bermudagrass. Additional research is being conducted to solidify the actual DLI requirements for these turfgrasses, as well as how the DLI values actually translate to turfgrass grown in the landscape.

With preliminary data in-hand, how can this information be used by homeowners, landscapers, and turf managers? New technology is in development to make determining the amount of light in a landscape as easy as a push of a button. Spectrum Technologies has developed the DLI100 – a device that can be placed in the desired location and then left for a period of 24 hours. During this time, the instrument collects light quantity based on one complete day, and then returns a DLI range value. Of course, this number can vary due to cloud cover and other factors, so a few days should be used to get an average. Sites with existing turfgrass can also be evaluated to determine if a decline in quality is due to low light or another culprit. We are evaluating this instrument in our research program.

Continued research in the area of the effects of low light should help us have a better understanding of DLI need of our warm-season grasses and their responses.

With these results, sod growers and marketers will be able to help clients choose the most appropriate turfgrass for their site, improving the satisfaction of all parties involved.

About the Author: A native of southern California, **Brian Glenn** will graduate from the University of Florida / IFAS in 2014 with a PhD in Environmental Horticulture. He received his B.S. from Brigham Young University and a master's in Agronomy from the University of Florida.

His current work includes determining light levels for optimal turf growth and the effect of shade duration and temperature on turfgrass growth and development. He plans to pursue a career working with turf managers to identify and solve future challenges within the industry.

SFWMD: November Edges All-Time Dry Record for the Month

Despite scant rainfall, regional water supplies remain adequate

West Palm Beach, FL— The first month of South Florida's dry season edged out the long-standing record rainfall low for November, South Florida Water Management District (SFWMD) meteorologists reported on December 3.

The District-wide rainfall average of 0.29 inches in November was just 0.01 below the previous record low of 0.30 inches in both 1940 and 1944, based on District records since 1932. All 16 counties in the District were more than 1.5 inches below average for November, which is typically one of the driest months in South Florida.

"With the benefit of above-average wet season rainfall, regional groundwater and surface water levels fortunately were in a position to 'weather' a record dry month," said Susan Sylvester, SFWMD Chief of the Water Control Operations Bureau.

Eastern Palm Beach County had the largest rainfall deficit in the District, with 0.69 inches of rain, representing a deficit of 3.46 inches, or 17 percent of average. The Upper Kissimmee Basin and Martin, St. Lucie and eastern Miami-Dade counties all recorded rainfall deficits of more than 2 inches for the month. The East Caloosahatchee Basin also recorded more than a 2-inch rainfall deficit while the Southwest Coast recorded a 1.88-inch deficit. Lake Okeechobee stood at 15.10 feet NGVD today, which is 0.30 feet above the historic average for this time of year.

2012-2013 Dry Season Forecast

South Florida is forecast to experience one of the few dry seasons having near-average rainfall in the past 14 years. Only two dry seasons, 1998-1999 and 2003-2004, have actually been about the historical average in that timeframe, with two above average and 10 below average dry seasons. The National Oceanic and Atmospheric Administration's Climate Prediction Center forecast calls for equal chances of slightly above or slightly below average rainfall for the first three months of the upcoming dry season.

Among the official forecast highlights for the 2012 - 2013 South Florida dry season:

- Near normal precipitation is mostly likely during the first part of the dry season, from November to February
- A drier-than-normal trend may characterize March and April
- Average dry season precipitation: 12 to 15 inches in the interior and west to 15 to 21 inches in the east

Update, December 13: Following the District's record-dry November, excessive rainfall fell over parts of the District in the past few days. Rainfall maximums of 10 to 12 inches were recorded in the Jupiter area over a 24-hour period starting Dec. 11. During the same timeframe, the Lake Kissimmee basin averaged a beneficial 4.03 inches, and the West Collier basin's 6.06 inches of rain boosted water levels. Lake Okeechobee currently stands at 15.16 feet; the historical average is 14.73 feet. The Lake stood at 13.78 as of December 13, 2011.

- Source: SFWMD News Release.
Follow all the District news at www.sfwmd.gov

Quantifying Light Requirements of Turfgrass Using Daily Light Integral

By Brian Glenn, PhD Candidate, Environmental Horticulture Department, UF/IFAS

Factoring in DLI may provide a more accurate assessment of a turf cultivar's performance under shady conditions.

Living in the southeast, many areas are dominated by thick and large stands of trees. They thrive in the wet, warm climate that persists for most of the year. Under that majestic live oak in the front yard, it is quite common to see a large expanse of St. Augustinegrass turf that completes the scene. As much as one-quarter of all managed turfgrass is grown under shaded conditions, and that percentage is probably much higher in residential landscapes. In many southern landscapes, a yard is not complete without a magnolia or crepe myrtle being placed in the middle. But do these elements always grow in harmony, or is there an unseen competition being waged?

The fact is that the warm season turfgrasses that we use for lawns in Florida require full sun for optimal growth. If adequate light levels are not achieved, a few things start to happen. The leaf blades usually begin to elongate rapidly, and will take on a spindly appearance. These changes occur because the turf is attempting to "grow" its way to more light. If light quantity remains low, the plants essentially become starved and start to thin out. At this point, weeds and other undesirable species might begin to move in, or it will remain bare and not uniform with the rest of the yard. Many communities have specific regulations on the number of trees that must be on a property, as well as prohibition of existing tree removal. If a homeowner does have dense shade in their landscape, what options are there if they want a lawn?

The DLI100 measures light quantity over a 24-hour period and returns a DLI (Daily Light Integral) value.

Recently, there have been numerous cultivar releases that are branded as being "shade tolerant". Common claims are that they have better quality "when grown under 60% shade", but what does this number really mean? Measurements that quantify light intensity are often made at one instantaneous moment in time, but the full story may be missed. Due to the sun's movement across the sky, shade and light conditions changes throughout the day. Day length throughout the year can also impact overall light interception by the plant.

Greenhouse growers have been using a measurement known as daily light integral (DLI), which uses moles/m^2/day to quantify light needs of greenhouse grown crops. Bedding plants grown in greenhouse often depend on day length for optimum flowering. According to Dr. James Faust, the DLI is a compilation of "total quantity of light delivered over the course of the entire day." By accounting for changes in shade due to sun angle, a better evaluation can be made of how much sunlight is actually reaching the turfgrass on a daily basis.

Little research has addressed quantifying the DLI for use in turfgrass. Recently, this preliminary data has been collected from greenhouse studies at the Turfgrass Envirotron in Gainesville, Florida. Twelve commonly grown warm-season turfgrasses were evaluated to determine the DLI required to maintain minimum acceptable quality. These included cultivars from the main species grown as lawn grasses such as centipedegrass, St. Augustinegrass, bahiagrass, and zoysiagrass, as well as others that are marketed for their shade tolerance.

Table 1 (*below*) represents an experiment that was performed in the summer months of July and August. Of the grasses evaluated, the three bermudagrasses had the highest DLI requirements. The turfgrasses with the lower DLI requirements included the St. Augustinegrasses and zoysiagrasses (both the *Zoysia japonica* and *Z. matrella* species). Two bermudagrass species that are being marketed as shade tolerant, 'TifGrand' and 'Celebration' appear to be about equal in their light requirements. Preliminary requests indicate that these two grasses need about 20% less light than 'Tifway'

Turfgrass Cultivar	DLI requirement (mol m^{-2} s^{-1})
Tifway hybrid bermudagrass	23.3
Tifgrand hybrid bermudagrass	18.7
Celebration bermudagrass	18.1
Argentine bahiagrass	16.0
Seadwarf seashore paspalum	13.5
Tifblair centipedegrass	13.3
Palisades zoysiagrass (*japonica*)	12.0
Floratam St. Augustinegrass	11.9
Diamond zoysiagrass (*matrella*)	11.7
Pristine zoysiagrass (*matrella*)	11.3
Captiva St. Augustinegrass	11.2
Jamur zoysiagrass (*japonica*)	10.5

Table 1. Preliminary DLI requirements to maintain minimum acceptable quality for twelve warm-season turfgrasses.