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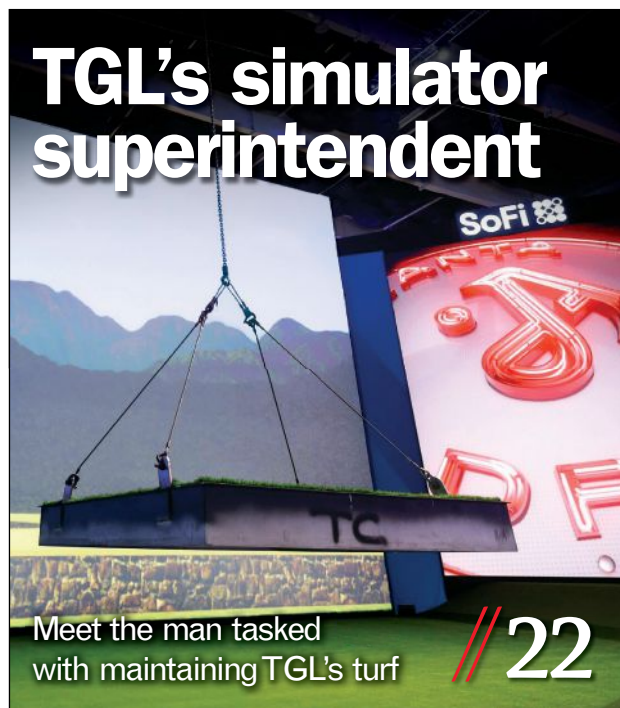
BUNKER RAKES

GR



New solutions for
your bunker, pathway
and erosion problems

// 14



Meet the man tasked
with maintaining TGL's turf

// 22

COLUMNS

// 4 **Keeping up with The Jones**—Seth Jones
Jones recaps the 2025 GCSAA Conference and Trade Show and shares the best advice he got in San Diego

// 12 **Matt's Memories**—Matt Shaffer
Shaffer gives his take on what the perfect bunker program would look like

// 28 **The Turf Doc**—Karl Danneberger, Ph.D.
Danneberger takes a look at the history of famous bluegrasses and the rise of fungicide-resistant bluegrass

// 35 **Off the Record**—Mike Kenna, Ph.D.
Kenna offers up a tour of his storage unit from his time with the USGA Green Section

DEPARTMENTS

// 6 **Starter**

// 10 **Golfdom Gallery**

// 36 **The 19th Hole**



SUPER SCIENCE

// 27 **Minimum mowing, fertilizer and irrigation cost estimates**

// 29 **How much Nitrogen is needed to establish seeded bermudagrass?**

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“There were so many great ideas in one place and we did our best to cover as much as possible.”

SETH JONES, *Editor-in-Chief & Associate Publisher*

Great ideas from the Gaslamp

The vibe at the 2025 San Diego GCSAA Conference and Trade Show was ridiculously good. The trade show floor was packed on Wednesday. Thursday traffic died down in the afternoon, but that just meant less dodging of meandering people to get to where I was going.

After show hours, the Gaslamp Quarter was packed with GCSAA members. Any place you'd go, there was a great chance you'd see a familiar face. And the city was happy to have us there. As I handed over my credit card for one last round at Bub's at the Ballpark before we jetted off to make our dinner reservation, the bartender looked at me and said, “I love this conference! You guys *drink*.”

Cheers to you, Mr. Bartender. I love this conference, too.

GCSAA reported that this was their best-attended show in three years. More than 11,000 attendees traveled to San Diego for the show —

better numbers than they saw last year in Phoenix or two years ago in Orlando.

There were so many great ideas in one place, and we did our best to cover as much as possible. We have 20-plus videos from the show that we'll be sharing on our YouTube channel and in our e-newsletter over the next several weeks. In those videos, we spotlight the new tools and technologies that stood out at the show. We'll also share a lot of what we saw in the pages of the magazine — an instant example of that is in this issue, my feature, “Super solutions,” which starts on page 14. Three different tools are profiled,

and I'm guessing at least one will be new to you.

I saw perhaps the best idea of my 2025 San Diego GCSAA Conference and Trade Show trip before I even got to San Diego. I was seated at the Coors Silver Bullet Bar in Denver, awaiting my connection to San Diego, when I was slapped on the back and greeted with a “Rock chalk, Jayhawk!”

It was Dan Grogan, aka @PurdueTurfy on X, superintendent at the Sagamore Club in Noblesville, Ind., who was with a group of fellow superintendents awaiting the same flight. Dan showed me his plan for the GCSAA Trade Show: He

looked at a map of the trade show floor and grouped the booths he wanted to visit by booth number, cutting down on wasted walking.

Why hadn't I thought of this in my 25 years of attending the show?

To be fair, it would be hard for me to do it. My meetings and those of my team are scheduled with the company we're visiting in advance. There's very little spontaneity in my trade show days. But next year, I am going to try to suggest days/times based on booth location.

Another great idea was doing 19th Hole interviews in person after the show. I'm happy that my request for volunteers on X generated some interest, and I was able to sit down in person with three superintendents for interviews (all three guys I know — but never featured in 19th Hole). The first of those three interviews appears in this issue.

To round out our GCSAA Conference coverage, this issue's *Golfdom* Gallery is all from San Diego. Scenes from the USS Midway, the Gaslamp and the Friends of *Golfdom* (FOG) party are included. The FOG party was a hit — management eventually warned us we needed to ask people to leave the upstairs of the Field because it was over the fire code capacity.

Looks like we're going to need a bigger boat in Orlando next year. 🍷

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Starter

NEWS, NOTES AND QUOTES



// A TURF PIONEER

RODNEY LINGLE, CGCS, WINS USGA GREEN SECTION AWARD



The USGA named Rodney Lingle, CGCS, as the 2025 USGA Green Section Award winner. Presented annually since 1961, the Green Section Award honors distinguished service to golf through an individual's work with turfgrass.

An innovator, turfgrass field expert and mentor to golf course superintendents, Lingle began his career in 1974 at Hattiesburg (Miss.) Country Club. Five years later, he joined Memphis Country Club as superintendent and would ply his trade there for the next 37 years.

During this time, he invented products, advanced the science and art of quality putting surfaces and influenced the entire course maintenance industry with his curious mind and innovative tactics, according to the USGA.

"It's just nice to know that what we did helped to improve the game of golf," Lingle said. "I'm glad that the USGA thought enough of what we did to recognize it, because I do think it really helped a lot of people."

Lingle's lifelong dedication to experimenting with and perfecting ultradwarf bermudagrass spurred an industry-wide movement, improving the putting and playing experience. That



Rodney Lingle, CGCS, who patented Mach 1, bermudagrass, hosted 10 on-site workshops at Memphis CC, hosting hundreds of superintendents to share his maintenance techniques.

work took root on greens at Streamsong (Resort in Bowling Green, Fla.), the Atlanta Athletic Club, the Robert Trent Jones Golf Trail, and the Pinehurst Resort & Country Club. It led to Lingle's development of Mach 1, an advanced turfgrass he eventually patented.

Lingle also created the new greens mowing brush system after a golf course equipment manufacturer stopped making a previous model for walking mowers.

"I can say with confidence that through all Rodney's work over the years, his love towards fellow turfgrass superintendents and professionals is his greatest contribution to the industry," Chris Hartwiger, USGA Green Section's director of agronomy said in his nomination of Lingle.

// WHO'S NEXT?

NOW ACCEPTING HERB GRAFFIS BUSINESSPERSON OF THE YEAR NOMINATIONS

Has someone you know made a positive impact at your golf course? Has their outside-the-box thinking resulted in increased revenue? Does this person perform at such a level of excellence that they have made the facility more successful?

If you know someone who has done this, nominate them for the 2025 Herb Graffis Businessperson of the Year! We're now accepting nominations. Email *Golfdom* editor-in-chief Seth Jones with your nominations at sjones@northcoastmedia.net.

Former winners include:

- *Golfdom* columnist Alan FitzGerald, CGCS, MG, superintendent at Rehoboth Beach (Del.) CC;
- Alex Stuedemann, CGCS, director of international and TPC agronomy for the PGA Tour;
- Scott Bower, superintendent, Martis Camp Club, Truckee, Calif.;
- and new GCSAA president T.A. Barker, superintendent at Fore Lakes Golf Course in Taylorsville, Utah.

// WE ARE ...

PENN STATE ADDS TO TURF FACULTY

The Penn State Center for Turfgrass Science and the Department of Plant Science recently added Manoj Chhetri, Ph.D., and Chase Straw, Ph.D., to its faculty.

Chhetri joined as an assistant teaching professor in turfgrass science. Chhetri holds a Ph.D. in horticulture from Kansas State University where he focused on cultural strategies for zoysiagrass management in the transition zone.

Straw joins as an assistant professor of turfgrass soils and the director of the Center for Sports Surface Research. Straw earned his B.S. in turfgrass science from the University of Kentucky, followed by M.S. and Ph.D. degrees from the University of Georgia.

PHOTO BY: WELGLAD / ISTOCK-GETTY IMAGES PLUS / GETTY IMAGES (GOLFBALL); USGA/JAN CULLEY (RODNEY LINGLE)

// INAUGURATION DAY

GCSAA names new board members at 2025 Conference

➔ GCSAA Members elected T.A. Barker, CGCS, superintendent at Fore Lakes Golf Course in Taylorsville, Utah, to a one-year term as president of the association at the 2025 GCSAA Conference and Trade Show in San Diego.

Barker is the 88th president in the association's history. He has been a member of the association's board of directors since 2018. A 21-year member of GCSAA, Barker is also a past president of the Utah GCSA.

Barker joined the grounds crew at Fore Lakes in 1995 and has been superintendent since 2006. A third-generation superintendent, he became exposed to the GCSAA at a young age when his father, GCSAA member Todd Barker, would take the family to the GCSAA show each year.

"This is one of the greatest honors

of my life," Barker said at the GCSAA Conference. "This organization is my professional home. The collective strength and passion of our members is what makes GCSAA exceptional."

In addition to Barker, chapter delegates elected Paul Carter, CGCS, superintendent at The Bear Trace at Harrison Bay in Harrison, Tenn., as vice president, and Marc Weston, CGCS, superintendent at Indian Hill Country Club in Newington, Conn., as secretary/treasurer.

Jeff White, CGCS, director of agronomy at Indian Hills Country Club in Mission Hills, Kan., will serve one year as the immediate past president, while Kevin Breen, CGCS, superintendent at La Rinconada Country Club in Los Gatos, Calif., retires from the board after serving as past president.



T.A. Barker, new president of the GCSAA, won the 2018 Herb Graffis Businessperson of the Year Award for his work growing the game in Utah.

PHOTO BY: TOM LEESACKIMOT PHOTOGRAPHY

Ask Thad

BY THAD THOMPSON

Superintendent
Terry Hills GC, Batavia, N.Y.



How was your 2025 GCSAA Conference experience? And tell us about your trip to "The People's Open" in Phoenix.

Power hours for education, a field trip with equipment techs, talking to all my vendors about upcoming projects, reconnecting with old and new friends alike and, of course, the Friends of *Golfdom* Party where I had to wear a Chiefs jersey again, the GCSAA Conference and Trade Show was a huge success both personally and professionally. It's still one of my favorite weeks of the year, and you get out of it as much as you're willing to put into it.

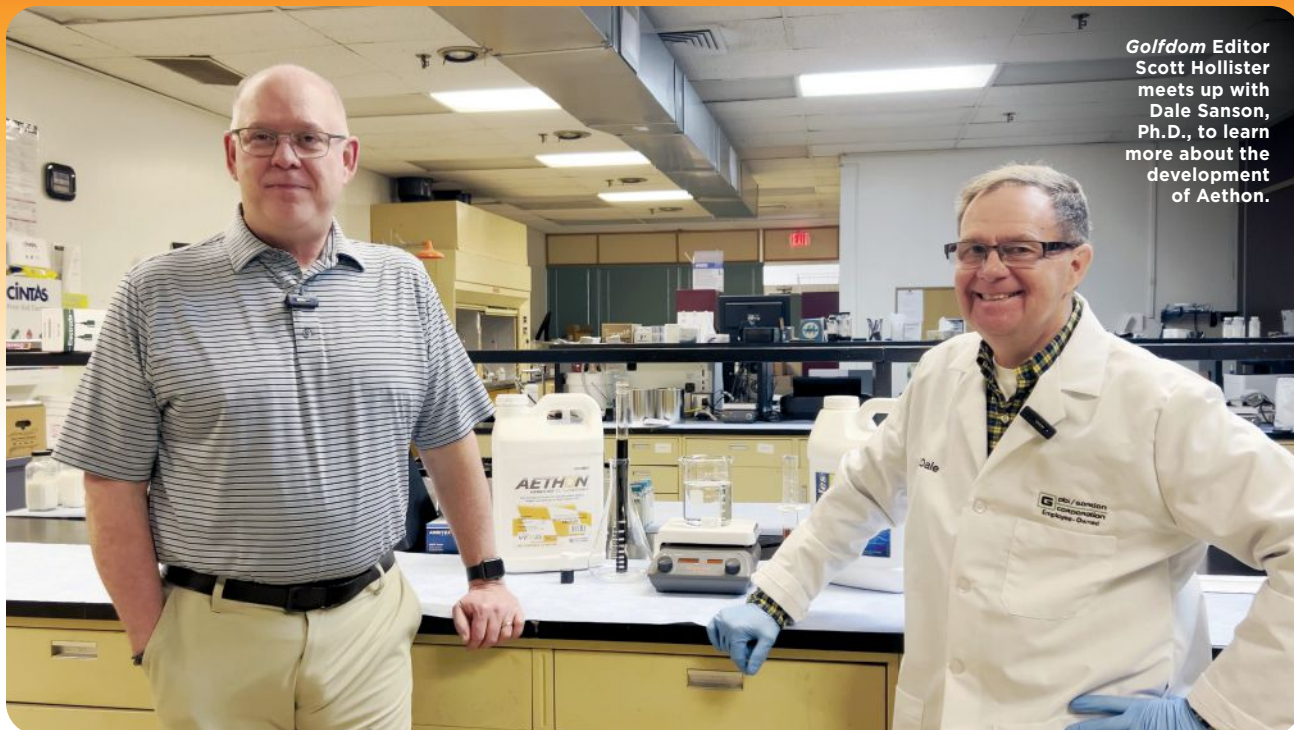
Free from the burden of wearing a Chiefs jersey, my brother Drew and I jetted to Phoenix for The Ewing Golf Getaway sponsored by Ewing Outdoor Supply. This included travel, first-class accommodations and meals, a pink ball golf tournament and the crown jewel: a day at the Waste Management Phoenix Open! We were in a second-story suite overlooking the drivable par 4, 17th hole.

The largest cheer of the day was for Peter Malnati, who Ewing sponsors. What a golf tournament. We were there on Friday, when the crowd was a bit more subdued. The golf is first-class, fun and dramatic to watch, but the people watching has to be the best I've ever witnessed. Guys in everything from top hats to red, white and blue shorts overalls to the ladies wearing dresses and heels to casual golf attire.

We met several people throughout the day who were also part of our group. Talking golf and tournament setup with other turf professionals in that setting is awesome and eye-opening.

Yes, all the bleachers and structures around the golf course are temporary and must be removed after the tournament. No, *Golfdom* wouldn't let me expense anything in the merchandise tent. Go Bills!

Got a question for Thad? Tweet to @TerryHillsMaint and @Golfdom or email Thad at thadthompson@terryhills.com



Golfdom Editor Scott Hollister meets up with Dale Sanson, Ph.D., to learn more about the development of Aethon.

Game-Changing Liquid Herbicide Now Available

Golfdom Editor Scott Hollister recently met with Dale Sanson, Ph.D., senior director of formulation development in compliance chemistry at PBI-Gordon, to learn about Aethon® Herbicide SL.

Scott Hollister: Most superintendents might have some memories of Aethon as a granular product that had an interesting evolution, so tell us about the history of the product and where we are today.

Dr. Dale Sanson: Turfgrass professionals who care for southern, warm-season grasses such as Floratam, Bitterblue and other improved varieties of St. Augustinegrass have a new tool to help control sedges, kyllingas and several broadleaf weeds.

Aethon was originally developed as a granular product with two active ingredients, Pyrimisulfan and Penoxsulam.

The active ingredient in combination on that granular application was designed for the southern market, and this is still for the southern warm-season turf, then migrated onto a fertility granule, a fertilizer. And from there we went on and we developed Aethon. This is a very unique formula.

The two active ingredients are typically formulated as an SC suspension concentrate, so they are suspended in a water-based system.

In this case, they're intimately dissolved together into a water-based system using new co-formula technology, along with the penetrant technology that allows those two active ingredients to be in that jug, chemically and physically stable together.

Scott Hollister: What sort of weeds is Aethon best targeting?

Dr. Dale Sanson: Dollarweed,

Doveweed, Virginia Buttonweed, Ground Ivy. It also controls yellow, purple and annual sedges. Green, false green, cockscomb and annual kyllinga and several labeled broadleaf weeds. Most likely you're going to have most everything covered that you're wanting to control. It's a full-service product for the southern market.

Scott Hollister: How does this do in the tank when mixed with other chemistries?

Dr. Dale Sanson: If you want to add a liquid fertilizer — there are lots on the market — it goes together nicely, very uniform, very clear. I would advise, in a big spray tank, up your agitation a little more to make sure you get a uniform mix. Look at this after a couple minutes, it's clearly uniform. It's a beautiful partner, you're guaranteed to have a successful day.

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Golfdom Gallery

GCSAA
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1 Reunion at GCSAA C&S Jerry Corbett, business manager, Albaugh Specialty Products, delivered a big hug to his friend and former coworker Erica Cardenas, marketing communications manager, Quali-Pro, at the Friends of *Golfdom* party.

2 Busy trip for you? At what is always a crazy-busy trade show, it was great to find time for this photo with (left to right) Kevin Stoltman, president and CEO, North Coast Media; Seth Jones, editor-in-chief, *Golfdom*; Rhett Evans, CEO, GCSAA; Jeff White, immediate past president, GCSAA, and CGCS at Indian Hills CC, Mission Hills, Kan.; and Scott Hollister, editor, *Golfdom*.

3 Rollin' with Roddy Reuel Heyden, U.S. Marketing communications manager, Nufarm, nabbed a selfie with Bill Roddy, group publisher, *Golfdom*, and Stoltman, at the Nufarm booth.

4 Petco Park party Tim Roethler, superintendent, Old Warson CC, St. Louis; Stoltman; Tim Demerath, VP of sales, PBI-Gordon; and Craig MacGregor, publisher, *Golfdom*, checked out PBI-Gordon's epic party at the home of the San Diego Padres.

5 Meet on the Midway We spotted Dave Waldmann, vice president of business development, Pure Insight; Carmen Magro, CGCS, Ph.D., CEO, Pure Insight; and Valentine Godin, president, Maya Global, at the Opening Ceremony on the USS Midway.

6 Team *Golfdom* ... assemble! Sporting their matching quarter-zips, the *Golfdom* team looked ready to fight off an interplanetary threat at the GCSAA Show in San Diego. From left to right are Jones; Stoltman; Hollister; Jake Goodman, Western regional sales manager; Roddy; Brian Davis, senior marketing and digital manager; Nader Hassen, account executive; Will Coughlin, digital media specialist; and MacGregor.

PHOTOS BY: GOLFDOM STAFF





7 When Irish eyes are smiling At the Friends of *Golfdom* party at The Field Irish Pub, we nabbed this photo with MacGregor, Stoltman, Alan FitzGerald, CGCS, MG, Rehoboth Beach (Del.) CC, Jim Ebsen, salesforce administrator, Turfco, and Scott Kinkad, executive vice president, Turfco.

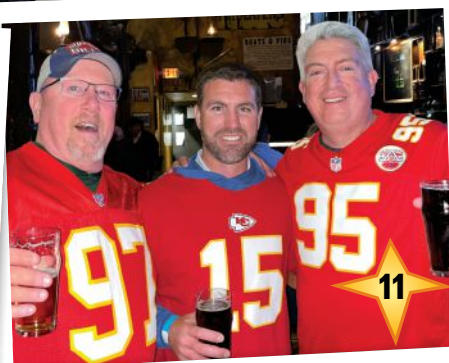


8 Are those ... Eagle's wings? Taken by the bartender just a few days before Super Bowl LIX, Craig Kight, Eagle Brook CC, Geneva, Ill., Jones, Chad Carpenter, Forest Park GC, St. Louis, and Mike Leech, Mississippi Valley GCSA, smile in front of what looks like green Philadelphia Eagle wings. *Foreshadowing!*



9 Shoulda gone to the Chiefs room Jones, MacGregor and Hollister treated Mike Sisti (center), sales effectiveness and training, Envu, and Alan Eife, commercial intelligence specialist, Envu, for a taste of Kansas City at San Diego's Kansas City Barbecue, also known as the "Top Gun" bar (Eife lives in Philly and is a die-hard Eagles fan and didn't seem at all bothered).

10 Good night, John Boy It was a '70s theme at the Nufarm party where Jones met up with Ken Barham, general manager, North America, Nufarm.



11 Another bet paid in full The Chiefs/Bills bet was once again paid off at the GCSAA show, this time with an additional Bills fan joining the fray. Thad Thompson, Terry Hills GC, Batavia, N.Y., and Patrick Joy, Boot Ranch GC, Fredericksburg, Texas, join Jones in Chiefs colors.

12 T.A. is no longer VP Congratulations to T.A. Barker (right) — winner of the 2018 Herb Graffis Businessperson of the Year award — for being elected the new president of GCSAA. The prez is pictured here with his family, wife Natalie and sons Peyton, Boston and Greyson.





"You haven't lived until you've filled up a big wheelbarrow with wet sand and pushed it uphill while standing in sand."

MATT SHAFFER, *director of golf course operations emeritus Merion Golf Club, Ardmore, Pa.*

The perfect bunker program

I am not sure why Seth ever asked me to write columns in *Golfdom* ... perhaps it's because I think unconventionally. For instance, he has asked me to write on the topic of bunkers this month! Anyone who has worked for me is laughing at the thought of that and saying, "Hang on!"

I have always fought how expensive golf has gotten and railed on the cost of perfection. There is absolutely no doubt that superintendents can do anything if they're given the resources.

Bunkers, in my opinion, have pushed the boundaries of out-of-control at a major cost to golf overall. When I was a young man edging bunkers with a half-moon edger and prematurely wearing out my Herman Survivor boots, I thought there has got to be a better way.

After a big rain, we'd fix all the washouts and then listen to the boss light us up because the sand distribution was out of kilter because we didn't shovel it from the bottom of the bunker back to the top. Out came the wheelbarrows.

You haven't lived until you've filled up a big wheelbarrow with wet sand and pushed it uphill while standing in sand. Or hand-raking bunkers when it was 85 outside the bunker and ridiculously hotter inside the bunker.

But for all you younger readers that never had to do any of that because riding bunker rakes with plows, reciprocators and edgers were invented by the time you entered the business — good for you!

By far, the best bunker invention was porous bunker liners. Goodbye bunker washouts! Prior to these, we had liners that were made by several companies, and we used sod staples to hold them in place. But if you lived in the north and the frost came,

out of the ground all those hundreds if not thousands of staples pushed out as well.

To solve this problem, we would put a dab of liquid nail on top of every staple. And if you ever caught a liner with a riding bunker rake, it was a monumental mess. One turn taken too tight and you're cussing up a storm because now the bunker rake is in park and you're once again playing with sand.

If golf is to become sustainable and affordable to the masses, then costly bunker programs need to be reconsidered. I always told my close friends, who nicknamed me "Nuts," that the perfect bunker program would be to only rake when crusty, spray weeds when necessary and only edge when they start to

get noticeably smaller. Who cares if they have ridges, are inconsistent, are wet and dry! They are hazards, for Pete's sake, on purpose.

Think of the man-hours you would save. But at the end of the day, we work for the members, and it is their demand to have perfection. Just remember, when they start squeezing you about your budget, let the bunkers go for a couple of weeks and tell them you are saving money. The budget rumbling will settle down, and you'll go back to perfecting a hazard.

Our bunkers at Merion were brutal because I had total disregard for their perfection. I cut the grass around them three times a year. The Pros lived in fear of losing a ball in the bunkers. Guess what? They avoided them. Just one of the few reasons +1 won it on a little dinky golf course that never played to 7,000 yards.

Yep, it is amazing that Seth lets me contribute to this magazine, but guess what? He is an out-of-the-box kinda guy as well! 🤖

Matt Shaffer, a longtime superintendent, is the owner of Minimalistic Agronomic Techniques (M.A.T.) He was previously the superintendent at The Country Club in Cleveland and is director of golf course operations emeritus at Merion GC, Ardmore, Pa., where he hosted the 2013 U.S. Open. Reach him at matthewshaffer@gmail.com.

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— **Randy Brehmer, CGCS**
THE FORT GOLF RESORT, INDIANAPOLIS, IN



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SUPER

Terry Kennelly, director of agronomy at Miakka GC in Florida, observes the bunker faces treated with LokSand.

Solutions

BY SETH JONES

It's your job to troubleshoot problems on your golf course. It's our job to keep you informed of some of the most innovative, cutting-edge solutions for your golf course. ¶ Only in this month's *Golfdom* will you find solutions for you to consider for bunker challenges, pathway problems and erosion failures. If you're just learning about any of these golf maintenance problem-solvers, remember us when you utilize them at your course.

Lok-ing up steep bunker faces

To demonstrate to attendees at the 2025 GCSAA Conference and Trade Show in San Diego what LokSand is capable of, the company invited attendees to kneel down, grab a handful of bunker sand and pick it up. Most of it would immediately fall out of their hand; the only sand that stayed was what was firmly in grasp.

Then, they'd ask attendees to grab a handful of sand treated with LokSand — a crimped fiber that can be added to any sand or soil. Much more sand stays in one's hand, like pulling a core from a green and seeing the dirt and sand attached to the roots.

"It's a little bit of a black magic product, to be quite frank," says Danny Potter, founder, owner and director of Centaur Asia Pacific, which represents products for golf, sports turf, nursery and lawn worldwide. "You don't get compaction. You get drainage ... you get firmness."

The product is 15 years old but has been sitting on the shelf until recently. Previously, it was used for soccer fields in the United Kingdom or on roads for overflow dirt parking lots. Now, the folks behind LokSand are eager to show superintendents how it can help alleviate trouble areas on golf courses.

The golf-LokSand connection began when

Australia's Graham Marsh, a former touring pro with a host of wins worldwide, was designing the New Course at Singapore Island CC in 2019. He asked Potter if he had a solution to keep the tops of bunkers from collapsing after heavy rains during the wet season.

"To be fair, you would need a crew of 10 running around with fly mowers to maintain these bunkers," Potter says. "They have these big, gnarly noses. I knew (about LokSand) and just thought outside the box."

Potter showed what LokSand could do by building a steep bunker with it and one without. Marsh walked along the top of the bunker without LokSand, and the top caved in. Then he walked along the top of the bunker constructed with LokSand.

"He's like, 'What the (heck) is going on here? What have you done?'" Potter laughs. "He jumped up and down on it, and it didn't move. It worked. Then he went and ordered two tons of the product and did all 27 holes of bunkers with it."

To be clear, LokSand is not meant to be hit from — a golfer would break their club, or worse, their wrist. It is meant to be a stabilizing material for areas that typically crumble based on gravity, wash out or struggle with perennial wetness.

Continued on page 16

PHOTO BY: GOLFDOM STAFF

// WINNING THE TURF WARS

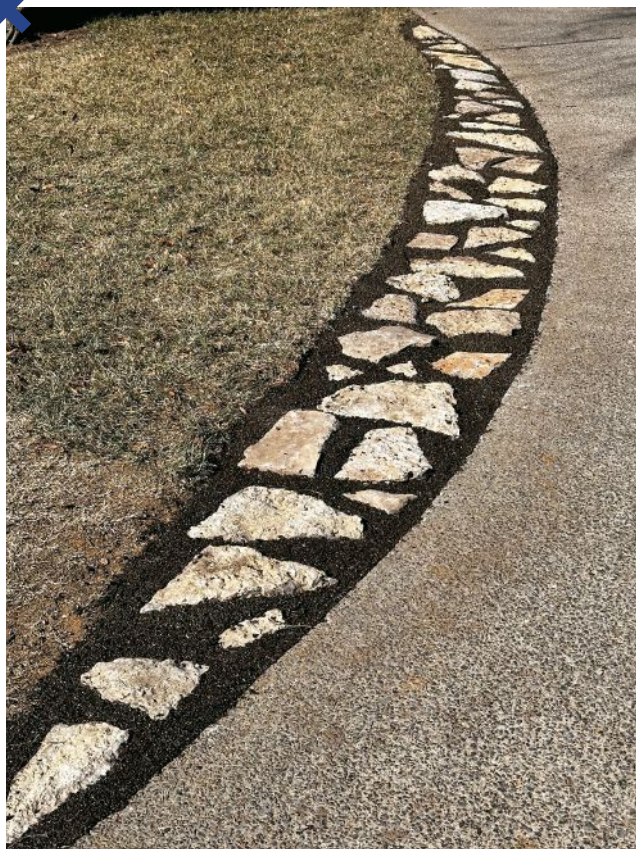
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"The things you could do with it are amazing," says Wayne Branthwaite, a former superintendent who has been the longtime vice president of Nick Price Golf Course Design. "It's not just a bunker edge product. It's a cart path product. It's a solution for hardscapes. It doesn't compact. You don't get all that dust like you do with coquina or concrete."

Potter says LokSand was recently used to build a playground in Melbourne, Australia, to solve the constant wear areas around the slides and swings. It was also used on a driving range near Brisbane Airport, built on a floodplain. When the tide comes up, it gets wet. The wet areas were replaced with rectangles of LokSand so grass could grow.

"It's like a ready-made root system. When the grass grows into it, because of those pore spaces, the roots can grow quickly through this and intertwine through the fibers," he says. "It's not just binding the soils together. It's giving the roots structure."

One American course utilizing LokSand is Miakka GC near Myakka City, Fla. A Fry/Straka Global Golf Course Design project in conjunction with Paul Azinger, construction of the course is ongoing. The bunkers emulate Australian bunkering using LokSand for the vertical face. If a shot hits into the vertical face of the bunker, the ball falls rather than ricochets.



At Hillwood CC, Kirk Gates installed flat rocks treated with Porous Pave on cart paths where golfers sometime stray from the path.

"It's a new method, to say the least," says Terry Kennelly, director of agronomy at Miakka with 40 years of industry experience at courses such as Inverness, Congressional, Concession and The Pelican on his résumé. "We've all seen that Australian look, but they've got the sand structure there that enables them do that. We don't have that in America. That, and we've had almost 90 inches of rain here. They don't get 90 inches in Australia."

"It's great to get a big project like Miakka," Potter says. "(But) that's only going to be one to five percent of the projects that we are going to do. The rest are going to be grass-covered steep faces, even straight faces. I see it helping the average Joe, the average golf course that comes back every year and keeps trying to find ways to grow grass on their bunkers and stabilizing those edges."

A labor saver and morale booster

If there's anything Kirk Gates hates, it's fighting the same problem over and over again. His previous position as superintendent at Belle Meade CC in Nashville presented him with that scenario.

A path was cut across a fairway in a landing area. Not wanting the ball to carom out of bounds, mulch was chosen for that path instead of other materials.

The problem? After every storm, he wasted hours of labor to collect the mulch and make the path look presentable again.

"We spent hours upon hours of labor remulching that," Gates says. "Finally, we installed Porous Pave; the ball doesn't react to it like it does on concrete or asphalt. It still looks as good today as the day I put it on over five years ago."

After 21 years at Belle Meade, Gates moved to a new club, Hillwood CC in Nashville three years ago. Like a dad who found a hundred different ways to put the same tool to good use, Gates found multiple applications for Porous Pave at Hillwood.

The club began a regrassing project last year to go from several varieties of bermudagrass to a monostand of TifTuf. While the course was closed for that project, Gates and his team tackled other projects, each utilizing Porous Pave. For example:

- A dilapidated walking bridge was reconstructed out of pressed decking. Knowing the bridge would eventually become slick from algae growth, they applied Porous Pave like it was carpet. "This will give us firm footing for members for years to come," Gates says. "It actually turned out really, really good."
- On areas where golfers commonly leave the cart path — curves, turns, etc. — Gates installed flat rocks and then coated them in Porous Pave to keep them stable. "Where you get one tire off the path, it creates a mud hole," Gates says. "Now, when you go off the path, you feel that wrapped stone and get back on the path."

• A turnaround was installed on No. 16 for members, and a cut-through to the shop was removed for the crew. After three weeks, they realized how much they needed the cut-through for maintenance and to service the comfort stations. With an op-

Continued on page 18

PHOTOS BY: POROUS PAVE



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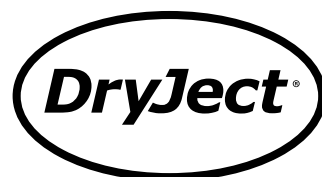
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// WINNING THE TURF WARS



To avoid a possible slippery scenario, the crew at Hillwood CC in Nashville applied Porous Pave to this newly constructed walking bridge.

Gates describes Porous Pave as a 50/50 mixture of crumb rubber and crushed granite. He either mixes it in a wheelbarrow or a mortar mixer. He says it's similar to spreading concrete. Pro tip: He suggests applying cooking oil to your shovel or mortar mixer before you start working with the material.

Gates looks back at the first time he used the material at Belle Meade to solve his mulch mess and guesses it saved thousands in labor costs from his budget.

"It was in a natural runoff area, so when we'd get heavy rains, it would pick all that mulch up and just push it into a big ol' pile on the cart path," he says. "(Fixing the problem) was a morale booster, for sure."

Continued on page 20

Continued from page 16

portunity to bring it back new and fresh, they installed a Porous Pave trail.

- Gates has also used the material around tee boxes where golfers walk

through native areas. And after installing huge stones as steps on the driving range tee, he added Porous Pave to the areas between the steps. "I keep finding things to use it for — it's a great product."

PHOTOS BY: POROUS PAVE

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// WINNING THE TURF WARS

Continued from page 18

A bioengineered, living shoreline

Nate Watkin worked for 15 years in South Florida as an assistant superintendent and then a superintendent. He knows well the challenges of trying to manipulate the effects of Mother Nature to maximize golf course conditions.

In late 2020, he made a career change and joined SOX Erosion Solutions, first as a regional expert and now as the company's global golf division manager.

"After installing four systems on the property I managed, I saw first hand the positive impact SOX had on our pond ecosystem," Watkin says. "We planted littoral vegetation in front of the system and within six months, wildlife was thriving. The opportunity to align myself with an environmentally focused company that wanted to grow awareness in the golf industry was something I could not pass up."

Watkin says much of what the company does is training on the installation of their system — to both contractors and superintendents — for courses that want to handle their erosion issues in-house. He describes the process as having five parts: installing anchors, then a rope system, then tethering the ropes



(Top) SOX Erosion Solutions in the process of being installed on the first hole at Addison Reserve. (Bottom) The end result of No. 1 on the Redemption Course.

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to a high-density polyethylene mesh, importing fill or dredging in material, then vegetation can be placed on top of the system and will root through the mesh.

"When we tether it back, it looks kind of like a taco," Watkin says. "Essentially, we're halting erosion and stabilizing the environment, and you can grass right over it. We're creating a bioengineered, living shoreline."

Watkin says the advantages are numerous, including a safer golf course, stability, improved water quality and a more aesthetically pleasing shoreline.

"We're turning water hazards into water features," he says.

Joshua Fleisher, director of golf course maintenance at the 27-hole Addison Reserve CC in Delray Beach, Fla., recently underwent a \$24 million renovation led by Rees Jones. It was completed in two phases — in 2023 and 2024 — and the installation of the SOX Erosion Solutions system was a small part of phase two.

"We had seen some major erosion on our lake banks," Fleisher says. "We're a direct-feed irrigation system. Basically, we feed no water into our lakes, but we pump from our lakes for all our common area irrigation."

While Fleisher was happy with how the renovation was going, the lake banks frustrated him, calling them "an eyesore." It was especially frustrating because the lake banks always looked worse

PHOTOS BY: SOX EROSION SOLUTIONS

in the winters — the dry season — when most members are at the club.

“The water level fluctuates up and down, up and down all year long,” Fleisher says. “Over the course of 25 years, we had some major erosion issues. We had done other erosion control measures before, but never one that had the versatility of SOX.”

The renovation of Addison Reserve was finished in November of last year, and Fleisher is thrilled with the results, including having his lake banks fixed. He is eyeing another area on the course where he plans to utilize SOX Erosion Solution.

“What I really loved about it is we have a couple areas that give us a really nice, big bull nose, kind of like an Augusta (National GC) lake bank, and then we have a couple areas that give us a really nice, subtle, gentle slope, four or five feet out,” Fleisher says. “It’s a solid product. We feel like our lake banks are going to be in really



In this before, during and after series, a golf course creek’s banks is rebuilt with SOX and then grassed over.

great shape for the next 10 to 15 years.”

Watkin adds that SOX Erosion Control’s versatility in how it can look is one of its key strengths for the golf market. If a course is 100 years old, it will still look 100 years old when the system is complete.

“We can stabilize any urban environment to any slope,” he says. “An older course doesn’t want straight, manicured lines. They want a natural look. We’re able to provide that and prevent erosion.”



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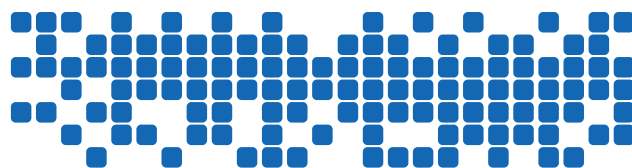
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The Simulator Superintendent

Q&A BY SETH JONES

The golf is simulated, but the turf is real — meet the man tasked with maintaining TGL's turf



Tanner Coffman

Tuesdays in January can be pretty bleak, especially for sports fans. The weather is cold throughout most of the country, and the sports schedule also cooled off.

It's hard to justify that trip to the local Buffalo Wild Wings when the TVs are mostly set to reruns of the weekend's action.

Lo and behold, here comes TGL — Tomorrow's Golf League — to help shake off some of those sports winter doldrums. Broadcast live on ESPN and featuring some of the game's best players mic'd up, it's a new spin on an old game. By now, it needs no introduction. The inaugural season concludes March 25 and features an impressive playing atmosphere inside the SoFi Center in Palm Beach Gardens, Fla.

Good news for this magazine: Even televised simulator golf needs a superintendent. That's because the players are hitting most of their shots off natural grass, in this case, Tahoma 31 bermudagrass. *Golfdom* caught up with the man responsible for the playing conditions for TGL: Tanner Coffman, director of turf management.

Golfdom: Tanner, thanks for taking the time for *Golfdom*. To start, can you tell me how you got into the business?

Tanner Coffman: I've been in the turf industry pretty much since my senior year of high school. That goes back 17 years at this point. Back when I was going into school, I really fell in love with soil chemistry and soil science and thought I wanted to be a farm consultant. I thought it'd be so cool to travel around, go to different farms, take soil tests, make recommendations to farmers about crop rotation,

what chemicals they need to be using and all that kind of fun stuff. On that journey, I found out that superintendents basically do that same exact thing. It's just the crop is grass, not soybeans or corn. And then it kind of brought in an athletic aspect. As a kid, I loved sports. So, being able to connect both of those into a career really seemed uplifting.

Golfdom: What has been your career path?

Coffman: I started off the turf journey in golf. I did golf for a handful of years — six or seven — doing different golf courses out in Tennessee. Then I kind of fell into a sports turf atmosphere. I got into minor league baseball, then jumped out of that and into Major League Soccer. I worked on an expansion team, Austin FC, built a brand new stadium and built the practice facility out there as an assistant director and then became the director at Colorado Rapids (MLS). So, lots of moving around the country — Salt Lake, Austin, Denver, Tennessee, Florida.

Golfdom: How did you end up latching on with TGL?

Coffman: Honestly, it came as a surprise. While I was out in Colorado, I got a message from a recruiter, and she was like, "We're doing this thing, Tiger Woods and Rory McIlroy are backing it ... It's indoor golf, but we're using real grass, and there's tons of technology." I just had to sit there, and I thought, I think this is spam! Someone stole the algorithm of my Facebook or my Twitter account and was just throwing keywords at me. I had to read that email a couple of times before I was convinced that, OK, maybe this is legit.

Continued on page 24



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Continued from page 22

I Googled what TGL was, and this was almost two years ago, so there wasn't much on the internet about what it was. It was just a concept at that point. But thankfully, TGL had already been working with Dr. Trey Rogers (Michigan State). I knew him, so I reached out to him and got his clarification on, you know, what exactly is this? Is it even possible? They're talking about greens going up and down and turf flying in and out of this building? What's the deal here? Once I started talking to people, I thought ... this is a chance worth taking, let's go ahead and try it.

Golfdom: I've seen the broadcasts on ESPN, but outside of those days, what does the job entail? What is your nine-to-five like?

Coffman: I'm still trying to figure that out. TMRW Sports, we're a startup company, and we're still small, even though we're doing such big things to a large audience. What I do is pretty much no different than a traditional golf course superintendent. We have just over 2,000 square feet of natural turf, which, compared to the hundreds of acres that some golf courses have, that's nothing. However, that 2,000 square feet is on prime-time TV every week, versus some of these golf courses having an entire year to lead up to their big tournament.

I'm working with the grass, determining if this is a divot that we need to replace with a plug or let it grow in. We've got grow lights. Do we want to go with red light views this week versus blue light views? Or do I want to get the high-pressure sodium light out so it gets a little bit of heat to the grass? All those crazy agronomic things — that's my day-to-day. And then, obviously,



"Golfers are very educated about their playing surface. When you're talking about two of the best players in the world? That definitely puts some pressure on," Coffman says.



Coffman is mostly a one-man band except for match days, when he has crew members from Seminole, the Club at Ibis and Boynton Beach come in to assist him.

the rest of the playing surface is artificial turf, and a lot of people have the misconception that you just install that stuff and you're done. It's actually very high maintenance, almost too high, in my opinion. I'm in there every day, cleaning it, brushing it.

Golfdom: Can you describe where your nursery is and how you transport the turf to the stadium?

Coffman: The nursery is about 100 yards away from the door of SoFi Stadium. I'm kind of tucked away in the corner. I've got a little storage building and a big pad. It's a unique nursery because it's a concrete slab versus most golf courses where, obviously, there's a root zone. There's dirt underneath it. For us, I'm sure you've seen we've got these trays that come in, they are dangling from the ceiling, and they drive over to the tee boxes. Those trays, there's a big misconception — they're a foot tall, but I only have about two-and-three-quarters inch of sod layer in there, so the rest of it is just empty.

Getting those pieces of turf off the ground, rolled up nice and clean and then placed into one of these trays is a pretty daunting task because this is sod grown on plastic, which is very thick, very heavy. It's about 18 pounds per square foot, and I'm just one person. That's a lot of grass to move. Usually, I just use a forklift and bring it into the building and get it positioned just right to our trolley system. That's positioned directly over each tee box. Drop that chain down, hook it up onto four different hooks hidden underneath the turf and bring it out.

Golfdom: Tiger Woods and Rory McIlroy are backing TGL ... how involved were they in the selection of grasses, the way the bunker plays, etc.? And what is it like having these megastar golf-

Continued on page 26

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TGL's turf is grown on a concrete slab located 100 yards away from SoFi Stadium. The facility includes a storage building.

Continued from page 24

ers so involved in what you're doing?

Coffman: I didn't need them to come and tell me that they were picky — because I just knew golfers, in general, are very picky about their grass. Golfers are very educated about their grass and playing surface, and when you're talking about two of the best players in the world, they know. So that definitely put some pressure on me.

We had multiple players who are involved in the TGL come through our training labs and testing facilities where we had grass, and the feedback was always really good. They'd hit their first iron shot into a screen, and then they kind of turn around, and even though they're surrounded by all this technology, they kind of chuckle and grin. The feel is just as if you're on a traditional course. Everybody's first time hitting the ball off the tee box is always when I'm trying to be close. I want to hear what they say about it.

It's really funny, Tiger's first trip, I feel like I didn't sleep for an entire week. I was just racking my brain — "What else can I do to make this place more perfect so he won't find something that's wrong? I want him to love it and enjoy it." The hours I put in that week before his first visit to actually play the simulator were wild.

He didn't really make too many comments about the grass, except for the rough. He hit a ball out of the rough, then he turns and says, "Man, that was perfect." And then he goes and grabs 10 other balls, and he starts placing the balls into the rough. He probably talked about the rough for a good five minutes, just blown away by how good the rough was. And in my head, I was like, "Cool, but that's the least amount of worry that I had in my head was the rough!" Because you just let the rough grow, where there's

so much more that goes into the fairways and then to the green.

I spent all my time on that. And the thing that I spent the least amount of time on is what Tiger thinks is awesome.

Golfdom: I know you've hosted some big games in your career, but that had to be a surreal moment to have Tiger there testing your handiwork. I bet your heart rate was crazy.

Coffman: If you were listening to my heart rate, you wouldn't even know it was a heart rate! I was sweating. But they've been in enough now that it's a little bit more relaxed. I still try to make it as perfect as possible, but I can sleep the night before.

Golfdom: No one has ever had this job before, you're essentially inventing it yourself. What are the challenges that are unique to this job? Do you have a crew?

Coffman: That's a topic of discussion right now. I'm a one-man band, except for on match

nights; I have a really good team that comes in and helps me.

On a match day, we have about three to four hours in the morning where the teams are open to come and practice, and they usually take advantage of that, so that puts a whole other set of divots on the ground. The grass trays are getting beat up, the green is getting trampled on, so it's speeding up every time that we're using it.

Golfdom: I've seen enough professional golf that I know how hard some of these guys practice. A guy like Vijay Singh lives on a practice putting green. And this is broadcast on ESPN with a huge audience. I imagine they want to practice as much as possible because it's a new format, and they don't want to get embarrassed on national TV.

Coffman: I joke about it, but it's really not a joke. I tell them, I can only do my job when you're not here. And that's not just the players. That's the technology team that's testing calibration and the broadcast team that's testing their spider cams and their rovers. I can only do my job when they're gone.

We have players coming in throughout the week that want to get better and learn. And this past week, it's been raining every day. I feel like we've had every golfer come in like, "Hey, it's raining today. I'd rather come in here and hit balls instead of go out to the range." And we're like, "Come on in!" So, yeah, that scheduling aspect of it — especially being by myself — is pretty harsh. **G**

Editor's note

Visit **Golfdom.com** to view the complete interview with Coffman. Additional content includes Coffman discussing how he speeds up and slows down the green, the most valuable tool he has at his disposal and what it feels like to take aim at the SoFi Stadium screen.



Super Science

// MAXING OUT THE MINIMUM

MINIMUM MOWING, FERTILIZER AND IRRIGATION COST ESTIMATES

By Mike Kenna, Ph.D.

Nine turfgrass scientists roughly estimated the minimum costs required to fertilize, irrigate and mow turfgrasses using climate data, turfgrass physiology information and resource costs.

Turfgrass type, maintenance practices, local climate and soil conditions impact golf course mowing. The frequency of mowing turfgrass primarily depends on the species or variety and the height at which it is cut, with taller, slower-growing types requiring significantly less mowing than shorter, faster-growing ones. More frequent mowing of turfgrass increases energy use, emissions, labor and costs, making it crucial for managers to set mowing standards that balance functional requirements with growth optimization.

Turfgrass yield measurements estimate management inputs like nutrients, mowing and irrigation. Due to turfgrass often being in a state of nitrogen deficiency, managing it economically involves calculating the minimum nitrogen input costs without compromising performance or aesthetics.

The PACE Turf model estimated turf growth potential (0 to 100 percent) for eight U.S. cities. Nitrogen (N) estimates were derived by multiplying the relative growth potential by a conservative estimate of maximum monthly N use for cool- and warm-season grasses (1 lb. 1,000 ft⁻²) based on a 0.82 pounds dry matter per 1,000 ft² daily growth rate and tissue content of 4 percent N. The estimated N use was then used to calculate a per acre cost based on an N source at \$0.50 per pound (see Table).

Although the actual minimum costs vary regionally, they estimate mowing golf putting greens require about \$34 per acre per month, while other areas cost less than \$11 per acre per growing month. Turfgrass fertilizer could cost \$22 or less per acre per growing month. Irrigation costs vary widely, ranging from \$276 to \$3,672 per acre annually. 

Reference

Soldat DJ, Brosnan JT, Chandra A, Gaussoin R, Kowalewski A, Leinauer B, Rossi F, Stier J, and Unruh, JB. 2020. Estimating economic minimums of mowing, fertilizing, and irrigating turfgrass. *Agriculture & Environmental Letters*. 2020;5:e20032. <https://doi.org/10.1002/ael2.20032>

Estimated annual turfgrass N use for eight U.S. cities

Estimates	Corvallis, Ore.	Dallas, Texas	Fort Lauderdale, Fla.	Ithaca, N.Y.	Knoxville, Tenn.	Las Cruces, N.M.	Lincoln, Neb.	Madison, Wis.
Cool-season N use, lbs. 1,000 ft ⁻²	4.7	5.8	0.0	4.4	5.8	5.9	4.8	4.5
Warm-season N use, lbs. 1,000 ft ⁻²	0.0	4.5	7.3	0.0	2.7	3.3	0.0	0.0
N use, lbs. 1,000 ft ⁻²	4.7	10.3	7.3	4.4	8.5	9.2	4.8	4.5
Annual cost of total N, \$ acre ⁻¹	102	224	159	95	185	199	104	99

NEWS UPDATES



USGA DEBUTS NEW MOISTURE METER

At the 2025 GCSAA Conference and Trade Show, the USGA unveiled the USGA Moisture Meter. According to the USGA, the new tool provides golf course superintendents with data regarding soil moisture, temperature and salinity.

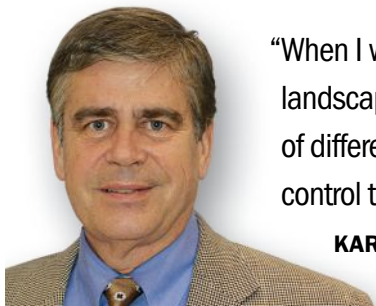
That data is uploaded into the USGA's DEACON technology platform, creating a digital record that can manage usage, plant health and course playability. The soil moisture sensors in the new tool are supplied by METER Group.

"The USGA Green Section is fully committed to providing superintendents with the best science, best practices and best tools to meet the expectations of golfers, golf course leadership and course owners," said USGA CEO Mike Whan.

The meter is available at gsshop.usga.org. USGA will re-invested proceeds into the support of golf's conservation goals.

“WHILE ANNUAL NITROGEN REQUIREMENTS FOR ESTABLISHED BERMUDAGRASS ARE WELL-STUDIED, OPTIMAL REQUIREMENTS FOR ESTABLISHING SEEDED BERMUDAGRASS REMAIN UNCLEAR.”

Jada Powlen, Ph.D. and Cale Bigelow, Ph.D.
(see story on page 29)



“When I was walking through the lawn and landscape stores, I was struck by the number of different products described as providing control to a broad spectrum of diseases.”

KARL DANNEBERGER, PH.D., *Science Editor*

The rise of fungicide-resistant bluegrass

Early spring is like Christmas time in lawn and landscape stores across the country. Strolling through these stores, you’ll see a plethora of products designed to give you that green dense lawn or a new landscape. The products are brightly packaged and displayed to target and attract buyers. The essential products used in lawn care like fertilizers, insecticides, herbicides and combinations of these products are prominently displayed on the shelves and in bags organized across the floor.

Walking between the organized stacks of products is like walking through a maze; a different product at each turn.

Increasingly encroaching through these stacks and on the shelves are lawn disease products. Although not considered a major treatment or application like fertilizers, herbicides or insecticides, fungicides are gaining prominence.

Disease control is not part of the vast majority of lawn care programs. It has been an extra treatment at a premium cost for the most part. A significant advancement in Kentucky bluegrass lawn maintenance was the development of melting-out- or leaf spot-resistant cultivars in 1947.

That first Kentucky bluegrass cultivar was known as ‘Merion’. It was selected from Merion Golf Club in Ardmore, Pa., in the mid-1930s from a small patch just off the 17th tee, by the golf course superintendent at the time, Joe Valentine.

Merion led to the classification of improved Kentucky bluegrass cultivars. These improved cultivars were resistant to the springtime disease melting-out or leaf spot (caused by the pathogens *Bipolaris* and *Drechslera* spp.) Cultivars susceptible to these diseases fell into the ‘common’ Kentucky bluegrass cultivars. Examples of common cultivars were ‘Park’ and ‘Kenblue.’

Since then, the Kentucky bluegrass cultivars have been further categorized, but the two major categories have improved and become standard. With improved cultivars, the need for controlling leaf spotting with fungicides was limited.

With leaf spot being the major disease and controlled through resistant cultivars, the remaining diseases were considered minor problems. Minor diseases were controlled through cultural practices like mowing, fertilization and irrigation. Additionally, making a fungicide treatment for a lawn disease

was prohibitively costly at the time; for the most part, fungicides just a decade or more ago were branded or on patent. This meant that for the end user or homeowner, these products were costly and, for the most part, needed to be applied by a trained or licensed pro.

In the last 20 years or so, we have seen an increase in what used to be considered minor diseases besides melting-out and leaf spot infecting lawns. Diseases like dollar spot, red thread and brown patch are becoming more common lawn problems.

A number of fungicides have come off patent in the last decade or two and are produced as generics. This has resulted in reduced price and availability for the active ingredient.

When I was walking through the lawn and landscape store, I was struck by the number of different products described as providing control to a broad spectrum of diseases. Under the banner of broad spectrum or systemic control of diseases was a range of active ingredients in the various products. The fungicides ranged from thiophanate-methyl in one product to propiconazole in a second and, finally, azoxystrobin in the last.

Of the fungicides mentioned, the benzimidazoles (ex, thiophanate-methyl) and QoIs (azoxystrobin) are considered the highest risk to develop resistance due to single-gene resistance mechanisms, with demethylation inhibitors like propiconazole less likely for rapid resistance development when used repeatedly.

It strikes me that as fungicides become widely available for use for the general population, resistance will become an issue, affecting some of these fungicides through potential indiscriminate use. **G**

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//THAT'S WHERE WE WANNA GO

How much Nitrogen is needed to establish seeded bermudagrass?

By Jada S. Powlen, Ph.D., and Cale A. Bigelow, Ph.D.

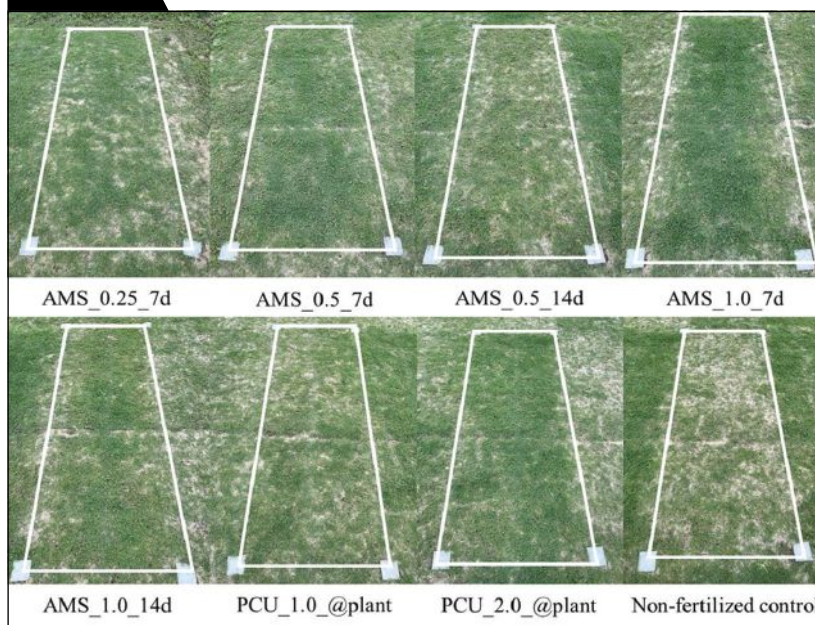
Common bermudagrass (*Cynodon dactylon* L.) is used on golf courses in temperate regions. Historically, seeded bermudagrass was considered inferior to vegetative hybrid varieties due to lower turf quality. However, genetic advancements have improved the quality of seeded cultivars, making them comparable to vegetative ones (19, 20 and 21). Turf managers increasingly utilize seeded bermudagrass for its flexibility in establishment, greater genetic diversity, improved winter hardiness and lower establishment costs (7, 24 and 29).

While annual nitrogen (N) requirements for established bermudagrass are well-studied, optimal N requirements for establishing seeded bermudagrass are unclear (8, 10 and 26). Previous studies suggest applying 1.0 lbs. N per 1,000 ft² every 15 days from seeding until mid-September (24) or using the same monthly N rate after seed emergence until four weeks before an anticipated hard frost (23 and 25).

Although applying 1.0 lbs. N per 1,000 ft² every four weeks after emergence is recommended, some turfgrass managers use higher rates, up to 1.0 lbs. N per week to hasten canopy coverage (12 and 13). However, frequent high N applications with soluble sources can lead to poor rooting, excessive shoot growth, reduced rhizome and stolon mass, water quality issues from runoff and leaching and unnecessary economic costs due to wasted fertilizer and labor (6).

Reducing application frequency and using controlled-release fertilizers may lower total nitrogen (N) requirements during establishment and reduce off-target N movement (2, 5, 14 and 15). A two-year field study was conducted

FIGURE 1



A two-year field study was conducted to determine the optimal N establishment program for a seeded bermudagrass cultivar on native soil, using two N sources with varying application rates and frequencies.

to determine the optimal N establishment program for a seeded bermudagrass cultivar on native soil, using two N sources with varying application rates and frequencies.

MATERIALS AND METHODS

A two-year field study was conducted in the summer of 2020 and 2021 at the William H. Daniel Turfgrass Research and Diagnostic Center in West Lafayette, Ind., on Starks silt loam soil with a pH of 7.1 and 5.2 percent organic matter. 'Rio' bermudagrass was seeded at 1.0 lbs. pure live seed per 1,000 ft² using a drop spreader, with seeds polymer-coated by the manufacturer. The area was covered with a vegetative blanket to prevent seed movement, which was removed after germination (~21 days). Light and

frequent irrigation maintained soil moisture until germination.

The study evaluated eight granular nitrogen (N) grow-in programs, varying in N source, application rate and frequency. Fertilizer sources included ammonium sulfate (21-0-0) and polymer-coated urea (44-0-0). Total N application ranged from 0.0 to 6.0 lbs. N per 1,000 ft², with treatments applied at planting or seven- or 14-day intervals after germination. Weather data were monitored using an on-site station.

Fertilization began on June 3 of 2020, and ammonium sulfate (AMS) applications were repeated on June 26, July 6, 14, 20 and 27. In 2021, fertilization started on June 9, with repeat applications on July 2, 9, 16,

Continued on page 30

TABLE 1

Nitrogen (N) application rates and application frequencies using ammonium sulfate (AMS) or polymer-coated urea (PCU) applied to seeded bermudagrass amongst various days after planting (DAP).

Avg. treatment date (DAP) ^a	AMS _0.25_7d ^b	AMS _0.5_7d	AMS _0.5_14d	AMS _1.0_7d	AMS _1.0_14d	PCU _1.0_@ plant	PCU _2.0_@ plant	Non-fertilized control
lb N 1,000 ft ⁻²								
0	0.25	0.5	0.5	1.0	1.0	1.0	2.0	
23	0.25	0.5		1.0				
32	0.25	0.5	0.5	1.0	1.0			
39	0.25	0.5		1.0				
46	0.25	0.5	0.5	1.0	1.0			
53	0.25	0.5		1.0				
Total	1.5	3.0	1.5	6.0	3.0	1.0	2.0	0.0

^a Granular fertilizer applications were applied on June 3 (at planting) and 26; July 6, 14, 20 and 27 in 2020; and on June 9 (at planting) and July 2, 9, 16, 23 and 31 in 2021.

^b Individual application rates of AMS or PCU ranged between 0.25 to 2.0 lbs. N 1,000 ft⁻².

TABLE 2

Days to achieve 50 percent green coverage (GC₅₀), 75 percent green coverage (GC₇₅) and 90 percent green coverage (GC₉₀) for various nitrogen (N) rates and frequencies with ammonium sulfate (AMS) or polymer-coated urea (PCU) applied to seeded bermudagrass in West Lafayette, Ind., during 2020 and 2021.

Fertilization program ^a	2020			2021		
	GC ₅₀	GC ₇₅	GC ₉₀	GC ₅₀	GC ₇₅	GC ₉₀
days						
AMS_0.25_7d	22.5 b	26.1 b	30.4 b	26.2 bc	30.5 cd	40.4 ab
AMS_0.5_7d	21.6 bc	24.5 cd	27.9 cd	24.3 de	27.9 ef	32.7 c
AMS_0.5_14d	21.8 bc	24.8 bcd	28.3 cd	27.1 b	32.5 b	39.1 abc
AMS_1.0_7d	21.0 cd	23.6 d	26.5 d	23.1 e	26.8 f	34.0 bc
PCU_1.0_@plant	21.5 bcd	25.1 bc	29.4 bc	25.6 cd	31.3 bc	38.5 abc
Non-fertilized control	24.1 a	27.9 a	32.6 a	30.0 a	35.1 a	41.4 a
P-value	**	***	***	***	***	*

Note: Means in the same column followed by a common letter were not significantly different according to Fisher's protected least significant difference ($P < .05$). Each value represented the average of four replications.

^a See Table 1 for N application rates and frequencies using AMS or PCU applied to seeded bermudagrass planting.

*, **, *** Significant at the .05, .01, and .001 probability level, respectively.

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23 and 31. We applied irrigation (0.2 inches) after each N application. We used a postemergent herbicide (carfentrazone) to control broadleaf weeds and manually removed annual grassy weeds.

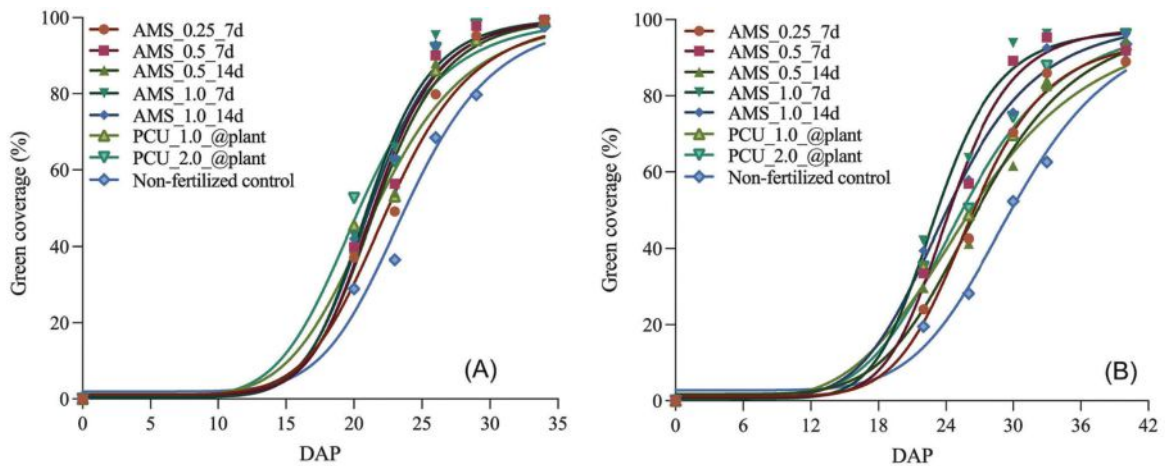
The research team first mowed plots ~30 days after planting (DAP) at a height of 0.5 inches with clippings collected. We then mowed every 5–7 days thereafter. In 2021, we measured

dry matter yield (DMY) at 47 and 54 DAP to assess how N programs affected mowing requirements. We mowed the turf, collected leaf tissue, dried it at 155 degrees F for five days and calculated DMY as lbs. per 1,000 ft² per day.

We assessed green coverage using digital image analysis, capturing images approximately every five days after germination (18). We used a Canon PowerShot G12 camera and a light box with LED lights to ensure

consistent lighting. To calculate the percent of green coverage, we used the Turf Analyzer software (17) and establishment rates for 50, 75 and 90 percent green coverage (GC₅₀, GC₇₅, GC₉₀) estimated using a four-parameter sigmoidal regression model in GraphPad Prism (4).

The team modeled the relationship between days to 90 percent green coverage, total nitrogen (N) rates and average dry matter yield (DMY) using

FIGURE 2

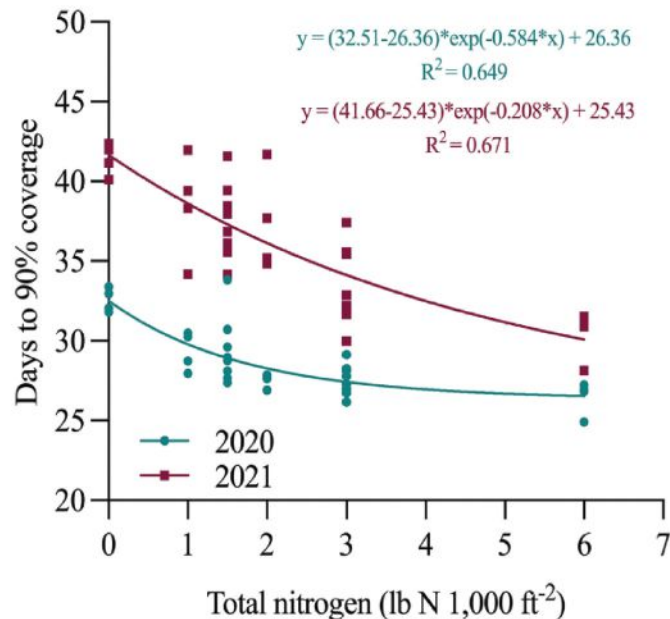
Four parameter sigmoidal regression model for percentage bermudagrass coverage as determined by digital image analysis among nitrogen (N) fertilization programs using AMS applied every seven or 14 days after planting (DAP) with application rates ranging from 0.25 to 1.0 lbs. N 1,000 ft⁻², or PCU applied only at seeding at 1.0 or 2.0 lbs. N 1,000 ft⁻² in 2020 (A) and 2021 (B).

an exponential decay equation. Linear regression was applied to evaluate the relationship between total N rates and average DMY. We conducted the study in a randomized complete block design with four replications. Plots measured 3 × 8 feet with 1-foot borders, and data were analyzed using analysis of variance (ANOVA) with significant differences determined by Fisher's LSD test at $P < .05$.

ESTABLISHMENT AND RELATIVE GROWTH

Seeded bermudagrass establishment was influenced by year, total N rate and application frequency. The establishment was five to 10 days slower in 2021 compared to 2020, likely due to environmental differences (Table 2). In 2020, the average daily temperatures 60 days after planting (DAP) were 64.5 degrees F (minimum) and 87.3 degrees F (maximum), with 5.3 inches of rainfall and 1,578 growing degree days (base 50 degrees F). In 2021, temperatures were similar (64.4 and 83.4 degrees F), but rainfall was higher (8.7 inches) and growing degree days were lower (1,474), likely contributing to the slower establishment.

The non-fertilized control had the slowest establishment rate for GC₅₀.

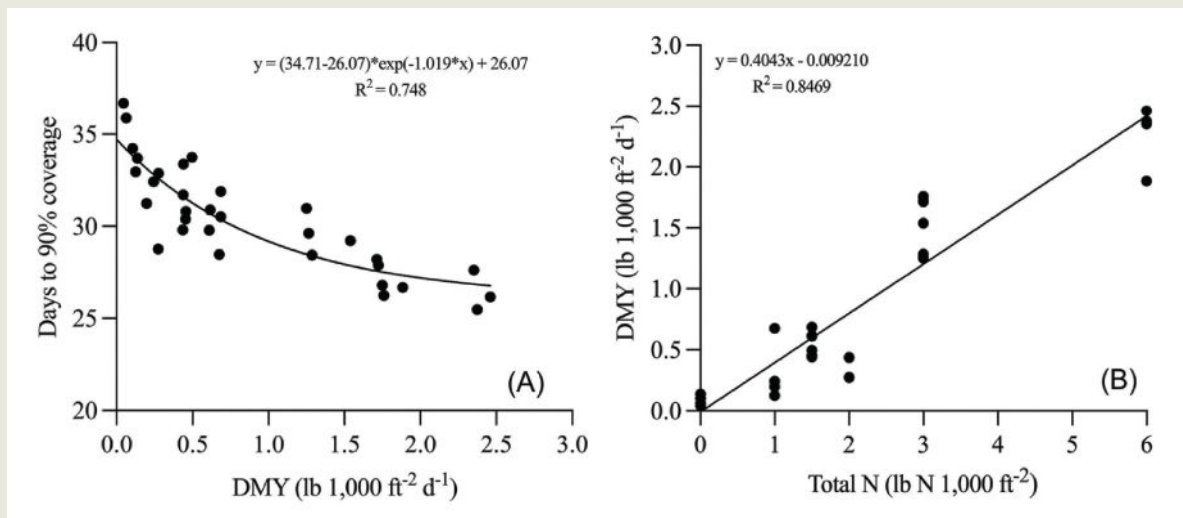
FIGURE 3

Relationship of total nitrogen (N) among eight fertility programs and days to 90 percent green coverage in 2020 and 2021 as calculated using an exponential decay model. See Table 1 for N application rates and frequencies using AMS or PCU applied to seeded bermudagrass planting.

GC₇₅ and GC₉₀ compared to all nitrogen (N) programs (Table 2). For N fertilizer

treatments, the 2020 time to green
Continued on page 32

FIGURE 4



Relationship between average dry matter yield (DMY) 47 and 54 days after planting and days to 90 percent green coverage for eight grow-in fertility programs as calculated using an exponential decay model (A) and the relationship of total N applied for eight fertility programs and average dry matter yield (DMY) calculated using simple linear regression (B). See Table 1 for N application rates and frequencies using AMS or PCU applied to seeded bermudagrass planting.

Continued from page 31

coverage (Figure 1) was the following:

- GC₅₀: Ranged from 20.1 to 24.1 days across treatments. PCU_2.0_@plant reduced days to GC₅₀ compared to AMS_0.25_7d, AMS_0.5_7d, and AMS_0.5_14d.

- GC₇₅: Ranged from 23.6 to 27.9 days. PCU_2.0_@plant and AMS_1.0_7d reduced GC₇₅ by ~2.1 days compared to PCU_1.0_@plant and AMS_0.25_7d.

- GC₉₀: Ranged from 26.5 to 32.6 days. AMS_1.0_7d and AMS_1.0_14d reduced time to GC₉₀ by 5.7 days compared to the non-fertilized control.

In 2020, all treatments achieved 100-percent green coverage (data not shown). Fertilization programs using AMS (2.0, 3.0 and 6.0 lbs. N per 1,000 ft²) and PCU (2.0 lbs. N per 1,000 ft² applied at planting) reached GC₉₀ in similar time frames (Figure 3).

The times to green coverage in 2021 were slightly slower (Figure 2):

- GC₅₀: Ranged from 23.1 to 30.0 days across treatments.

- GC₇₅: AMS_0.5_7d and AMS_1.0_7d reduced time to GC₇₅ by 7.8 days compared with the non-fertilized control.

- GC₉₀: Ranged 32.7 to 41.4d for AMS_0.5_7d and non-fertilized control, respectively. Differences in establishment time between PCU treatments were not observed in 2021.

For dry matter yield (DMY) measured in 2021, AMS_1.0_7d showed an increase of 97 and 94 percent compared with the non-fertilized control at 47 and 54 days after planting (DAP), respectively (Table 3). In 2021, an exponential decay model evaluated the relationship between DMY and GC₉₀. The results demonstrate that fertilization programs with higher rates of total nitrogen successfully reduced the time to reach GC₉₀. Simple linear regression showed that during the first 60 days after planting (DAP), DMY increased by 0.4 lbs. per 1,000 ft² per day for every 1.0 lbs. of total supplemental nitrogen applied, suggesting a correlation with accelerated green coverage.

DISCUSSION AND CONCLUSION

Establishing bermudagrass from seed offers turfgrass managers greater flexibility in renovation timing, simpler soil preparation and potential cost savings compared to using sod or sprigs

(24). However, nitrogen (N) is crucial for seedling growth, and there is often a temptation to apply it excessively (e.g., 1 lbs. N per 1,000 ft² per week) in hopes of quickly achieving full green coverage.

This study confirms that while N fertilization is vital during seedling establishment for promoting growth and coverage, over-application can lead to increased dry matter yield (DMY), requiring more frequent mowing without hastening the time to 90 percent green coverage (GC₉₀). Programs like AMS_0.5_7d, AMS_1.0_14d and PCU_2.0_@plant, which involve less frequent N applications or lower total N, achieved similar milestones in ground coverage (GC₅₀, GC₇₅ and GC₉₀) as the more intensive AMS_1.0_7d program but with reduced mowing needs and overall N input.

Although the study did not measure this directly, observations suggest that programs with reduced N applications meet coverage milestones at similar rates and improve initial canopy density and overall turf quality compared to lower N rates or no fertilization.

Research has been conducted on

TABLE 3

Seeded bermudagrass dry matter yield for eight grow-in nitrogen (N) fertilization programs using ammonium sulfate (AMS) or polymer-coated urea (PCU) in West Lafayette, Ind., 47 and 54 days after planting (DAP) in 2021.

Fertilization program ^a	Measurement date	
	47 DAP	54 DAP
	—— lb 1,000 ft ² d ⁻¹ ——	
AMS_0.25_7d	0.670 d	0.432 cd
AMS_0.5_7d	2.256 b	0.986 b
AMS_0.5_14d	0.531 d	0.589 c
AMS_1.0_7d	3.190 a	1.345 a
AMS_1.0_14d	1.570 c	1.332 a
PCU_1.0_@plant	0.364 de	0.257 e
PCU_2.0_@plant	0.458 d	0.253 e
Non-fertilized control	0.101 e	0.074 f
P-value	***	***

Note: Means in the same column followed by a common letter were not significantly different according to Fisher's protected least significant difference ($P < .05$).

^a See Table 1 for N application rates and frequencies using AMS or PCU applied to seeded bermudagrass planting.

*** Significant at the .001 probability level.

Research Takeaways

- This field study compared the effects of controlled release versus readily soluble N sources, total N rate and application frequency on establishing seeded bermudagrass on native soil in the northern transition zone.
- 'Rio' bermudagrass was seeded in June 2020 and 2021, testing eight granular N-fertilizer programs using ammonium sulfate (AMS) or polymer-coated urea (PCU).
- Total N applied ranged from 0.0 to 6.0 lb. N per 1,000 ft², with application strategies including PCU only at planting and repeated applications of AMS every 7 or 14 days after germination.
- Time to reach 50 percent green coverage (GC_{50}) ranged from 20 to 24 days in the first year and 23 to 30 days in the second year, showing variation across N programs.
- Applying 2 lbs. N per 1,000 ft² of PCU at planting achieved a similar time to 90 percent green coverage (GC_{90}) compared with other fertilization programs but with fewer applications and less total N used.
- Results suggest that applying more than 3 lbs. N per 1,000 ft² during the first 60 days of establishment does not provide additional benefits regarding time to maximum turf coverage.

the total nitrogen (N) requirements for establishing seeded and vegetative bermudagrass. Yet, comparative studies on the establishment rates between soluble nitrogen sources (like AMS) and controlled-release products (like PCU) are sparse (12, 13, 16, 22 and 23). While this study did not measure it, factors such as N rate, application frequency and the availability of N among different fertilizer sources could influence N loss through pathways like nitrate leaching, runoff and ammonia volatilization (1, 6 and 14).

Rice et al. (28) reported that lower N rates (0.25 or 1.0 lbs. N per 1,000 ft² per week) resulted in similar establishment rates for bermudagrass from sprigging at higher rates but with reduced inorganic N loss. Moderately higher N rates (a total of 2.0 to 3.0 lbs. N per 1,000 ft²) could enhance bermudagrass stolon density, decrease surface runoff and improve water infiltration compared to non-fertilized turf (6, 11 and 28).

Additionally, controlled-release fertilizers potentially decrease nitrate leaching and ammonia volatilization while improving nitrogen use efficiency compared to soluble nitrogen sources.

Controlled-release products might offer a more environmentally sustainable option for fertilizing bermudagrass during establishment (3, 31 and 32).

This study suggests that the total N rates, application frequencies and the types of N sources used for bermudagrass establishment need further evaluation, particularly outside the optimal planting period and across different geographical locations. Early to late-autumn N applications may impact fall color retention, winter survival, carbohydrate status and spring greening, mainly when applied near the onset of bermudagrass dormancy (9, 23, 27 and 30). These data were not part of this study since N applications only occurred in June and July.

The study found that polymer-coated urea (PCU), particularly PCU_2.0_@plant, the highest N rate applied at planting, effectively met turf establishment needs due to its slow and steady N release. While PCU_2.0_@plant achieved similar green coverage times as other AMS programs, other controlled-release fertilizers might slow the establishment rate due to their slower N

release than the PCU used in this study.

Despite total N applied 53 days after planting (DAP) varying from 0.0 to 6.0 lbs. N per 1,000 ft², the study achieved more than 90 percent green coverage before the final fertilizer application, indicating that a single application of PCU_2.0_@plant or an initial application of AMS followed by a repeat application after germination could suffice for optimal green coverage during the seeding period.

Cost considerations, including labor and the price of specific fertilizer sources, are crucial for turf managers. For example, the study highlighted that using AMS might increase labor costs significantly compared to a single application of PCU due to the different application frequencies required. Although more expensive per pound of N than AMS, PCU could save costs through reduced labor.

Continued on page 34

Continued from page 33

In summary, applying 2.0 to 3.0 lbs. N per 1,000 ft² during the first 60 DAP in June on silt-loam soil was adequate for maximizing seedling establishment without excessive dry matter yield (DMY), thereby avoiding increased mowing needs and potential damage to young plants. **G**

Acknowledgements

Adapted from Powlen, J. S., and Bigelow, C. A. 2024. Seeded bermudagrass establishment as affected by nitrogen source, rate, and application frequency. *Crop, Forage & Turfgrass Management*, 10,e20250. <https://doi.org/10.1002/cft2.20250>

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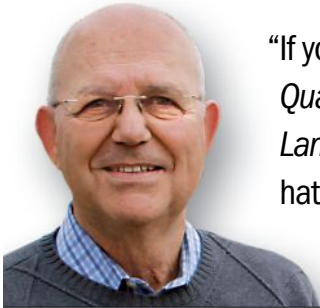
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"If you want a copy of *Water Quality and Quantity Issues for Turfgrasses in Urban Landscapes*, please email me ... I would hate to throw the books away."

MIKE KENNA, PH.D., Research Editor

Cleaning out the storage unit

I retired from the USGA a little more than five years ago. Time has passed quickly, and I still have not cleaned out my storage unit, which is filled with research reports, books, records and miscellaneous stuff collected over the years.

Whenever the topic of fertilization comes up, I think more about the environmental impacts on water quality, probably because that subject dominated USGA research in the '90s and early 2000s.

In 2008, the Council for Agricultural Science and Technology (CAST) released a special publication titled *Water Quality and Quantity Issues for Turfgrasses in Urban Landscapes*, the culmination of discussions and presentations from a three-day, CAST-sponsored workshop held in Las Vegas.

The proceedings, presented as a hardcover book with a 16-page full-color inset and executive summary, comprise 16 presentations from 25 water, turf and landscape specialists.

Turfgrasses used in urban areas impact Americans daily in many ways. There are an estimated 50 million acres of maintained turfgrass in the United States on home lawns, golf courses, sports fields, parks, playgrounds, cemeteries and highway rights-of-way.

The 25 presenters maintained that

turfgrass provides environmental and human benefits, including decreased runoff from storm events, erosion and air pollution control, heat dissipation, recreation and business opportunities and enhanced property values.

Critics, however, suggest that turfgrasses in landscapes use extensive

amounts of water, require excessive or unnecessary fertilizers and pesticides, disturb existing land use patterns and waste time, money and resources.

CAST provided an opportunity and contribution to the continuing discussion on the environmental impact of turfgrass, particularly golf courses.

Topics covered in the new CAST publication include:

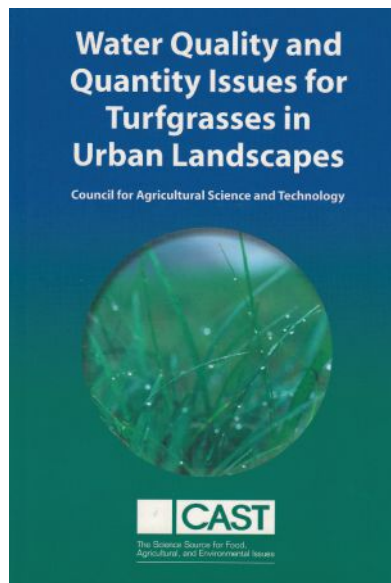
- The pending water crisis
- Low-precipitation landscapes
- Regulatory considerations
- Municipal policies
- Turfgrass and the environment
- Ground and surface water
- Plant selection
- Turfgrass water use
- Cultural practices
- Achieving efficient irrigation
- Recycled water
- Public Policy approaches
- Comprehensive assessment

When the USGA was doing some house cleaning at the Liberty Corner headquarters, I was asked if I wanted the remaining cases of books. So, here we are more than 16 years later, and I still have three boxes of books.

If you want a copy of *Water Quality and Quantity Issues for Turfgrasses in Urban Landscapes*, please email me (which you can find below). I would hate to throw the books away and would like them to end up on a golf course superintendent's or turfgrass scientist's bookshelf.

Note: CAST is an international consortium of scientific and professional societies. It assembles, interprets and communicates credible science-based information regionally, nationally and internationally to legislators, regulators, policymakers, the media, the private sector and the public. 

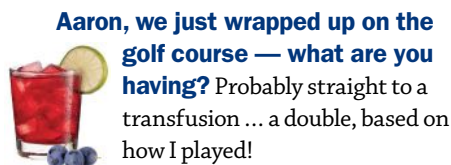
Mike Kenna, Ph.D., retired director of research, USGA Green Section. Contact him at mpkenna@gmail.com.



The 19th Hole

Aaron Fankhauser

Assistant General Manager / Director of Agronomy // The Club at Rolling Hills, Golden, Colo.



Aaron, we just wrapped up on the golf course — what are you having? Probably straight to a transfusion ... a double, based on how I played!

Tell me about Rolling Hills. The Club started back in the mid '50s at what is now Applewood Golf Course. Coors Brewing made a land swap and agreed to build the new Club in our current location in 1968. We're nestled into South Table Mountain just down the street from Coors Brewing Co. and still have several wonderful members from the Coors Family. I've been involved for a little over 20 years and currently, I am helping the Club as the Director of Agronomy and the Assistant General Manager.

Are you from that area? No, I grew up in northeast Kansas, about 15 minutes from Manhattan, in Wamego.

I know Wamego, that's not far from me! Who are your sports allegiances? K-State football; we had season tickets as a kid. I was a big basketball player, so KU basketball is home to me. The Chiefs were terrible when I was young, so I never got into the Chiefs. I'm a Broncos fan. It's really hard, because my



// BEST ADVICE

"GET INVOLVED. UNTIL I GOT INVOLVED IN THE ROCKY MOUNTAIN CHAPTER AND THE GCSAA, MY NETWORK WAS SMALL. YOU MEET PEOPLE, AND YOU CAN RELY ON THOSE PEOPLE."

family is all Chiefs fans. My seven-year-old, especially. I think he wears a Chiefs T-shirt almost every day to school. It's a hard place to be when your seven-year-old tells you how trash the Broncos are and how great his Chiefs are.

Tell me about your family, and what do you all do for fun? My wife and I have three kids, ages 14, 12 and 7. I feel like our life right now revolves around everything that they've got going. We're playing basketball, we're running track and cross country. Our oldest just started high school this year, and it's been a lot of fun watching that transition. And our youngest is driving him crazy all the time. Our daughter, she's just a pistol, she's a lot of fun. I think she read 145 books last year.

What's your favorite tool to get the job done? My moisture meter. We use

the Pogo. I love the way that it maps the greens for our guys. I think that's the biggest thing that my assistants and I talk about right now, is this technology. I talked to a couple of colleagues around the country, and they're hiring assistants who are just data managers. I've been in the industry now for 23 or 24 years, and I don't feel like I'm that old yet. But the technology changes that I've seen and that we still see coming with autonomous and drones? It's just a cool spot to be in.

What's the best thing about having your job? The location and the members. We're on the west side of the Denver metro area, right there in the foothills ... it's outstanding. You never take it for granted. You look up at those mountains every day, and you get excited. It's just a great spot.

As interviewed by Seth Jones, Feb. 4, 2025.



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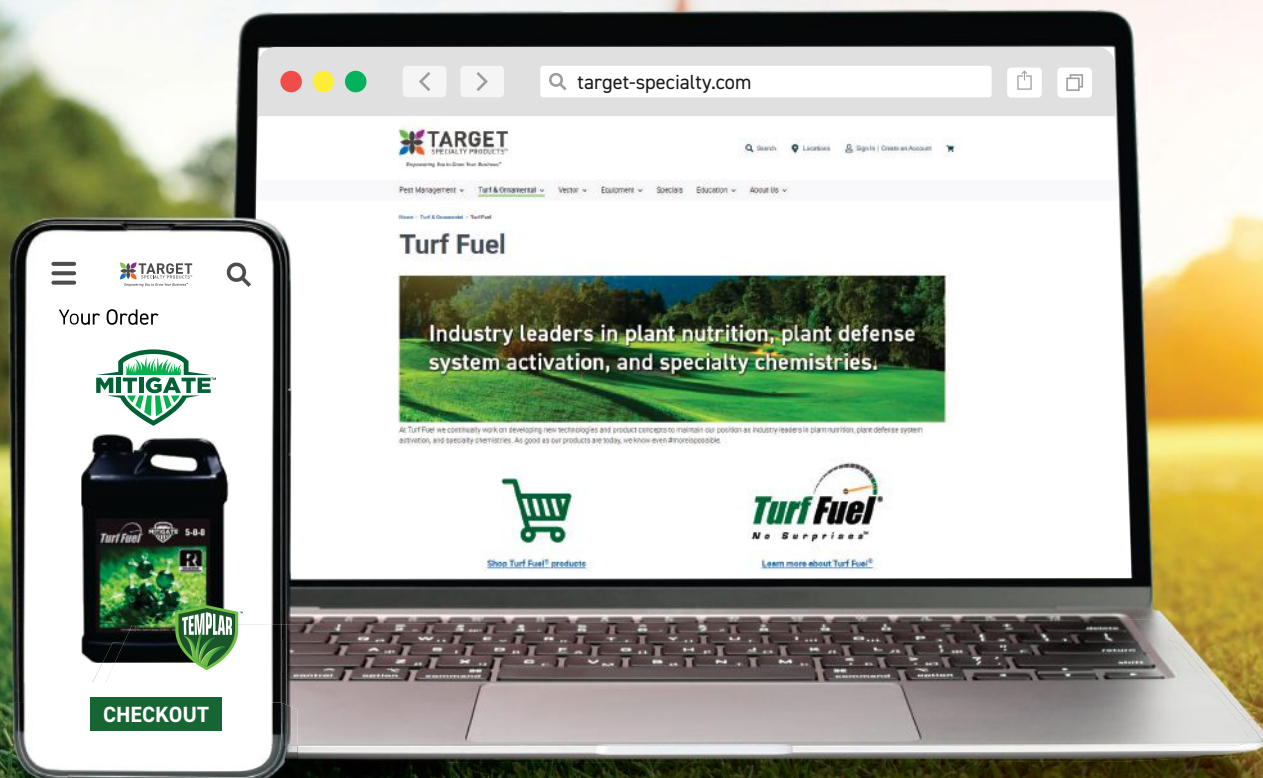
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