

3rd Quarter 2024

TEXAS TURFGRASS ASSOCIATION



President's Message



As summer draws to a close and Texas dodges the latest

hurricane, I want to take a moment to reflect on the summer. I would like to thank all the attendees and exhibitors who made our summer conference at Kalahari a rousing success. Our first visit to Kalahari proved to be phenomenally successful as the reviews have been unprecedentedly positive for a summer event. Not only did we have a great tradeshow, but we also teamed up with TXSFMA (Texas Sports Field Management Association) to do a tour of the Round Rock Dell Diamond facility. In addition, we had our first Live band event, and a wonderful time was had by all who attended. I want to personally thank Katie for exploring new venues to keep our events ongoing and exciting.

The end of summer also means we are putting the final touches on TTA's winter show in Corpus Christi. This year's event is shaping up to be one of the best trade shows ever as we have several new vendors slated to exhibit and an All-Star cast of speakers already lined up. As you know our winter conference will have even more attendees and exhibitors, and we will also feature **Phil Pritchard and the Full Band** at **Texas House of Rock**. Stay tuned for details on this event!

In conjunction with the winter show, TTA will be holding its famous gun raffle with a new record of twelve guns to be raffled off. Tickets will be available soon to purchase...so do not miss out. As some of you will remember, the last gun raffle was sold out in record time. In closing, I would again like to thank Katie and all my fellow board members for the hard work that made the summer show such a success and look forward to seeing everybody in December in Corpus Christi.

Sincerely,
Scott Sipes
Your TTA President



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The Texas Turfgrass Association decided to try a new location for Summer 2024 - Kalahari Resort, and it did not disappoint.

The City of Round Rock provided a family atmosphere along with great education and networking opportunities. I value all feedback on our speakers, location, and planned activities. Even though our Education is the priority, the fun is being a part of TTA and visiting with each other.

Below you will take note of the 4 teams that won in the Corn hole Championship in Kalahari! This was a part of the family-friendly event that helped promote networking and fun in between turf education. Thank you to everyone who participated; it was a great time!



Membership Texting - Join It!

Texas Turfgrass Association has implemented a Texting System and we urge you all to opt in.

Please Text: TTA2023 To: 972-243-9239

This service will only be used for TTA events and notifications.

This is a great tool! Emails get buried and you can stay informed!

Next Summer, we will venture back to Lost Pines in Bastrop and in Denton for Winter. Please mark your Calendars now!

As we plan our upcoming Winter Show- I want to remind you all our 2024 Awards Program that is high lighted at the winter show. This is a wonderful opportunity to highlight your field, company and employees on a job well done.

If you have not thought of registering for the upcoming Winter show, please consider the education we are bringing. Our CPTM lecture will take place along with an All-Spanish speaking day! This is in addition to the standard CEU education, Annual meeting, and awards. We are jammed packed with activities in Corpus, and I hope you all will venture to that region.

Lastly, I want to thank you 2024 Sponsors, members, vendors, and Board of Directors for continuing to support and believe in the Texas Turfgrass Association! I hope to see you in Corpus Christi this Winter!

God Bless! Warmest Regards,
Your Executive Director,
Katie Flowers



Summer Conference - Bastrop

July 20 - 22

Winter Conference - Denton

December 9 - 10



2025
Conference Sites

**Join us at these
great sites in 2025!**

Save the Dates!



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Texas Turfgrass Association 2024 Gun Raffle

Wednesday December 18 *A maximum of 1,200 tickets

Need not be present to win * Donation: \$25 each or 5 for \$100

Beretta A300 Synthetic Shotgun 12 or 20 gauge



Remington 700 BDL 270 Winchester Bolt Rifle

Sig Sauer P320 9mm Auto Pistol



Henry Goldenboy 22LR Rifle

Kimber K6xs 38 Special Revolver



Colt Python 357 Mag Revolver

Glock 19x 9mm Auto Pistol



Weatherby Orion 20 gauge over under Shotgun

Bergara BMR 17 HMR Bolt Rifle



Weatherby Vanguard 6.5 Creedmoor Rifle

Henry Big Boy 44 Mag Lever Rifle



Bergara Ridge 22.250 Bolt Rifle

Join us in Corpus Christi for this exciting event!

2024 TTA CPTM

Lecture & Exam Schedule

12/16-12/17

Requirements: All applicants for the CPTM lecture and exam must have pre-registered and paid with Executive Director, Katie Flowers. All requirements must have been

met in accordance with the TTA CPTM Application and Brochure.

Materials required: Pencil(s) and Calculator (phones will not be allowed to use as calculators during exam)

Time	Topic	Speaker
<i>Monday Afternoon- December 16th</i>		
12:00 – 12:45	<i>Turfgrass Growth and Development</i>	Dr. Pablo Boeri
12:45 – 1:45	<i>Turfgrass Species Selection</i>	Dr. Pablo Boeri
<i>1:45 – 2:00 Break</i>		
2:00 – 3:00	<i>Primary Cultural Practices</i>	Dr. Manuel Chavarria
3:00 – 4:00	<i>IPM Principles and Weed Management</i>	Dr. Manuel Chavarria
<i>Tuesday Morning- December 17th</i>		
8:00 – 9:00	<i>Soil and Fertility</i>	Dr. Joey Young
9:00 – 10:00	<i>Disease and Insect Management</i>	Dr. Joey Young
<i>10:00 – 10:15 Break</i>		
10:15 – 11:00	<i>Fertilizer Calculations</i>	Dr. Ben Wherley
11:00- 12:00	<i>Sprayer/Spreader Calculations</i>	Dr. Ben Wherley
12:00 – 2:00	<i>Review Time/ Trade Show</i>	
2:00 – 4:00	CPTM EXAM	TBD

CPTM Required Reading in advance

Applied Turfgrass Science and Physiology

Jack Fry and Bingru Huang

Practical Math for the Turfgrass Professional

University of Arkansas – Free PDF download

<https://docplayer.net/19667418-Practical-math-for-the-turfgrass-professional-cdhort200.html>

Optional Reading

The Mathematics of Turfgrass Maintenance

Nick E. Christians and Michael L. Agnew

Fundamentals of Turfgrass Management

Nick E. Christians, Aaron J. Patton, Quincy D. Law

Turfgrass Soil Fertility and Chemic I Problems

R. N. Carrow and D.V. Waddington

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July 20 - 22



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Winter Conference - Denton, Texas

December 9 - 10



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PRODUCER UPDATE



Scott Sipes: TTA's President Looks to the Future of Turfgrass in the Lone Star State

Scott Sipes, 2024 President of the Texas Turfgrass Association (TTA), has been in the turfgrass industry for 14 years as project manager at All Seasons Turf Grass. His love for the business made him want to represent farms like his and contribute to the industry.

"I enjoy giving back to the Texas turfgrass industry and it's given me a broader perspective of everyone's needs," Sipes said. He explained the various challenges different regions face, particularly contrasting his sand-based farm with others' maintenance practices. "Their needs aren't the same as ours, but we're all in this together. We need to balance everyone's needs, whether it's the sod check-off program, water rights, labor costs or H-2A programs. A farm in West Texas has completely different needs than a farm in Southeast Texas."

As President, Sipes is focused on leading the TTA's mission to promote the environmental benefits of natural grass to consumers, a particularly important message as water usage remains a central issue. "We constantly stress the importance of grass fields, especially moving away from artificial turf and plastic on our kids' sports fields. We also advocate for watering rights and addressing the growing labor shortage."

Becoming TTA President is a four-year commitment, progressing through roles as second vice president, first vice president, president and finally past president. Each position has unique responsibilities and Sipes is actively leading key events. He noted that this summer's conference in Kalahari was one of their most successful yet, with record attendance. The winter conference in Corpus Christi promises to be just as impactful, focusing on education, CEUs and even offering tests in Spanish. "We're aiming for the best winter show we've ever had, complete with a live band and a gun raffle," he added.

Sipes reflected on the industry's challenges, including a tightening labor market and a noticeable softening in demand compared to recent years. Looking ahead, he envisions the Texas turfgrass industry becoming a more unified voice in tackling common issues like water rights, government regulations and labor shortages. "Water will continue to be the most critical issue for us," he said, adding that educating consumers on the benefits of natural and native grasses suited for Texas's climate will remain a key focus for sod producers.



Entering the Turfgrass Industry

Born outside of Houston in Southeast Texas, Sipes has spent most of his life in the region. He began his college career swimming at the University of Southern California but eventually graduated from the University of Houston. Before turfgrass, Sipes worked in sales and managed apartment renovations along the Gulf Coast.

In 2008, Sipes met his wife, Irene Sipes, who plays a pivotal role in the Texas turfgrass industry. Her father, Willie Gavranovic, owns Horizon Turf Farms in Wharton, TX. In 2000, Horizon began recognizing the need for sand-based soils near Houston, as their farm's clay-based soil was limiting. Also, Irene saw an opportunity to expand sales to golf courses and further develop the business, which led to the founding of All Seasons Turf Grass. By 2002, they expanded by purchasing a farm northwest of the city. Initially, they grew St. Augustinegrass and bermudagrass to generate cash flow while also selling products from Horizon Turf.

A year after meeting Scott, Irene asked him if he'd be interested in running projects for them and he's been doing so ever since. As a self-proclaimed "sports fanatic," Sipes found the transition into managing specialty grasses and significant projects a natural fit.

All Seasons operates a retail office in Brookshire with three internal and two external sales employees. At the same time, the rest of the staff, including 25 farm workers and two drivers, supports the 1,850 acres spanning Brookshire, Sealy and Monaville.

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They also utilize the H-2A program to manage labor needs. As product manager, he wears many hats, from delivering grass to handling bids and overseeing projects. This fall, he's already preparing for major projects and grass production for 2025.



Scott and Irene Sipes at their booth at the 2018 Golf Industry Show in San Antonio, TX.



Scott and Irene Sipes at the Sports Field Managers Association Show.



Scott and Irene Sipes giving a tour of All Seasons Turf Grass to a group from Japan.

Sipes also represents All Seasons in various leadership roles, which led him to the TTA. "Irene and her family value having input on boards and committees and I've willingly stepped up as a spokesperson for All Seasons."

According to Sipes, what sets All Seasons apart is its commitment to customer service and quality. "We pride ourselves on cutting and delivering fresh grass, never letting it sit. Our specialty grasses grown on sand are unique in the South Texas market, giving us an edge."

Growing Celebration Bermudagrass

For many years, All Seasons Turf Grass has grown [Celebration® Bermudagrass](#), a decision Sipes credits to the relationship they've built with Sod Solutions. "It's not just about their marketing support; it's their overall knowledge and willingness to assist in any situation," Sipes explained. He highlighted how accessible the team is, mentioning that he often calls Sod Solutions' Director of Research, Roberto Gurgel, to discuss both needs and general industry trends.

"Celebration grows phenomenally at our Brookshire location," Irene added. "If it were up to my farm manager, he'd convert everything to Celebration. He loves it." She noted the grass's durability, particularly during winter when its tensile strength ensures it stays intact without falling apart.



The Sod Solutions team visiting Texas in 2013.

The demand for Celebration is high, especially for the Houston area's premier golf courses and sports facilities. "We've put Celebration at several top-tier golf courses, like River Oaks, where they specifically request it from our farm," Sipes shared. They've also provided Celebration for Houston Oaks Golf Course and Shell Energy Stadium, home of the Houston Dynamo FC. Currently, Sipes is consulting on a significant project in Texas, assisting with turfgrass selection.

Embracing Technology with Turf Logistics



Alongside its dedication to turfgrass, All Seasons has embraced innovation in its operations. About four years ago, they began using [Turf Logistics](#), a sod-specific software designed to streamline order management, routing and delivery. Irene described how the software has transformed their business, moving them from a whiteboard and paper system to a fully digital platform. "It's an impressive program and we couldn't operate as smoothly without it. The system allows our drivers to handle deliveries efficiently, take photos, capture signatures and track everything in real time," she said.

Turfgrass Producers International

Sipes shared that All Seasons Turf Grass benefits significantly from being part of Turfgrass Producers International (TPI). "Their education programs are invaluable, but even more important to me are the relationships I've developed with farmers throughout the country," he said. **Continued on next page**

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He explained that, unlike the big-box competition, farmers help each other like family when challenges arise, no matter the size of the problem. "It's really a unique industry," Sipes said.

Sipes doesn't hesitate to contact producers in other states whom he's met through TPI. "The relationships and knowledge from others who have experienced things you're facing can be invaluable," he explained. "We've even visited their farms to see firsthand how they're handling issues."

In 2023, Irene and Scott took an RV trip to visit Jasperson Sod Farm in Wisconsin and Wade Wilbur, owner of Sod Shop in Kansas, learning six new business practices to implement. "One great tip we got was using the same H-2A truck drivers year after year so they learn the routes, saving us from retraining each season." Sipes also aims to hire a mechanic similar to the one Wilbur employs for farm maintenance. He was particularly impressed with Wilbur's operation. "His shop was immaculate—you could've eaten off the floor."

"TPI offers more than just education. They help navigate the ever-changing rules around H-2A programs and are quick to connect you with answers or resources when you need them," he added.

Sports and Hobbies



Scott Sipes showing a large redfish he caught.



Scott Sipes after a successful hunt with his dog.

Sipes' expertise and passion for turfgrass led him to consult on projects where clients often change grasses or course features based on his recommendations. He aims to match the right grass to the proper application, improving conditions for golfers and course maintenance teams.

A lifelong sports enthusiast, Sipes swam competitively and qualified for the 1984 Olympic Trials. He still plays golf regularly and is particularly interested in maintaining grasses that can handle the Texas heat while requiring low maintenance and providing a high-quality playing surface. "I'm passionate about keeping grass at a manageable height and ensuring it performs well for everything from golf to soccer, rugby and football here in Texas."

Sipes is also a part of the committee responsible for organizing the sod for Houston's hosting of the 2026 World Cup. He's excited to play a role in preparing the grass for one of the world's most significant sporting events.

When he's not focused on turfgrass or sports, Sipes enjoys hunting and fishing outdoors. He's hunted across the U.S. from South Dakota to California and fished in places as diverse as the Celtic Sea off Ireland and 27 states. Other hobbies include reading 40 novels a year, cooking and taking RV trips with Irene and their two dogs—a boxer and a miniature schnauzer.

Sipes looks forward to continuing his role as TTA President through 2024 and watching the industry grow. For more information on All Seasons Turf Farm, click [here](#).



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How Much Light is Enough?

Daily Light Integral Requirements for Warm-Season Grasses

Ben Wherley, Ph.D. , Texas A&M University

Zhaoxin Chen, Texas A&M University

Casey Reynolds, Ph.D., Turfgrass Producers International



Green Section Record August 31, 2021 Volume 59, Issue 16



Key Takeaways:

- Shade is a problem for superintendents everywhere, but quantifying light levels at a given location and the light requirements for various grasses has been a challenge.
- New technology makes it easier to measure the photosynthetically active radiation (PAR) reaching the turf and the daily light integral (DLI) in a given location.
- Knowing the minimal daily light integral required to maintain acceptable quality (DLI_m) for various grasses can indicate whether shade is an issue in a given area and guide tree removal or turf selection decisions.
- This study identified marked differences in DLI_m , which were affected by season, cultivar and growth regulation in the fairway-height bermudagrasses and zoysiagrasses studied.

Shade is arguably one of the most ubiquitous abiotic stresses faced by golf course superintendents around the world, and selection of the best-adapted turf species and cultivars for low-light environments is key to long-term success at many courses. In the past, this has been challenging due to difficulty in quantifying light levels throughout a golf course as it relates to the light requirements of specific grass species or cultivars. The complexity and differences among shade environments can make it difficult to specify a minimum light requirement in terms of hours per day or percent shade that can extend across different situations. Biologically speaking, rather than responding to the number of hours of sunlight or percent shade level, plants ultimately respond to the cumulative daily number of photons – measured in moles per square meter per day ($\text{mol}/\text{m}^2/\text{d}$) – they receive within the photosynthetically active wavelengths of 400-700 nanometers (nm), known as the daily light integral (DLI). For reference, in Houston, Texas, ambient DLI levels in full sun fluctuate from approximately $45 \text{ mol}/\text{m}^2/\text{d}$ during summer to less than $20 \text{ mol}/\text{m}^2/\text{d}$ during the winter months. In sunnier areas such as the desert southwestern United States, DLI may approach as high as $65 \text{ mol}/\text{m}^2/\text{d}$ during summer months (Faust et al. 2018). Furthermore, minimum DLI requirements needed to support acceptable quality (DLI_m) for a particular cultivar may not remain constant throughout the year, sometimes varying by month and temperature.

With the recent development of relatively inexpensive and easy-to-operate DLI meters, superintendents can readily determine the approximate DLI levels within particular areas of their course. Furthermore, methods are available for using multiple instantaneous handheld photosynthetically active radiation (PAR) sensor readings taken over the course of a day to estimate DLI for a given site (Richardson et al., 2019). Numerous apps are also now available that allow turf managers to predict the sun's path for a given month of the year, and thus, selectively remove only limbs or trees that may be of concern based on the DLI_m of the turf. Use of DLI data along with these types of technologies can aid the superintendent in making data-driven decisions about tree pruning, tree removal or turf cultivar selection.

Continued on page 20

Making a big splash with very little water.

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Requiring 38% less water, TifTuf is redefining drought tolerance. In four years of National Turfgrass Evaluation Program drought stress trials, it outperformed Tahoma 31 and all other tested bermudagrass cultivars hands down. In fact, with the sale and installation of over 500 million square feet in just the past four years, TifTuf has saved over 9.5 billion gallons of one of our most precious natural resources, our Water!



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There has been growing interest by turfgrass researchers in quantifying DLI_m (Baldwin et al., 2009; Bunnell et al. 2005a; Bunnell et al. 2005b; Chen et al., 2021; Glenn et al., 2014; Meeks et al., 2015; Russell et al., 2019), however, published field-study data of this type for warm-season fairway and rough cultivars have been limited. The goal of this research was to determine seasonal DLI_m in five zoysiagrass and four bermudagrass cultivars commonly utilized on southern and transition zone golf courses. The research also sought to assess the effects of monthly growth regulator application on DLI_m .

Approach

A two-year field study was conducted at Texas A&M University in College Station, Texas, during the 2016-2017 growing seasons. A 15,000-square-foot shade research facility was constructed to accommodate replicated shade treatments offering 0% to 90% reductions in PAR. Turfgrasses utilized in this project included cultivars of bermudagrass and zoysiagrass commonly used on golf courses in the southern United States. The study was arranged in a completely randomized design with four replicate plots per treatment and six density-neutral shade levels that provided approximately 0%, 30%, 50%, 70%, 80% and 90% photosynthetic photon flux reductions. Plots were established from washed sod in July of 2015 and given six weeks to establish under full sun conditions before shade structures were moved onto the plots. Shade structures remained on the plots through the duration of the project (August 2015 to November 2017), including winter months, and were only removed for short periods for routine maintenance and data collection.



The Texas A&M Research Field Laboratory shade study facility with moveable shade structures in place.

During the study, plots were irrigated twice weekly to prevent wilt based on reference evapotranspiration from an onsite weather station. Plots were mowed one or two times weekly, depending on the time of year. Mowing was performed at a 0.75-inch fairway height using a walk-behind reel mower. Plots were further subdivided to receive either no trinexapac-ethyl (TE) or a monthly rate of 0.2 pounds of active ingredient per acre from May through September using a handheld boom sprayer. Preventative fungicides were applied during spring and fall months using granular fungicides. A 21-7-14 sulfur-coated urea fertilizer was supplied to all plots at a rate of 0.75 pounds of nitrogen (N) per 1,000 square feet every six weeks from May through September for a total annual application of 3 pounds N per 1,000 square feet.

PAR measurements were continually recorded using PAR sensors and data loggers mounted underneath shade structures. These data were used to calculate mean monthly DLI levels within each respective shade treatment. Turf quality data were collected twice monthly throughout the study. At the end of the study, regression analysis was used to determine DLI_m , or minimal DLI thresholds needed to support acceptable turf quality in each entry. Mean DLI values recorded for full-sun treatments during summer months at the study site averaged 47 mol/m²/d. The shade treatments resulted in reduced summer DLI values that ranged from 28 mol/m²/d to as little as 5 mol/m²/d with increasing shade density.

Findings

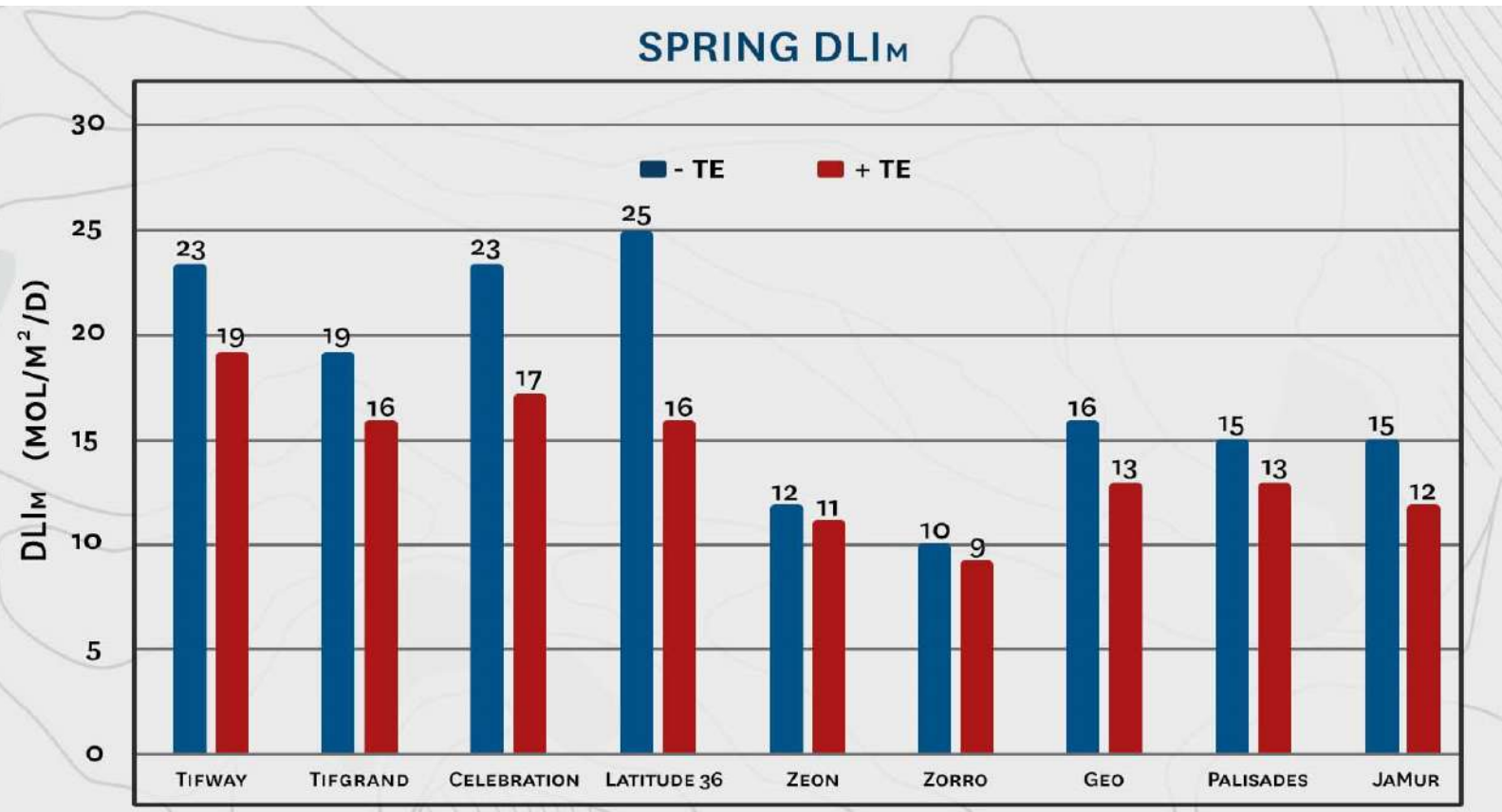
For the purposes of this article, we will highlight DLI_m of fairway-height turf for the final spring, summer and fall of the project, at which time grasses had been exposed to shade stress for nearly two full years. An effect of season on DLI_m was observed across all cultivars, with higher DLI_m generally required during summer compared to spring and fall seasons. The DLI_m were generally higher for bermudagrass than for zoysiagrass cultivars, regardless of TE treatment. (Figures 1-3)

Spring DLI_m

During spring, bermudagrass cultivars required between 16-25 mol/m²/d to achieve acceptable quality, with TE application resulting in lower DLI_m for all cultivars. In the absence of TE, 'Tifgrand' showed the lowest DLI_m (19 mol/m²/d) of any bermudagrass. TE-treated 'Tifgrand' and 'Latitude 36' each showed the lowest DLI_m during spring (16 mol/m²/d). Overall DLI_m reductions due to TE ranged from 16% to 36% in bermudagrass cultivars during spring.

Zoysiagrass cultivar DLI_m ranged between 9-16 mol/m²/d during spring, and again, TE reduced DLI_m in all cultivars. In the absence of TE, 'Zorro' showed the lowest DLI_m (10 mol/m²/d) of any zoysiagrass. TE-treated 'Zorro' showed the lowest DLI_m during spring (9 mol/m²/d). Overall DLI_m reductions due to TE ranged from 8% to 20% in zoysiagrass cultivars during spring.

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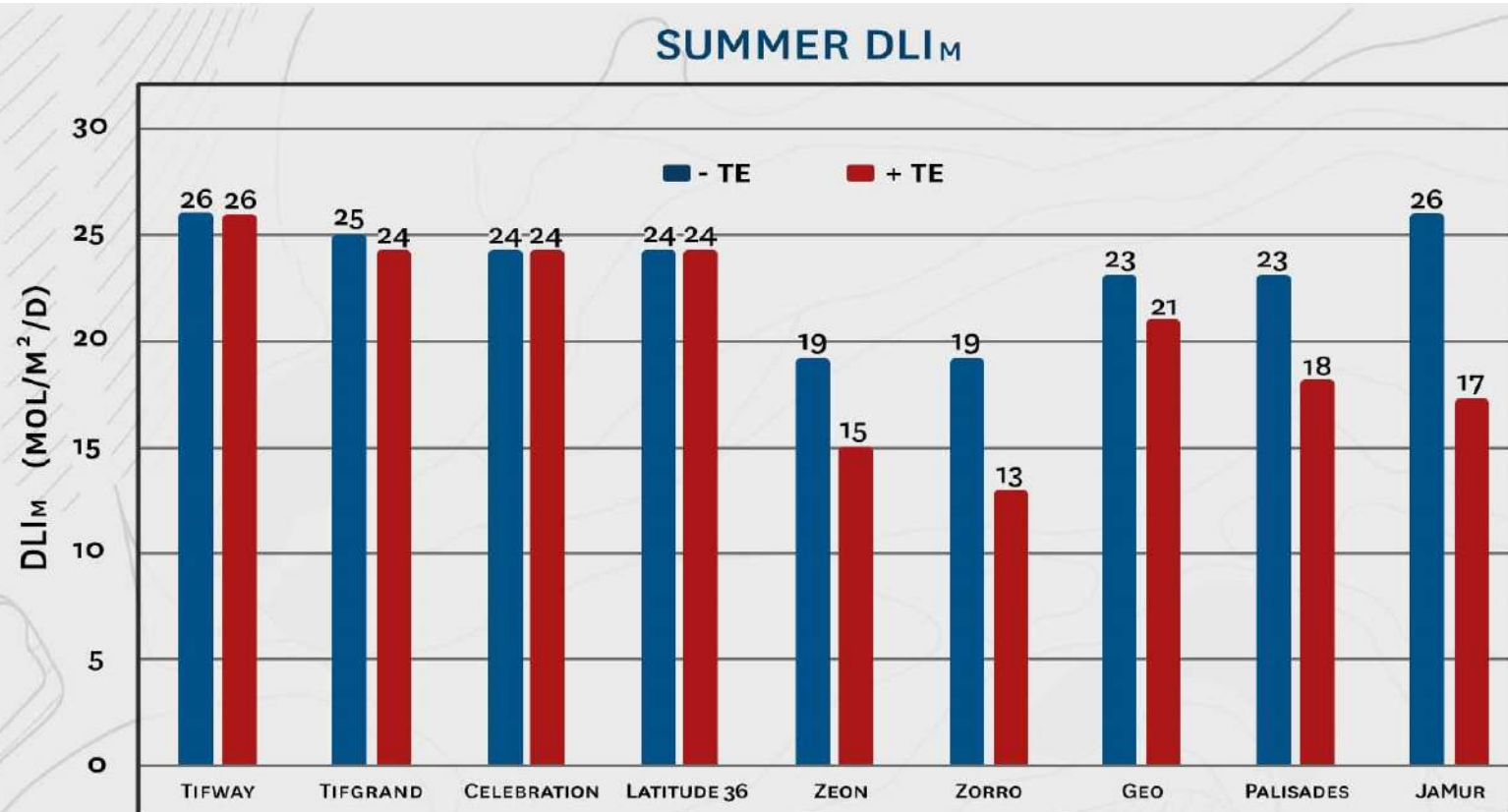


Spring minimal DLI requirements for fairway-height bermudagrass and zoysiagrass cultivars as influenced by monthly trinexapac-ethyl application. Data are for the final year of the shade study. A lower minimal DLI indicates less light is required to maintain acceptable quality.

Summer DLI_m

During summer months, bermudagrass cultivars required slightly higher DLI_m compared to spring, ranging from 24-26 mol/m²/d. Also, while TE application slightly decreased (4% decrease) DLI_m in 'Tifgrand', it had no effect on DLI_m of any other bermudagrass cultivars. Regardless of TE application, 'Celebration' and 'Latitude 36' showed the lowest DLI_m (24 mol/m²/d) of any bermudagrass cultivars during summer.

Zoysiagrass cultivar DLI_m notably increased from spring to summer, with summertime DLI_m ranging between 13-26 mol/m²/d. Unlike bermudagrasses, TE was effective at reducing summer DLI_m in all cultivars, with the greatest DLI_m reduction noted in 'JaMur' (35%). In the absence of TE, 'Zorro' and 'Zeon' showed the lowest summer DLI_m (19 mol/m²/d) of any zoysiagrass. TE-treated 'Zorro' again showed the lowest DLI_m during summer (13 mol/m²/d).



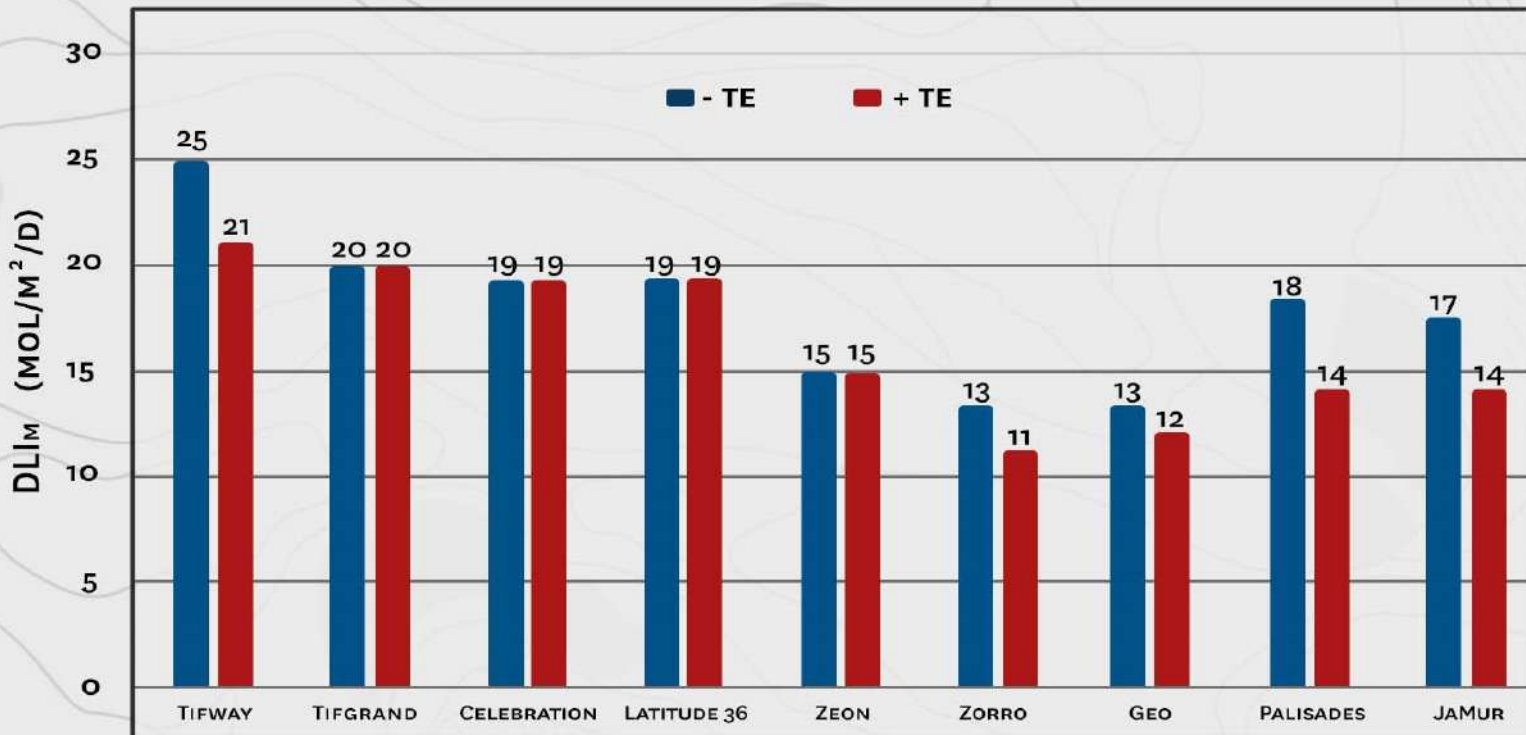
Summer minimal DLI requirements for fairway-height bermudagrass and zoysiagrass cultivars as influenced by monthly trinexapac-ethyl application. Data are for the final year of the shade study. A lower minimal DLI indicates less light is required to maintain acceptable quality.

Fall DLI_m

Similar to spring, DLI_m of most bermudagrasses declined during fall compared to summer, ranging from 19-25 mol/m²/d. With the exception of 'Tifway', which showed a 16% decrease in DLI_m due to TE, application of TE again had limited effect on reducing DLI_m in bermudagrass cultivars. 'Latitude 36' and 'Celebration' (19 mol/m²/d) showed the lowest DLI_m during fall, regardless of TE application.

Zoysiagrass cultivar DLI_m were also reduced in fall compared to summer, ranging from 11-18 mol/m²/d. 'Zorro' showed the lowest fall DLI_m, regardless of TE application (11 and 13 mol/m²/d, respectively for + and - TE). In the absence of TE, the medium-textured 'JaMur' and 'Palisades' zoysiagrasses showed slightly higher DLI_m (17-18 mol/m²/d) than the finer-textured cultivars 'Zorro', 'Geo', and 'Zeon' (13-15 mol/m²/d). 'Palisades' showed the greatest benefit from TE application in fall, with 22% reduction in DLI_m observed due to TE.

FALL DLI_M



Fall minimal DLI requirements for fairway-height bermudagrass and zoysiagrass cultivars as influenced by monthly trinexapac-ethyl application. Data are for the final year of the shade study. A lower minimal DLI indicates less light is required to maintain acceptable quality.

Continued on page 24



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Summary

Shade stress is a widespread problem faced by superintendents throughout the world. However, characterization of light levels and the corresponding DLI for problem areas combined with the use of adapted cultivars can lead to greater long-term success in shaded environments. This shade study sought to determine DLI_m of commonly used zoysiagrass and bermudagrass cultivars for golf course fairway and tee situations. It should be noted that although shade may be more of a seasonal occurrence in many situations, our shade treatments remained on the plots throughout the duration of the study – i.e., shade structures were not removed during dormancy months – and this may have produced a greater amount of plant stress than may be typical for some shade situations. Furthermore, the 0.75-inch mowing height used in our study may have been somewhat higher than that commonly used for these cultivars under fairway conditions. Lower mowing heights would be expected to lead to higher DLI_m .

Our data showed that DLI_m varied by season, with greater DLI_m needed during summer than fall and spring months. TE application was beneficial in reducing DLI_m , primarily in zoysiagrass cultivars. Minimal summer DLI_m for fairway bermudagrasses, regardless of TE application, were generally highest in 'Tifway' ($26 \text{ mol/m}^2/\text{d}$), but relatively similar among 'Tifgrand', 'Celebration' and 'Latitude 36' which all had DLI requirements in the range of 24-25 $\text{mol/m}^2/\text{d}$. In the zoysiagrasses studied, DLI_m were lowest for 'Zorro' compared to other cultivars, and higher DLI_m were generally found for the medium-textured 'Palisades' and 'JaMur' cultivars.



'JaMur' zoysiagrass fairway plot under 70% shade. The left half of the plot received no trinexapac-ethyl, while the right half received a monthly application.

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