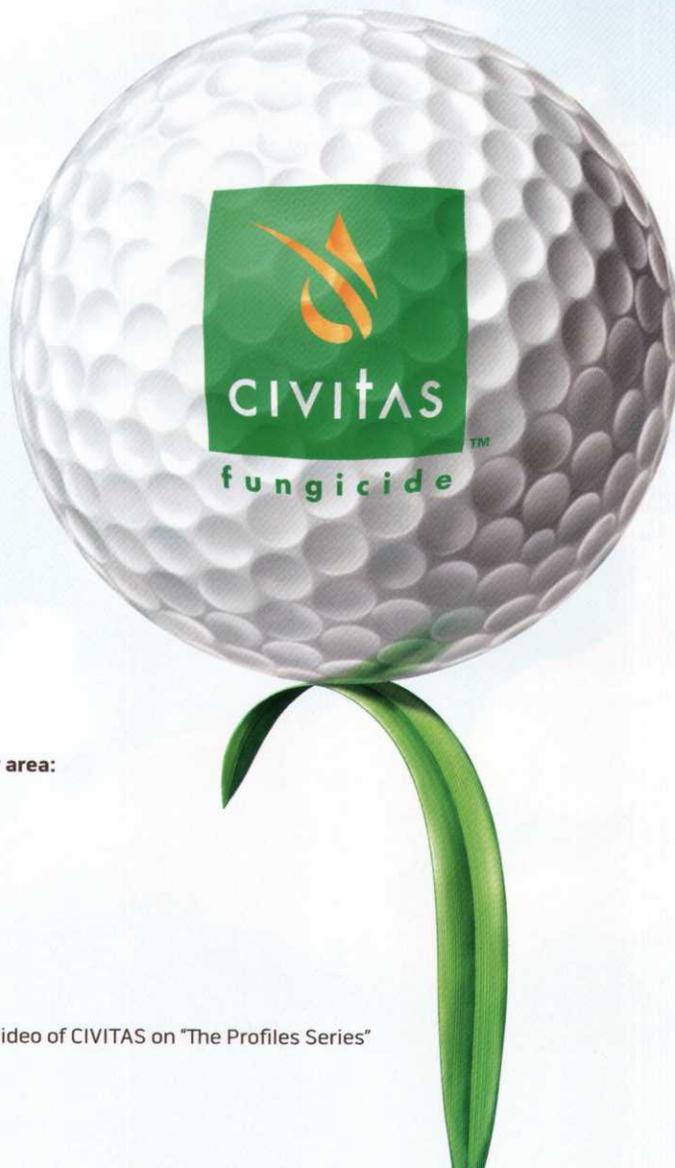


Discover your turf's inner strength.

The best offense is a good defense when it comes to overall plant health.

That's why CIVITAS turns on the natural defenses of the plant to fight off fungus. Studies have shown that CIVITAS helps the plant develop a more structured root system and can decrease fertilizer requirements by up to 50%. Effective fungus control without any resistance issues. Embrace CIVITAS and change the game for the better.



Turf & Chemical Inc.

Helping to change the game in your area:

Precision Turf & Chemical
7728 Commerce Circle
Greenfield, MN 55373
www.precisionturf.com
Phone: 763-477-5885
Toll Free: 800-925-TURF
Fax: 763-477-6511

For more information and to view a video of CIVITAS on "The Profiles Series"
visit www.civitasturf.com



Inside This Issue Of Hole Notes

- 4 *President's Message* - Paul Diegnau, CGCS
- 5 *The Jewel Set for August 16 MGCSA Championship*
- 6 *Team Stillwater Captures Scholarship Scramble at GreyStone*
- 7 *MGCSA Scholarship Scramble Results*
- 8 *Daily Dose of Sun* - Aaron Johnsen
- 11 *Musing the Minutes: May Board Meeting* - Matt McKinnon
- 15 *U of M Field Day Set September 16 at TROE Center* - Brian Horgan Ph.D.
- 17 *Savory Supe: Asian Chicken Pecan and Pea-Pod Salad* - Scottie Hines, CGCS
- 18 *SuPerspective: Green Aerification* - James Bade, Jake Schmitz, Eric Counselman
- 22 *In Bounds: Wee One Golf Event Set Sept. 27* - Jack MacKenzie, CGCS

What the Hail Happened at Spring Hill?



MOTHER NATURE VISITS SPRING HILL, AGAIN

Last fall, a tornado touched down between fairways at Spring Hill Golf Club in Orono/Wayzata. Though the marsh land was flattened, there was minimal damage to the course considering it was a tornado. On June 25, however, Mother Nature decided she wanted to dump golf ball-sized hail all over the course. The hail created thousands of pitch marks on every green. The repair was tedious and the course was closed for member play for two days.

PHOSPHORUS RECERTIFICATION

GO TO www.MGCSA.org

JULY HOLE NOTES ADVERTISERS

- 7 Country Club Turf
- 19 Gertens Wholesale
- 10 Hartman Companies, Inc.
- 17 Hedberg Landscape & Masonry
- 15 Leitner Company
- 21 John Deere Golf
- IBC JRK Seed
- BC Par Aide Products Co.
- 12 MTI Distributing, Inc.
- 13 MTI Distributing, Inc.
- IFC Precision Turf & Chemical
- 16 Superior Turf Services Inc.
- 9 The Tessman Company
- 11 The Tessman Company
- 14 Turfwerks

About the Cover:

The Jewel in Lake City will host the 2010 MGCSA Championship on August 16.

The Jewel offers spectacular views and well worth the trip to Lake City.

(See story on Page 5)

MGCSA EVENTS

August 16
MGCSA Championship
The Jewel
Host: Doug Mahal, CGCS

September 16
U of M Field Day
TROE Center
Host: Dr. Brian Horgan

September 20
**MGCSA Harold Stodola
Research Scramble**
The Classic at Madden's
Host: Scott Hoffman, CGCS

October 4
MGCSA Fall Mixer
Minnesota Horse & Hunt Club
Host: Tom Proshek

December 8
**MGCSA Awards &
Recognition Banquet**
Southview CC
Host: Jeramie Gossman



PRESIDENT'S MESSAGE

Looking Back, Looking Forward!

By Paul Diegnau, CGCS

It looks like the weather patterns are finally beginning to shift. The stacked up rain events were getting a bit monotonous and taking a toll on facility bottom lines. Always looking for the bright spot in the clouds, I must say it could always be worse. Our friends in eastern Wisconsin have been inundated with rain. Chatter on the Noernet listserv reveals many clubs have received 9 - 11+ inches in the month of June. A little closer to home, Spring Hill was hammered by large hail and was closed for two days (see photo on Page 3). How does one go about repairing nature's handiwork in this instance? I am thinking along the lines of a large roller and lots of topdressing. Ouch! I bet other golf courses in the area experienced similar "catastrophes." In the future, please feel free to share photos with your colleagues via *Hole Notes* and maybe a short explanation on how you dealt with the crisis.

Here are some updates from past events and reminders for upcoming events:

- The Turf Research Benefit netted \$14,811, a new record for this program. Thank you to the local clubs that generously donated tee times to help us in this endeavor. The research that is funded by these monies ultimately benefits you, me and our industry.
- Greystone Golf Club hosted the 2010 MGCSA Scholarship Scramble and raised \$4,000. I was unable to attend but was told all had a good time and rain drops were kept to a minimum. Thank you to Lee Mahnke and the staff at Greystone for hosting this annual MGCSA event.
- As you may or may not know, the MGCSA Board of Directors has been exploring the option of producing *Hole Notes* magazine as an online digital version. Such a move would cut production costs substantially. We recently surveyed the MGCSA membership for their thoughts on this issue and 144 responded. It was almost two to one in favor of retaining the hard copy version. The BOD will discuss this issue further at our next Board meeting. In the meantime, please check out several examples of electronic versions produced by other GCSA chapters. Most are in PDF format but some, such as Iowa GCSA, use software that presents the publication so that it makes you feel you are reading a hard copy. Many chapters across the country have made the switch:
 - <http://www.epaperflip.com/aglaia/viewer.aspx?docid=f2689ce614954b23a2f4cefb1e52b4ed> Iowa GCSA
 - <http://www.hagcsa.org/HearbeatJuly2010.pdf> Heart of America GCSA
 - <http://carolinagcsa.org/uploadedFiles/Home/MayJun2010feature.pdf> Carolinas GCSA (partial)
 - <http://www2.cybergolf.com/sites/images/527/tee-to-green-Jan-2010fin.pdf> Met GCSA
- A BIG thank you to all who showed up to assist with moving the rain shelter at the TROE Center. It took all of five minutes but required many bodies. We really do have a great bunch of members who are always willing to help when needed!
- MGCSA event sponsorship raised \$14,000 in 2010! Please keep this in mind the next time you pick up the phone to place an order. Make a conscious effort to support vendors that support MGCSA.

• The **MGCSA Golf Championship** will be held on August 16 at The Jewel in Lake City. Doug Mahal, CGCS, will host the event.

On September 20, the **MGCSA Research Scramble** will take place at The Classic in Brainerd. Scott Hoffmann, CGCS, will host this event.

University of Minnesota Field Day is set for September 16 at the TROE Center on the St. Paul Campus.

The **Wee One Tournament** in honor of Tom Fuller is set for Sept. 27 at North Oaks Golf Club. Jack MacKenzie, CGCS, will host this event.

Registration information for all of the above will be available soon. I hope to see you there.

Legislative Update

Keep your eye on "America's Commitment to Clean Water Act" introduced by Jim Oberstar (D-MN), H.R. 5088. This bill is an expansion of the 1972 "Clean Water Act". It would remove the word "navigable" from the current law to include ALL waters within the U.S. This would remove any connection to the interstate commerce clause which was used to prove constitutionality in the original 1972 law. The introduced bill would expand federal regulatory authority to "activities affecting these waters," which essentially gives the EPA and the Army Corp of Engineers control over all the land and water in the U.S. In a nutshell, the Feds could regulate the wet spots in your fairways! If at all concerned, you may want to do some personal research on this attempted power grab.

Until Next Time,
Paul Diegnau, CGCS

HOLE NOTES (ISSN 108-27994) is published monthly except bi-monthly November/December, January / February for \$2 an issue or \$20 per year by the MGCSA, 217 Minnetonka Ave. S., Ste. D, Wayzata, MN 55391. Scott Turtinen, publisher. Periodicals postage paid at Wayzata, MN. **POSTMASTER:** Send address changes to **HOLE NOTES, P. O. BOX 617, WAYZATA, MN 55391.**

HOLE NOTES

Official publication
of the MGCSA

Editor
Jack MacKenzie, CGCS
jmackenzie426@msn.com

2010 Board of Directors

OFFICERS

President
Paul Diegnau, CGCS
Keller GC
651-766-4174

Vice President
Scottie Hines, CGCS
Windsong Farm GC
763-479-6524

Secretary
Matt McKinnon
The Legacy Courses at Cragun's
218-825-2751

Treasurer
E. Paul Eckholm, CGCS
Heritage Links GC
952-440-6494

Ex-Officio
Rick Traver, CGCS
Monticello CC
763-271-0167

DIRECTORS

Shane Andrews
MTI Distributing, Inc.
763-592-5639

Brian Brown
Chisago Lakes GC
651-257-8734

Joe Churchill
Reinders, Inc.
612-790-7333

Eric Counselman
Somerby GC
507-775-3743

Bill Gullicks
Bellwood Oaks GC
651-438-3839

Jeff Ische
Golden Valley G&CC
763-732-4150

Tom Proshok
Brackett's Crossing CC
952-435-2543

Jacob Ryan
Northland CC
218-525-1422

Roger Stewart, Jr., CGCS
TPC Twin Cities
763-785-0696

MGCSA Chapter Delegate
Kevin Lunis, CGCS
Tanner's Brook GC
651-464-4118

MGCSA OFFICE
AND HOLE NOTES OFFICE
EXECUTIVE DIRECTOR

Scott Turtinen
P. O. Box 617
Wayzata, MN 55391
952-473-2582 Fax: 952-473-2586
Toll Free: 1-800-642-7227
scott@mgcsa.org

The Jewel in Lake City Set to Host MGCSA Championship on August 16

"The Juice is Worth the Squeeze!"

The Jewel Golf Club was built between 2003-2004 and opened for play in July 2005. The course was designed by Hale Irwin and Stan Gentry.

Doug Mahal, CGCS, a former president of the MGCSA (1987), has been Superintendent at The Jewel since July 2003. Chad Setter is Assistant Superintendent.

The par 71 course stretches out to 7,050 yards from the back and play just 4,900 from the forward tees.

The Jewel offers an interesting blend of links-style and woodland holes with their associated natural areas. The spectacular bluff land views and layout make the trip and cost to Lake City very worthwhile.

The 800-acre Jewel Tree Nursery was purchased in the late 1990s to build a planned urban development in Lake City. The golf course was to be an amenity to that housing development. With the crash of the housing market post 9/11, the owners made the decision, late in 2006, to auction all property not already owned by others, which included the 200-acre golf course. Currently, the course is privately owned with about 100 members but open for public play.

The Jewel has received a variety of awards including being honored as a "Top Ten Best New Course in America" by *Golf Magazine* in 2005; 2005 Seed Research of Oregon "Golf Course of the Year" 2006 *Golf Digest* "Top Ten Best New Public Course (Under \$75 category).

Challenges

Early normal grow-in challenges have given way to a course that's becoming more routine to manage. During construction, generally all topsoil was removed from the course and not returned. Growing turf on the native underlying silty soil has been challenging.



Weed management also continues to be a bit of a problem due to the seed source from the surrounding large acreage of unbuilt and unmaintained housing lots.

Doug Mahal, CGCS

Doug Mahal, CGCS, is in the middle of his 43rd season on golf courses. Forty-three years ago he began his career on a small, 9-hole course in Babbitt, Minn. Mahal has had prior working stints of one season at Majestic Oaks in Ham Lake, 17 seasons at Interlachen Country Club in Edina, 12 at The Minikahda Club in Minneapolis, and one at Big Fish in Hayward, Wis. Mahal gained a BS degree from the University of Minnesota in 1977. He has been married Norma for 33 years with three grown sons and three grandchildren. Doug enjoys hunting, fishing, golf and more recently, a little bicycling.

Chad Setter

Assistant Superintendent Chad Setter, grew up in north of the metro in St. Francis and got his career start at Viking Meadows in Cedar, Minn. at the age of 16. He's also provided service to Giants Ridge and Hillcrest Country Club in St. Paul prior to arriving at The Jewel in 2008. Chad holds a BS degree in Turf Facilities Management from University of Minnesota-Crookston. Chad is single and enjoys biking, exercise and golf.

In Summary

The Jewel will provide a great test of golf in a beautiful setting. "The juice is worth the squeeze!"



Team Stillwater Wins 2010 Scholarship Scramble at GreyStone Golf Club

As the rest of Minnesota was getting rain, the sun shined through clouds in Sauk Centre. Threatening skies did not produce poor weather and the 2010 Scholarship Scramble at GreyStone Golf Club on June 14 was a great success.

"The course received a lot of rain in the past week," said host Superintendent Lee Mahnke. So it was nice to have a dry day for this event. Lee and his grounds staff had the course in excellent condition. Head Golf Professional Tim Sanborn and his staff took good care of the attendees throughout the day.

The team of Marlin Murphy, Ty Tollefson, Kevin Milbrand and Jeff Gajdostik from Stillwater Country Club won this years Scholarship Scramble with a 15-under par score of 57. They shot a back nine score of 27 to beat team Windsong by 4 shots.

Scottie Hines, CGCS, Mark Lewis, Mark Patten and Phil Ebner from



CHAMPIONS AT GREYSTONE

From the left, Ty Tollefson, Jeff Gajdostik (Amery GC), Kevin Milbrandt and Stillwater Superintendent Marlin Murphy. The foursome was 15-under-par and won by four shots.

Windsong Farm Golf Club shot a score of 61 to finish in second place. They narrowly beat 3 other teams by 1 shot.

Thanks to our MGCSA Affiliate members we had seven Field events. The closest to the pin winners were Kevin Milbrandt, Stillwater CC; Billie MacDonald, Yamaha Golf & Utility; along with Paul Bauer and Adam Pahl both with Baker National GC. The two longest putt awards went to Billie MacDonald and Gregg Paulus, The Ponds at Battle Creek. Adam Pahl hit the longest drive of the day.

Thanks to Jake Ryan, Northland Country Club, telling the attendees about the current Scholarship program.

Please support our MGCSA vendors. They make many things possible. Our

2010 sponsors are: Bayer Environmental Science; Becker Underwood; Country Club Turf; CycleWorks Golf Supply; Duinink Golf; Excel Turf & Ornamental; Frontier Ag & Turf; Frost Services; Gertens Wholesale; GreenJacket; Hartman Companies Inc.; Healthy Ponds by Bioverse; Helena Chemical Inc.; JRK Seed & Turf Supply; MTI Distributing Inc.; Par Aide Products Co.; Plaisted Companies Inc.; Plehal Blacktopping Inc.; Precision Turf & Chemical Inc.; Reinders Inc.; Saint Croix Tree Service; S&S Tree Specialists; Specialty Turf & Ag Inc.; Superior Tech Products; Superior Turf Services Inc.; Syngenta Professional Products; The Tessman Company Turfwerks; Twin City Seed Co., and Versatile Vehicles Inc.

(See Results on Page 7)



LEE MAHNKE
Host Superintendent

MGCSA CHAMPIONSHIP

MORE INFO
AT
MGCSA.ORG

AUGUST 16, 2010

THE JEWEL

LAKE CITY, MN



PENNCROSS SOD
&
Dominant X-treme 7
from Country Club Turf

Grown by
**GOLF COURSE
PROFESSIONALS**
for
**GOLF COURSE
PROFESSIONALS**



Supplying over 200
Golf Courses Since 1987

24317 Durant St. N.E.
East Bethel, MN 55005

(763) 444-6753

"A Quality Grown Reputation"

Scholarship Scramble Results

June 14, 2010 - GreyStone GC, Sauk Centre

- 57 Marlin Murphy, Stillwater CC
Ty Tollefson, Stillwater CC
Kevin Milbrand, Stillwater CC
Jeff Gajdostik, Stillwater CC
- 61 Scottie Hines, Windsong Farm GC
Mark Lewis, Windsong Farm GC
Mark Patten, Windsong Farm GC
Phil Ebner, Windsong Farm GC
- 62 Tom Ramler, Boulder Ridge GC
Dan Stang, Territory GC
Mike Stang, Territory GC
Andy Stollburger, Pine Ridge GC
- 62 Mike Brower, Minnesota Valley CC
Troy Lang, Minnesota Valley CC
Brady Klein, Minnesota Valley CC
Steve Gilles, Minnesota Valley CC
- 62 Bill MacDonald, Yamaha Golf & Utility
Tom Mundy, Yamaha Golf & Utility
Tom Bjornberg, Yamaha Golf & Utility
Tim O'Driscoll, Rochester Golf & CC
- 63 Jim Johnson, Rich Spring GC
David Johnson, Rich Spring GC
Tom Wodash, Eagle Creek GC
Kevin Norby, Herfort Norby GCA
- 63 Tom Proshek, Brackett's Crossing CC
Jeff Schmidt, Reinders
Bruce Leiverman, Montgomery GC
John Meyer, Agrotain International
- 63 Lee Mahnke, GreyStone GC
Matt Schmid, Superior Turf Services Inc.
Jeff Girard, StoneRidge GC
Matt Johnson, StoneRidge GC
- 63 Dave Kazmierczak, Prestwick GC
Jacob Kosak, Prestwick GC
David Thalberg, Prestwick GC
Dick Rieg, Prestwick GC
- 64 Eric Ritter, Spooner GC
Rob Adams, The Ponds at Battle Creek
Greg Paulus, The Ponds at Battle Creek
Brett Wenzel, Keller GC
- 64 Donnacha O'Connor, Alexandria GC
Joe Churchill, Reinders
James Bade, Somerset CC
- 65 Brady Scott, Baker National GC
Paul Bauer, Baker National GC
Kyle Stirn, Baker National GC
Adam Pahl, Baker National GC
- 65 Jim O'Neill, CycleWorks Golf Supply
Doug Daniel, CycleWorks Golf Supply
Pete Nolan, Meadows at Mystic Lake
Andy Keyes, Meadows at Mystic Lake
- 67 Jake Ryan, Northland CC
Chad Terch, Northland CC
Charlie Miller, Goodrich GC
Scott Turtinen, MGCSA
- 75 Brad Smith, Precision Turf & Chemical
Greg Bondy, Turfwerks
Jeremy Stafne, Turfwerks
Ryan Moy, Hazeltine National GC

Daily Dose of Sun

By AARON JOHNSEN
Winfield Solutions

Four essential requirements for plant growth are nutrients, water, air, and light. As turfgrass managers we spend time and energy focusing on obtaining the right balance of nutrient and water inputs. We have very little, if any control over air, so that is often overlooked. A lack of light causes plant elongation, decreased root growth, thinner cuticles, fewer chloroplasts, decreased photosynthetic rates, and greater succulence (Fry and Huang, 2004). On a golf course, shade is most often caused by trees, which also alter microclimates, use water and nutrients intended for the turfgrass, and cause maintenance headaches with mowing and trimming. Trees can even affect the playability of a golf course. When was the last time you did something to manage your light inputs?

Greenhouse managers manage light inputs by using supplemental lights and shade cloths. Turning on and off supplemental light sources is done to extend natural day length or to increase Daily Light Integral (more on this to come). Opening and closing retractable shade curtains reduces excessive light during the summer months which can lead to heat stress and inhibit photosynthesis (Buck, 2010).

Managing turfgrass does not afford the opportunity to use artificial lighting or shade cloths to manage light levels. This leaves superintendents implementing a traditional practice for maintaining turfgrass in shade, such as reducing nitrogen, applying plant growth regulators, raising the mowing height, or planting shade tolerant cultivars. The alternative to management is tree removal and trimming. Although it is easy for a superintendent to understand tree removal and trimming with respect to turf health, when a tree is not a problem for golfers it can be difficult to communicate the need for removal or trimming.

The last time you removed or trimmed a tree: How did stakeholders, such as golfers, the greens chairman, the club manager, or the head golf professional, respond? Were stakeholders involved in the decision? You may be familiar with ArborCom and other companies who use computer software to generate light analysis. This information can be very useful for validating tree management decisions, especially to those who do not manage turfgrass on a daily basis. Unfortunately these services cost thousands of dollars. Light sensors, which have been used by greenhouse managers for years, can also assist tree management decisions and cost as little as \$200.

Light 101

The human eye perceives light in the visible (400 nm to ~700 nm) wavelengths, but has the most sensitivity to green (500-600 nm) wavelengths. Foot candles or lux is the measurement of light

as the human eye sees it (see Figure 2). Although foot candles and lux have been measured historically, they should not be measured. Instead Photosynthetically Active Radiation (PAR) or quantum light should be measured. PAR light ranges from 400-700 nm, but it is more affected by blue (400-520 nm) and red (610-750 nm)

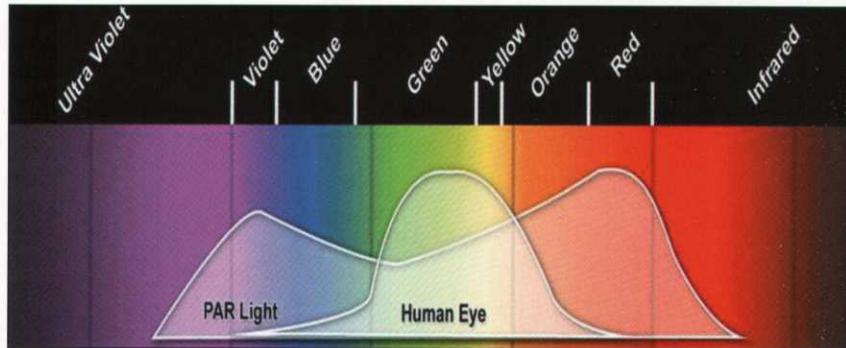


Figure 2: Wavelength spectrum covered by Photosynthetically Active Radiation (PAR) and lux (Human Eye) measurements. Notice the greater intensity of measurement at blue and red wavelengths for PAR and at green wavelengths for lux. (Spectrum Technologies)

wavelengths. Blue and red wavelengths are the drivers of photosynthesis.

In shade, the light type and quantity is altered. Plant material, such as trees, reflect light back to the atmosphere, absorb light for photosynthesis, and transmit light through the leaves. Plants below only receive transmitted light which has a low number of blue and red wavelengths. Building shade has various effects depending on the material, color, and many other factors. The effects can range from a total absorption of certain wavelengths to the complete reflection of wavelengths.

How is light measured?

PAR light is measured as the total number of photons striking a square meter in a second ($\mu\text{mol}/\text{m}^2\text{s}$). This is comparable to the rate rain is falling in a given location. Both PAR and foot candle measurements are point in time measurements. We all know light outdoors changes throughout a day and from day to day. Researchers use another measurement to provide a more complete story, Daily Light Integral (DLI). DLI is the summation of the total number of photons striking a square meter in a day (moles/day). Basically, DLI is the addition of PAR measurements taken throughout a day or the total rainfall in a given location over a day.

How much light does turfgrass require?

Lots of research has been conducted on the effects of shade on turfgrass, however, research on light requirements is lacking. It is known that photosynthesis in cool-season turfgrass is maxed out somewhere between 534 and 1072 $\mu\text{mol}/\text{m}^2\text{s}$. A range exists,

(Continued on Page 9)



Figure 1: Turfgrass under shade. (Andrew Hollman, U of M)

Light sensors, which have been used by greenhouse managers for years, can also assist tree management decisions and cost as little as \$200.

Daily Dose of Sun-

(Continued from Page 8)

because between and within species there are differences in photosynthetic saturation points. Research tells us that most turfgrass requires 4 to 5 hours in photosynthetic saturation each day to be healthy. Roughly speaking, cool-season turfgrass requires a DLI between 21 and 41 moles/day (Fry and Huang, 2004). There is very little published research on the DLI needed for individual cool-season turfgrass cultivars. We can expect traditionally shade tolerant turfgrass, such as fine fescue, to perform well on the low end (21 moles/day) and traditionally sun loving turfgrass, such as Kentucky bluegrass, to perform best near the higher end (41 moles/day). I recommend that you correlate various DLI measurements to turfgrass quality on your site to determine the optimal DLI for your site.



Figure 3: Instant (Hand-held) light meter. Great for collecting point in time measurements. (Spectrum Technologies)

What tools are available to measure light?

There are several manufacturers but really only two types of light sensors, those that measure instant levels and those that calculate DLI. Models that measure instant levels start around \$200 (See Figure 3).

(Continued on Page 10)



Figure 4: Mini weather station positioned on the side of a golf green for collecting daily light levels. (Derek Settle, CDGA)

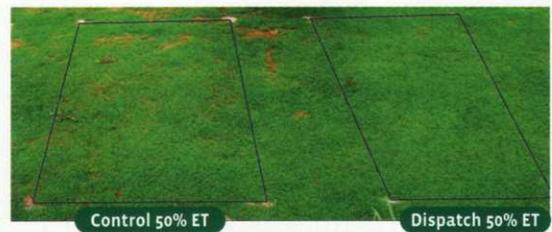
Whether your course is under constant water use restrictions or you have plenty of water available, the real challenge is getting water to go where you need it. The amount of water you apply doesn't matter if your turf can't access it.

Dispatch increases the penetration and infiltration of irrigation or rainfall, making it more readily available for plant uptake. Because Dispatch delivers water more efficiently into the soil, photosynthesis

and other turf metabolic functions can be maintained with less water. The result is increased turf performance even under heat and moisture stress, and more dependable plant growth.

For those who cannot or choose not to inject, we now offer a sprayable formulation so that you may enjoy the benefits of this unique, patented, water saving chemistry.

Aquatrols offers two pump options for injecting Dispatch Injectable. The Neptune Pumps are available through the Tessman Company.



- ▶ Reduced water lost to runoff and evaporation
- ▶ improved irrigation efficiency and reduced water usage
- ▶ Better turf performance and playability



All Aquatrols products are available at these Tessman locations—

The Tessman Company | St. Paul — 652.487.3850 | Fargo — 701.232.7238

Daily Dose of Sun-

(Continued from Page 9)

These sensors are hand-held and operate with a simple on/off switch. It is important to orient hand-held sensors vertically to get accurate measurements. Check out Spectrum Technologies FieldScout Quantum Light Meter for \$199.

Sensors that calculate DLI are preferred, because these sensors report how much light is received over time. Most often these models measure additional environmental parameters, such as temperature, and cost \$500 and up (see Figure 4). Check out Spectrum Technologies Greenhouse Tracker for \$545. For a sensor that only measures DLI look at Spectrum Technologies LightScout DLI 100. This sensor collects light data, calculates DLI after 24 hours, and reports the DLI with a simple LED system (see Figure 5). This sensor is sold in a pack of three for \$190. All sensors that measure DLI must remain in the same location for at least 24 hours and should be oriented vertically to obtain accurate measurements.

*I mention Spectrum Technology products, because I am very familiar with their products. Onset, Campbell Scientific, and

Apogee make comparable products.

Using light measurements?

Choose a sensor that fits how you plan to use the sensor. Instant sensors are best used for mapping light and demonstration. Using a coordinate system, measurements can be collected across a site to obtain light maps. I have also seen superintendents use instant sensors to point out light levels and the associated turf health during green committee meetings. DLI sensors are most useful for validating how much actual light an area receives over individual and multiple days.

Light sensors are an economical tool to test whether turfgrass is receiving enough light. Often the story light sensors tell is well known by the superintendent. The real value of a light sensor is putting science and data behind what is known by the superintendent. Light data can validate removing or trimming a tree to stakeholders. Ultimately, better qualified and unified decisions about tree management



Figure 5: LightScout sensors placed on and around a golf green to collect daily light levels. (Scott Lemke)

are best for all parties. Now where is the chainsaw!

(Editor's Note: Aaron Johnsen is a Professional Product Advisor with WinField Solutions and an adjunct lecturer at the University of Wisconsin - River Falls. He can be reached at arjohnsen@landolakes.com or 651.895.2601.

References: Buck, Johann. 2010. Personal Communication. Fry, J. and B. Huang. 2004. Applied Turfgrass Science and Physiology. John Wiley & Sons, Inc. Hoboken, NJ.)

HARTMAN
Golf Course Construction
& Renovation

Quality since 1971...

Specializing in...
Bunkers Tees Laser Leveling Green Drainage Irrigation Design Pump Station Upgrades

8099 Bavaria Rd.
Victoria, MN 55386
952.443.2990

info@hartmancompanies.com
www.hartmancompanies.com