

Golfdom

04.18

Three different projects, one common goal: making bunkers less stressful

No. 10 on the Canyon Course at Forest Highlands Golf Club, Flagstaff, Ariz.

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Q&A WITH USGA'S BRIAN WHITLARK

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No more fighting Fought's bunkers

Oregon's The Reserve undergoes a course renovation to improve some bunkers and eliminate others.

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Brian Whitlark, USGA

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“...he turned on his cell phone flashlight and took a quick look up there. That’s when he saw a roll of canvas leaning up against the wall.”

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

Message in a ceiling

Recently a new Guinness world record was set when a 132-year-old message in a bottle was discovered on a beach in Australia. The bottle was thrown from a German ship into the Indian Ocean in 1886 as part of a research project. That something so fragile as paper in a bottle can survive for 132 years fascinates me.

Since then, American golf has had a similar discovery like that 132-year-old message in a bottle. Except that this was a 97-year-old message in a ceiling.

See page 8 for a short story about the discovery made by Mike Manthey, superintendent at Midland Hills CC in Roseville, Minn. Manthey was looking for a topography map in his closet when he decided it was time to straighten out that crooked ceiling tile. But before straightening it, he turned on his cell phone flashlight and took a quick look up there. That’s when he saw a roll of canvas leaning up against the wall.

It was a 3-foot by 6-foot copy of the original Seth Raynor drawing of the course,

with a drawing of the original irrigation system on top. It was dated Feb. 7, 1921.

Manthey has written a great blog post about the find. I encourage you to check it out. I’m again stunned when such a fragile document survives and is found decades later. It makes me wonder what else is out there waiting to be discovered.

I had my own message-in-a-ceiling moment recently. What I found wasn’t nearly as significant, but it did cause some introspection.

When my mom died a few years ago, my sister and I inherited all her belongings (my dad passed back in 2009). I now have three large plastic tubs with thousands of old photos. One of the tubs con-

tains more modern memories... my old basketball team photos; my sister’s softball team photos; embarrassingly, both of our high school report cards. And then I found something I forgot I ever did: a series of 10 letters I wrote to my parents as a 19-year-old freshman attending Kansas University.

I tore into the first letter, excited to experience this time capsule gift from my mom of what my life was like then. Some of the things I learned from just one letter:

- I didn’t want to leave my dorm room for fear I would miss a call from the editor of the student newspaper, offering me a job;

- I was really impressed by a friend’s Mitsubishi 3000;

- And of course, I had to tell my parents about the girl I was dating while at the same time trying to act cool about it.

I finished the letter, cussed, then stashed all 10 envelopes away, embarrassed by what a jerk I was at 19. I wanted to light the stack on fire. Only recently did I read all 10 letters, and I found later ones more rewarding. Turns out the editor never called, the girl and I went separate ways. But how else would I have remembered any of this (especially the bit about admiring the Mitsubishi 3000) if it weren’t for these letters?

I recently got to speak at the Ohio Turfgrass Foundation Spring Tee-Off. Some advice sprung up from that meeting during a conversation where we were asked about documenting our accomplishments. Mark Novotny, CGCS at Westchester GC in Columbus, Ohio, advised everyone in the room to be sure to take photos of everything you accomplish on the golf course during the year. “You end up doing so many things, you tend to forget some of the projects you did early in the season,” he said.

We won’t all find priceless Seth Raynor drawings in the ceiling. Be thankful you won’t find embarrassing Seth Jones letters in any shoebox. But we can all take the time to document life as it’s happening — before we forget all the good, bad and ugly details.

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NEWS, NOTES AND QUOTES



// GOLD ON THE CEILING



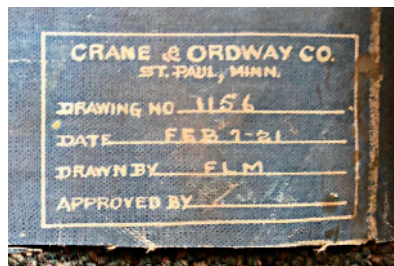
MINNESOTA SUPER FINDS LOST RAYNOR ART

BY SETH JONES // Editor-in-Chief

➔ “For many decades now, Midland Hills has been making guesses about what Seth Raynor intended when he designed our golf course... until right now.”

That’s the opening of Mike Manthey’s blog post (available at mhccturf.com), and it is appropriately dramatic. Recently, Manthey, the superintendent at Midland Hills CC, Roseville, Minn., made an Indiana Jones-like discovery in the ceiling of the maintenance shop. Stashed away above a crooked ceiling tile in his closet was a 3-foot by 6-foot irrigation map drawn over the original design, dated Feb. 7, 1921.

“When I found it, I called Jeff Johnson, superintendent at Minikahda (Minneapolis) CC, who has prior knowledge of the course as he was



previously the assistant superintendent here,” Manthey told *Golfdom*. “He told me, ‘Mike, people are going to freak out... this is huge.’”

Since posting photos of the map online, Manthey has made all sorts of new friends. More than 100,000 people interacted with his tweet from @MidlandTurf in only five days. Golfers from around the world, superintendents, architects, architecture fans and even a few PGA Tour pros (one asked if he could buy the print) have reached out to Manthey since the find.

“There are way more people who have an appreciation for golf history than I realized,” Manthey says.

The timing couldn’t be better. Midland Hills recently retained Jim Urbina to create a master plan for the course.

For now, the print is getting a high-definition scan. Where will it go after that? “It’s going in a bank vault,” Manthey laughs.

// BAYER LOOKS NORTHEAST

A NEW MEMBER FOR BAYER'S GREEN TEAM

Environmental Science, a business unit of the Crop Science division of Bayer, announced Paul Giordano, Ph.D., is joining the Bayer Green Solutions Team, serving customers in the Northeast. Giordano will help Bayer customers ensure success while supporting the broader industry through scientific thought leadership, education and training.



Paul Giordano

Giordano joined the Bayer team in 2014, serving as technical services representative for Bayer Environmental Science Canada. In that role, Giordano was responsible for coordination and execution of research trials across business segments, competitive surveillance and innovation consultation. He has also given more than 150 presentations in the past three years and is the author of more than 30 magazine and technical articles in various turfgrass industry publications.

// A HOMECOMING

BASF NAMES JENSEN AS DIRECTOR

Stephanie Jensen has joined the BASF Professional & Specialty Solutions (P&SS) division as its director for U.S.



Stephanie Jensen

business. The P&SS business focuses on new and innovative solutions for customers in the pest control, turf, ornamentals and vegetation management/forestry markets. Jensen has been with BASF for 16 years in a variety of roles. Most recently she served as director, group controlling and data management for the North American Crop Protection Division of BASF.

“I am thrilled for this opportunity, as the P&SS business is where I started when I joined BASF — so this feels like a bit of a homecoming to me,” said Jensen. “I am very much looking forward to working with our teams and customers to bring exciting new innovations to market.”



// **TAKING THE BALL AND RUNNING**

QUALI-PRO PROMOTES STRAIN, MOORE

Control Solutions Inc., parent company of Quali-Pro, announced the promotions of Nicholas Strain to business director for the Quali-Pro brand, and Jeremy Moore to key accounts manager.

Strain joined the turf group in 2013 as Midwest area sales manager. Strain has been with the company for seven years and has built solid foundations and relationships with his customers. Moore has been with Quali-Pro for seven years. His experience in working directly with senior management of various buying groups will make the transition to key accounts manager an easy one, the company says.

“Nick has fully exhibited the skills and drive to move the turf group forward into the future,” says Curtis Clark, executive vice president. “And, Jeremy’s passion for this position is second to none. I look forward to watching both of them take the ball and run with it.”

// **GET YOUR LEARN ON**

SYNGENTA BUSINESS INSTITUTE TURNS 10

Superintendents seeking to enhance their business knowledge can now apply for the 2018 Syngenta Business Institute. This year marks the 10th anniversary of providing superintendents with the opportunity to learn and network in an academic setting.

This year’s program will take place Dec. 3-6 in Winston-Salem, N.C. Approximately 25 superintendents will be selected to attend the program. To be considered, candidates must complete an online application, which includes relevant work experience and educational background, as well as a short essay on why they should be selected. Visit GreenCastOnline.com/SBI to apply.

// **A CLICK AWAY**

Only at Golfdom.com

➔ It’s been a busy few weeks at *Golfdom* — in fact, there was news we wanted to share in this issue that we just couldn’t fit in! So be sure to click over to **Golfdom.com** to find these stories and more...

- You may have heard that after 20 years, Steve Cook, CGCS, MG, is leaving Oakland Hills CC, Bloomfield Hills, Mich., to become director of agronomy at Medinah (Ill.) CC. But only at **Golfdom.com** can you read an interview with Cook, who talks about how hard it was to leave Oakland Hills, and why he’s excited about being back in Illinois.

- You probably knew that Ralph

Kepple, CGCS, has been promoted to director of agronomy at East Lake CC, Atlanta, longtime home of the Tour Championship. But only **Golfdom.com** has a video interview with the recently promoted superintendent of the course, Charles Aubry. He tells us about how he got to where he is today, and what sets the crew at East Lake apart from other crews he’s been on.

- And if you want more detail from Mike Manthey on his big find in the ceiling of his closet... well, you know the place by now.

So, come see us at **Golfdom.com**. By the way... we’re mobile friendly.

THEY SAID IT

IN-KYUNG KIM

LPGA PLAYER, RANCHO SANTA FE, CALIF.

Asking American Air on Instagram about the status of her lost golf clubs (the same sticks she won the 2017 Women’s British Open with) after they were found for sale at a Play It Again Sports in San Diego.

“Do you still think my clubs are missing?”



ABOUT THE COVER

Some 30 years ago, Drew Annan started working on golf courses just as a way to put himself through school. Today he’s the CGCS at the 36-hole Forest Highlands Golf Club in Flagstaff, Ariz. “It’s funny how careers find you,” he says. Annan took this month’s cover photo of No. 10 on the Canyon Course, a 205-yard, par-3.



Golfdom Gallery



1 Coming down the mountain The 2018 Nor'easter Ski Day event in Killington, Vt., featured plenty of highlights. The Vermont GCSA won the coveted Nor'easter Cup, and Craig Craft (that *might be* Craig) was the fastest snowboarder, with a 35.27-second run.



2 Good company Before the Ohio Turfgrass Foundation Spring Tee-Off, we got the band back together. Left to right are Karl Danneberger, Ph.D., The Ohio State University; Matt Neff, assistant superintendent, Westwood G&CC, Powell, Ohio; Craig MacGregor, publisher, *Golfdom*; George Furrer, CEO, United Turf Alliance; and Seth Jones, editor-in-chief, *Golfdom*.



3 Up high Todd Apgar, Metro Turf (left), and Paul Blodorn, Quali-Pro, are ready to head back down the mountain after rehydrating at the Peak Lodge, elevation 4,241 feet.



4 Zoom! The fastest male skier was Scott Watelet (25:75 seconds, and that *might be* Scott, because he does look fast!), and the fastest female skier was Claire Whitaker (30:77 seconds.)



5 Support team The Winterberry Irrigation and Pumps team was a proud supporter of the Nor'easter Ski Day. Left to right are Matt Faherty, Tom Shea, Chad Epps and Chris Daigle. And hey, bonus — that's Cornell's Frank Rossi, Ph.D., and Craig Currier, Glen Oaks Club, Old Westbury, N.Y., sharing a laugh in the background.

6 Back at the Wobbly Barn (Left to right) Jesse Shannon, CGCS, Manhattan Woods GC, West Nyack, N.Y.; Chris Strong, CC of Troy, Troy, N.Y.; and Matt Lapinski, Greensight Agronomics, celebrate an injury-free ski day.





“Bunkers are like greens and tees in that they tend to shrink over time, causing original contoured edges to change. This change affects bunker appearance, but also potentially affects playability.”

MARK WOODWARD, *Contributing Editor*

Bunker renovation 101

Bunkers, like all physical features on golf courses, show signs of aging over time. Golf is an outdoor sport, and bunkers are affected by numerous conditions, including dust storms, wind, rain, animal contamination, golfers and maintenance workers. Consistency between bunkers also begins to change. These outside influences also affect sand color, again causing inconsistency.

Bunkers are like greens and tees in that they tend to shrink over time, causing original contoured edges to change. This change affects bunker appearance, but also potentially affects playability.

As much effort as your maintenance staff puts into the bunkers to look and play consistently, they always continue to show signs of aging. Some courses just add more sand to get the color and consistency right. However, by doing this, most bunkers end up containing too much sand because no old sand is removed. This also affects playability and changes the original design as well as the strategy for playing out of these bunkers.

Most courses stretch out rebuilding bunkers as long as they can because they don't have the resources to com-

plete all bunkers at the same time. Again, this leads to inconsistency. When rebuilding bunkers one-off, it's difficult to get the new sand firm and color-consistent with older bunkers that haven't been reworked and have been through years of raking, play and weathering. In some areas (like where I live in Arizona), one dust storm can change the appearance of the bunkers overnight.

Most courses eventually have discussions about their bunkers, focusing on:

- consistent firmness from a playability standpoint
- consistent color and appearance
- proper drainage
- getting edges and floors back to their original design

Although the primary issue with bunkers at most courses revolves around managing

consistency in all its aspects in a difficult outdoor setting, some people argue that bunkers are true hazards and that consistency is not that important. But it's extremely important at some facilities.

All golf courses are different, but when funding is available, it's best to try renovating all bunkers at the same time, focusing on the following:

- removing all the existing sand and stockpiling it; if it's clean enough, using it for top-dressing fairways or roughs
- checking all existing drainage in each bunker, replacing or repairing any drainage pipe that is compromised, damaged or not functioning efficiently and effectively
- recontouring deteriorating edges to restore them to their original shape and size

- if necessary, recontouring the floors of selected bunkers to accommodate the appropriate sand depth and playability concerns

- determining whether to install bunker liners (This decision is typically based on your location and the amount of rain you get.)

- adding an “approved” sand blend to ultimately achieve a 4-inch to 6-inch compacted depth on the bunker floors and a 2-inch to 3-inch compacted depth on the slopes

- when certain bunkers are no longer necessary and are expensive to maintain, consider bunker elimination

It is possible for golf course maintenance staff to occasionally renovate an individual bunker, but it is generally a good idea for most clubs to hire a qualified contractor for the following reasons:

- a contractor will have a higher level of expertise
- the job will get done much quicker during the off-peak season
- your maintenance staff can focus its efforts on what it does best, which is maintaining the golf course

- completing them at one time greatly improves consistency in terms of appearance, playability and firmness

In other words, all bunkers will be at the same stage in their renewed/renovated life-cycle, improving consistency across the board.

Mark Woodward is director of agronomy at Whisper Rock Golf Club in Scottsdale, Ariz., and a contributing editor for *Golfdom*. He can be reached at mwoodward@whisperrockgolf.com.

Smart Fertilization Program Saves Labor

Bulle Rock Golf Course in Havre de Grace, Maryland has a reputation to maintain. A favorite of the Baltimore-Washington set, Bulle Rock is widely recognized as the state's top public course and claims to be the only five-star public golf facility in the Mid-Atlantic. Designed by Pete Dye, the course, which opened in 1998, spans 250 acres, including 44 acres of bentgrass.



Bill Lewis

Superintendent Denny Leischner took over the top spot at the course in March from Bill Lewis, who was named superintendent at Shaker Heights Country Club near Cleveland, Ohio. Leischner and Lewis, both Ohio State University graduates, worked together at Bulle Rock for 22 years.

Lewis describes Bulle Rock as a "country-club-per-day model" where "every golfer is considered a member. Leischner says the course's success comes from its "innovative programs."

Bulle Rock relies on repeat business, and at \$130 per round, the only way a golfer will return is if the course offers a premium golfing experience. Smooth bentgrass greens roll at 10.5 to 11 feet. Tees and fairways are bent, too. Kentucky bluegrass roughs are kept playable at 2 or 2.5 inches. That makes Bulle Rock a regular in the Top 100

rankings in every major golf publication.

Still, Lewis and Leischner have not been working with an unlimited budget to achieve that quality. In fact, budgets are down 35 percent since 2003. And, while the course had 28 or 30 on staff in the past, today, the team is down to a lean 16.

"We have a budget crunch like everyone else," Lewis says. "We need to save money."

THE PROGRAM

Bulle Rock uses Koch Turf & Ornamental's NUTRALENE® slow-release fertilizer on the greens and POLYON® controlled-release fertilizer on fairways and roughs.

POLYON is a controlled-release fertilizer known for its trademarked green color. The key to its performance is the Reactive Layers Coating technology which meters out nutrients via diffusion, regulated by soil temperature and coating thickness. NUTRALENE is a methylene urea (MU) source designed for release over a period of 12-16 weeks. The idea is to provide consistent, long-lasting nutrients with minimal maintenance required by the course. Long term, it boosts root growth.

Lewis and Leischner fertilize the entire course each spring with a granular formulation and supplements with liquid treatments as needed.

"For the year, on greens, I target 1.5- to two-pounds of nitrogen per year," Lewis explains. "Last year, fairways got just one pound of nitrogen, but that was an

anomaly. It was an easy, mild year, and we were able to keep our color."

Tees also see about one pound of nitrogen per year, consistently delivered by the slow or controlled-release granules and supplemented with liquid if needed. Leischner says he'll be using the same approach. "Everything Bill outlined, we're sticking with — it's a proven track record."

RESULTS THAT SPEAK FOR THEMSELVES

Since implementing the POLYON/ NUTRALENE fertilizer program, Bulle Rock's turf has experienced less flush



Denny Leischner

growth and requires less frequent mowing. That helps save money on maintenance and stay within budgetary constraints.

"We now mow roughs once a week versus two or three times when we were dealing with flush growth," Lewis says. "We mow fairways twice a week. It helps save on labor."

In the past, the Bulle Rock team could be found walking the course every week with spinner spreaders to treat the weak areas where trees and turf compete.

The slow-release/controlled-release fertilizers have worked so well that Lewis and Leischner finished 2017 with extra fertilizer that they did not use. Instead, that fertilizer will be applied this spring, keeping the course green — and ahead of budget. That's something that Bulle Rock's owners and the course's patrons can all appreciate.

"The players see better conditions. We mow less, have fewer bare spots and have fewer tire tracks," Leischner says. "We've gotten an excellent return on our fertilizer investment."

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The view from Bulle Rock Golf Course's No. 2 looking back at the tee shows off the smooth bentgrass greens and fairways. The course uses Koch products.



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FOUGHT'S BUNKERS

Golf course architect John Fought speaks fondly of The Reserve Vineyards and Golf Club in Hillsboro, a suburb of Portland, Ore.

“The Reserve was one of my first — probably was my first — real solo design,” says Fought, of John Fought Design. “I have special memories of that project.”

The picturesque golf course consists of two 18-hole courses, the North Course and the South Course, which alternate between private member play and public play. Rotating the first and 16th of each month, players experience challenging and refreshing play all year on these champion-level courses.

“It’s unique in the fact that the public golfer as well as the membership gets an opportunity to play two totally different golf courses,” says Jason Blythe, director of agronomy at The Reserve.

Back in the mid-90s, The Reserve engaged two of the top golf course architects in the nation, Fought and his partner, the late Bob Cupp. Cupp would design the North Course while Fought would plan the South Course. According to Blythe, the North Course is a links-style golf course, with minimal bunkering and lots of rolling terrain with native, unmaintained areas. In contrast, the South Course design is more challenging, with lots of hazards.



JOHN FOUGHT

Fought, the 1977 U.S. Amateur champion and a two-time PGA Tour winner, remembers his time working with Cupp, who passed away last August at age 76. “My old design partner, Bob Cupp, did one course and I did the other one,” Fought says fondly. “So, he just fashioned the idea at the time, ‘John, why don’t you do like all the bunkers, and I am going to do like none ... I am just going do a few, and ground contouring. You love bunkers, so why don’t you do them?’ So, that was the plan, I did over a hundred bunkers on the (South) golf course.”

The Reserve opened in 1997 under private ownership and in time, the South Course became a darling among the pro circuit, playing host to a handful of championships.

DETERIORATION OVER TIME

While Fought had taken great pride in designing the challenging South Course, his original motif had become costly to maintain and experienced a great deal of deterioration in just 20 years.

“If you are not familiar with the Pacific Northwest, we

Continued on page 16

Oregon's
The Reserve
undergoes a
course renovation
to improve some
bunkers and
eliminate others.

Continued from page 15

golf year-round here,” says Blythe. “Even if you are not familiar with the Pacific Northwest, you do know that it rains a lot. Spring, fall, winter. Lots of rain. Lots of bunker sand washing off the faces of bunkers, the sand becoming contaminated with silt and dirt.”

The Reserve’s South Course prior to renovation had a total of 114 bunkers. While a course with that number of bunkers is attractive to more experienced golfers, it’s far from sustainable. For Blythe, it became essential to have a course that would attract a variety of golfers from the growing population in his region while minimizing operational costs. With the South Course in its existing state, that proved a challenge.

“Sustainability — that word that’s always thrown out there — it’s a hot topic for everybody, so (a renovation was) our part in becoming sustainable and self-sufficient,” Blythe says of their approach to a renovation.

By August of 2016, Blythe continued to find ways to maintain the South Course. Simultaneously, Fought, while in the area, visited the course, creating a serendipitous start to a renovation.

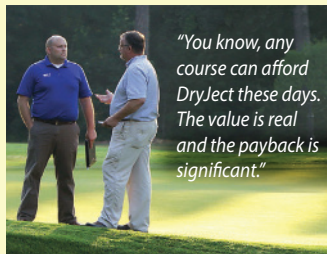
Continued on page 18



The Reserve’s No. 16 green before and after tree removal.

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Continued from page 16

“It was kind of funny,” says Fought. “I happened to be in Portland and thought, ‘I’ll go by and take a look at it,’ and I saw the bunkers had badly deteriorated.” As part of that visit, he received a tour of the course and spoke with The Reserve’s original and current owner, Jim Park.

Fought continues, “(Park) just said, ‘You know, I just need to hire you to fix these,’ and away we went.”

Fought understood that bunkers are a man-made feature, and in many cases they don’t have the sand or drainage to last 20 years, which Blythe was seeing firsthand. Moreover, the bunkers Fought designed in 1997 didn’t have the technology used today to preserve sand.

“The problem is,” Fought says, “when the bunkers get old, it’s just that much more to fix them. The bunker sand is triple what it was when we built the golf course — it just wasn’t sustainable the way it was. I went



The Reserve crew. (Left to right) John Fought, Travis Quisberg (Duininck Bros), Jason Blythe, Ahren Habicht (Duininck Bros), Gabe Hughes and Taylor Goodling (The Reserve).

in and created a whole new design for the greens complexes and the bunkers and made it so that instead of over 100 bunkers, now it has 58, and that’s really all it needs.”

The near \$1.5 million-dollar renovation began mid-July of last year. “We have a very short window for moving dirt here

in the Pacific Northwest,” explains Blythe about the speed of the renovation.

GREENS AND BUNKERS, BUNKERS AND GREENS

The design incorporated two major trans-

Continued on page 20

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Continued from page 18

formations: new low-mow greens complexes where bunkers had been previously, and upgrading existing and new bunkers with more efficient technology.

According to Blythe, the sand-plated low-mow areas were built with the low- and high-handicapped players in mind. “This tight lie shot would be more appealing to a higher handicap golfer,” he notes. “Rather than being stuck in a deep bunker, they could now have the opportunity to putt from this lie. Take the lower-handicap golfer from this same position and they would understand how much more difficult and strategic this tight lie shot is versus a nicely maintained bunker lie.”

As for bunkers, the new design called for upgrading to Better Billy Bunkers, installed by Duininck Golf out of Minnesota.

“We’ve worked very closely with John Fought on other projects and have a good working relationship on how to bring

value to the project and projects like this,” says Judd Duininck, owner of Duininck Golf. According to Duininck, they decreased the number of bunkers but also strategically added a few, many upgraded to the Better Billy Bunker Method.

This bunker technology provides a polymer drainage layer between the sub-grade and the sand that allows rainwater to release out of the sand into the gravel layer. Water then percolates down through the gravel layer into the drain tile, basically keeping the sand from getting saturated, contaminated or sliding into the bunker.

“Utilizing this liner, we should be able to maintain the quality of the sand and minimize contaminations, in turn making them last longer and play consistently better,” says Blythe.

Following the renovation, players were skeptical of the bunkers, as many were rebuilt with a familiar steep grade, suggesting that the sand might still slip and

again become contaminated. But Blythe is convinced otherwise.

“The utilization of this liner has proven through some rain that in these bunker faces, the sand is going to stay in — it’s not moving at all. They are going to be playable after a rain event,” says Blythe. “From a design aspect, I think everybody is extremely happy. It’s a completely different golf course and it’s a more strategic golf course.”

For Fought, the renovation was as endeavoring as working on his original design.

“Twenty years later, it’s fun to go back and make those small adjustments that really make the golf course better... the fun thing is every hole is better now,” says Fought. “Let’s hope for the next 25 years it’s going to be even more fun to play.”

Travel writer Katy Ibsen is based in Lawrence, Kan., and is a regular contributor to *Golfdom*.

Continued on page 22

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THEN THERE WERE TWO

The Riviera CC finds a solution to its bunker problems after torrential storms during the 2017 Genesis Open.

— BY ABBY HART —

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A Polylast bunker liner installation on the practice chipping green bunker at The Riviera CC.

A downpour in the middle of a big tournament can be a problem for any golf course, but for a course known for its bunkers, like The Riviera Country Club in Pacific Palisades, Calif., it can be disastrous.

During the 2017 Genesis Open, a strong storm rolled through, whipping around tree branches and soaking the turf with several inches of rain. Superintendent Matt Morton and his crew went to work on the golf course, clearing debris and pumping out bunkers. “We had a tremendous amount of rain — every bunker on the golf course had water in it,” Morton recalls. “We had to stop play and fix every bunker.”

Except for two, that is.

“The only bunkers that didn’t need any work were the two bunkers we had Polylast liner in,” explains Morton. “The sand held up on the face, and there was no trace of standing water.”

Morton discovered Polylast at the Golf Industry Show and opted to try the product on a couple of his bunkers, the defining features on his course.

“George Thomas designed a great, old-fashioned course and used bunkers as the main hazard on the property,” he says. “They are large bunkers, very deep, they can fill quickly with water. They kind of sit down in the ground, so drainage is critical. We looked

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PHOTOS BY: MATT MORTON

at Polyplast for a few of our steepest bunkers and haven't had any problems."

Polyplast began in 2010 as a company that solely manufactured horse trailer flooring. Pete Laurence, the company's founder, explains that a superintendent who used the product in a trailer that he used to haul his two mules, saw its potential and asked if he could use the product on his golf course.

It's been about two and a half years since the first Polyplast bunker liners were installed. The liner is made from recycled rubber free of metals or synthetics, sourced in the United States mainly from truck and farming equipment tires.

Laurence had a team install the liners on the first test bunkers at The Riviera. After watching the initial installation, Morton saw that the process looked a little familiar. "It's just like ordering a truckload of sod," he says. "The product is delivered in rolls, you roll it right out, cut some edges, glue (the seams) together and you pin it where you want to."

Aside from its easy installation and a 10-year warranty, Morton notes that the product has an upside for golfers as well. "From a playability standpoint, it's a lot friendlier. There's less liability for scratching clubs compared to the harder liners. Once we saw that the durability was there, we were impressed."

So impressed that The Riviera Country Club is looking to go from two Polyplast-lined bunkers to lining all of their 60 bunkers this year — approximately 130,000 square feet. Morton plans to have his crew install the product, saving on labor and installation costs.

While there's no solution for torrential rains during tournaments, he is glad he's at least found something that can help with bunker drainage.

"I think Polyplast provides a practical option for bunker liners in our industry," Morton says. "I think the fact that the product is recycled, it's kind of neat that you can take some old tires and make a product that helps our industry along."

Continued on page 24

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MAN VERSUS ELK

An Arizona course combats elk damage in bunkers.

— BY SETH JONES —



Capillary Concrete installation in progress on Forest Highlands GC's No. 3 fairway bunker.

Amature elk weighs more than 700 pounds. Imagine that stomping around in your bunkers every day.

Drew Annan, CGCS at Forest Highlands Golf Club, Flagstaff, Ariz., doesn't have to imagine it. He's seen it just about every day since he started at the club 30 years ago.

"I saw 28 of them this morning," Annan groans. "Elk are the real problem here. They stand in the bunkers and they feed on the capes so they don't have to bend over as far to eat. It's the damndest thing."

One man's bunker, apparently, is an elk's buffet.

The elk at Forest Highlands have done a number on the bunkers over the years.

No bunker liners were installed when the course opened in 1988. The heavy hooves of the animals churn the clay into the sand, resulting in severe contamination. Annan tried his best to combat the situation.

"We took the bunkers that had been impacted the most and we tried a soil stabilizer and we tried a textile liner," Annan says. "Over time, the textile liners failed miserably. They start to float to the surface... sand would filter through them. We couldn't consider them a long-term solution."

Tom Weiskopf, who built the course with Jay Morrish, told Annan about the positive experience he had with Capillary Concrete at Torrey Pines.

"I heard that Capillary Concrete did well from a frost/heave standpoint," Annan says. "I went with them, based on the recommendation from the mountain guys in the area and from Weiskopf."

Last fall, 41 bunkers got the Capillary Concrete treatment at the course. Annan says the installation process was smooth. Ted Fist, head of U.S. business operations for Capillary Concrete, was on site to monitor and train the crew on the first couple bunkers before cutting them loose. A local concrete company maintained the neces-


sary specs of the material, and with the "terrific work" of DHR Construction, they were off to work.

"You measure it, throw it in the back of a Workman, drive it out and shovel it into place," Annan says. "You roll it with a paint roller to put the finish on top. By the next morning you can walk all over it."

Though there has been no play on the bunkers since installation (the course has been closed for the winter), Annan loves what he sees so far.

"We've moved some sand around in the bottom of the bunkers to inspect the Capillary Concrete," Annan says. "We've had a pretty good amount of freezing and thawing this year. And I'll tell you, it's damn near perfect. I could not find anything like little rocks that chipped off. It looks great. And I can take a 1-inch hose at 60 psi, and I can't move water on these bunkers — it sucks it right on in."

That's a good thing, too, because the elk aren't going to give him a break any time soon.

"We run them off when we see them, we yell at them, we throw a golf ball at them," Annan says of the beasts. "But there's nothing you can do about them at night. You can tell they've been lying in there all night. But the members love seeing them around, so we don't do anything to discourage having them around. They're a nuisance animal with a mesmeric value." 



DREW ANNAN

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Bill Abbey, superintendent of Forest Highlands GC's Canyon Course, puts the final touches on the No. 12 greens bunker.

PHOTOS BY: DREW ANNAN

CONDITION. PERFORM. RECOVER.

How one longtime Florida superintendent keeps his roots strong, even when nematodes strike.



Kevin Frost

while he had early success battling sting nematodes, he's had to find a different recipe to control lance nematodes.

"You need an arsenal of two to three different products in order to achieve decent results," Frost says. "We're using Divanem to control Lance and Root knot nematodes and with its continued use have seen a reduction in nematode counts of up to 40 percent."

The 1,400-plus members have taken notice and they understand: The better the condition of the roots, the better they can perform allowing Frost and his team the ability to provide a product his members are accustomed to and recover from environmental pressures.

"We've done a good job educating our members and board about the problems nematodes cause," Frost says. "We realize that we can manage through those problems if we push the roots and get the greens as healthy as possible."

So, what other challenges keep Frost up at night? He says time management always is a struggle — there aren't enough hours in the day. And of course, another pest problem looms as mole cricket season quickly approaches.

One battle he doesn't worry about anymore is that overnight Florida soaker that could shut down mowing for a few days. His use of Primo Maxx PGR gives him the peace of mind that it's OK to miss a day or two of mowing if needed. Primo Maxx is a staple in Frost's agronomic plan to keep clippings down.

"If we don't use it, and we get an overnight Florida rain event, you're right behind the 8-ball," Frost says. "We exclusively use Primo. I've always been a Primo guy because it works."

Kevin Frost, CGCS, is knocking on wood. Why? Because the greens and the roots at BallenIsles Country Club in Palm Beach Gardens, Fla., are as good as he's ever seen them.

"Right now, we've got the best root structure I've ever seen since I've been on property," says Frost, who was promoted to Director of Agronomy last year, after working five years as the Senior Superintendent at the 54-hole facility managed by Troon. "To have two-and-a-half, almost three-inch roots on TifEagle greens in March? It's really encouraging."

It's not always been such a sunny forecast at BallenIsles. The course has been battling nematodes for years — the minutes from greens committee

meetings 25 years ago go into great detail about the efforts dedicated to fighting the rootkillers. When the North course was rebuilt in 2013, it seemed to make nematode populations only stronger.

"Nematodes — without question — are my main nemesis," Frost says. "There are a lot of products out right now, a lot of new chemistries. They may have been tested but they haven't been on the market long enough that superintendents can say, 'This is definitely the only way to control these.'"

Frost has been working with Syngenta's Lane Tredway, Ph.D., to try to find the perfect combination of products to get the best results. Interestingly,

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The *Golfdom* Conversation

Brian Whitlark, USGA

BY CLARK THROSSELL, PH.D.

Golfdom sits down with the USGA's agronomist in the West to get the full scoop on the revised USGA green construction recommendations.

Brian Whitlark knows his soils.

A certified professional soil scientist, Whitlark joined the USGA Green Section staff as an agronomist for the West Region. Specializing in courses that face challenging soil and water conditions, he regularly consults for courses in Arizona, Nevada, California, New Mexico and Mexico. The University of Arizona grad (B.S. and M.S. from the Department of Soil, Water and Environmental Science with an emphasis on turfgrass science) is also a regular writer for USGA publications and is a highly sought after conference speaker.



Brian Whitlark

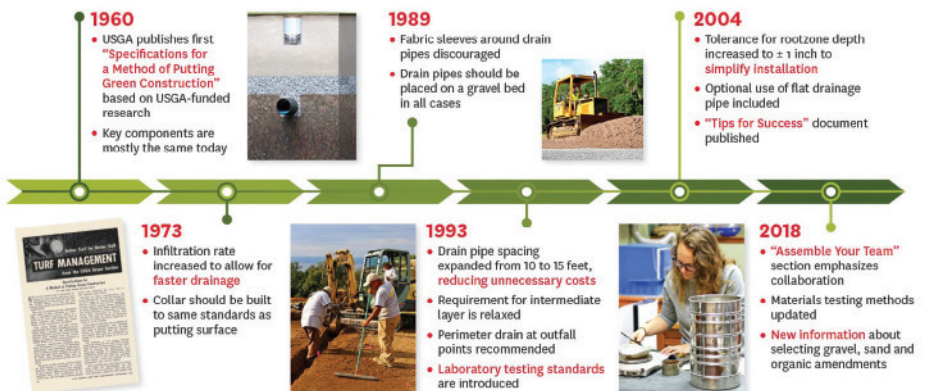
Whitlark worked alongside several USGA staff members and a host of industry representatives to update and revise the USGA Recommendations for a Method of Putting Green Construction. We recently sat down with Whitlark to discuss these new updates, how they will change greens being built in the future and what might be even further down the road for the next update.

Whitlark invites *Golfdom* readers to contact him with any additional questions at bwhitlark@usga.org.

Golfdom: Brian, thanks for taking the time. First off, why was there a need to update the recommendations?

Whitlark: The USGA updates and revises the Recommendations for a Method of Putting Green Construction about every 10 years.

Evolution of USGA Recommendations for Putting Green Construction





The USGA took 18 months updating the Recommendations for a Method of Putting Green Construction. The recommendations include updates in several areas, including drainage and gravel layer construction.

We had four major objectives for this revision: Review and evaluate new technology that could be used to construct a green and test the material suitability; Improve the information for end users with a focus on how to select the root zone mixture; Keep in place the main advantage of the method of putting green construction that can be used in a wide range of growing conditions; Consider alternative materials and methods that could be used in putting green construction.

The latest USGA Recommendations for a Method of Putting Green Construction are available online. (*Editor's note: visit <http://archive.lib.msu.edu/tic/usgamisc/monos/2018recommendationsmethodputtinggreen.pdf> to view the updated document.*)

Golfdom: What was the process used to update the recommendations and who was involved?

Whitlark: We started the 18-month process with the philosophy that we needed to hear from all people involved in putting green construction. To do that, we reached out to university scientists actively engaged in putting green construction research, staff from international

and U.S.-accredited soil testing labs, golf course builders, golf course architects, superintendents, USGA agronomists and USGA Research Committee members.

We held numerous online meetings so people could express their ideas, concerns and questions. After the meetings, all input was summarized and provided to Norm Hummel, Ph.D., who wrote the revised recommendations. The recommendations went through several cycles of review before being released to the public.

Golfdom: What are the major changes in this version of the recommendations compared with the previous version?

Whitlark: The recommendations are broken down into eight steps. The key changes by section are:

1. ASSEMBLE YOUR TEAM

We stressed the importance of assembling a team of professionals with expertise in specific disciplines. Building putting greens should not be reliant on a single person. The team needs a leader and ultimate decision maker, but advice from an architect, builder, superintendent and others needs to be considered. Based on

the unique characteristics of every site, professionals such as a soil physicist or civil engineer may be included on the team as needed to address specific challenges.

2. THE PUTTING GREEN CAVITY AND SUBGRADE

There are no major changes in this step.

3. DRAINAGE

Cleanout ports should be installed at the highest and lowest points of all drain-age lines.

Place a perimeter (smile) drain inside the putting green cavity directly against the cavity wall at all low points where water may collect, and not only at the lowest point of the green, which is typically the front of the green.

4. GRAVEL AND INTERMEDIATE LAYER

The wicking barrier is optional.

Two tests for the stability of gravel for the gravel layer were eliminated and replaced with a single, improved test for gravel stability.

The recommendations acknowledge the slight possibility that iron oxide may

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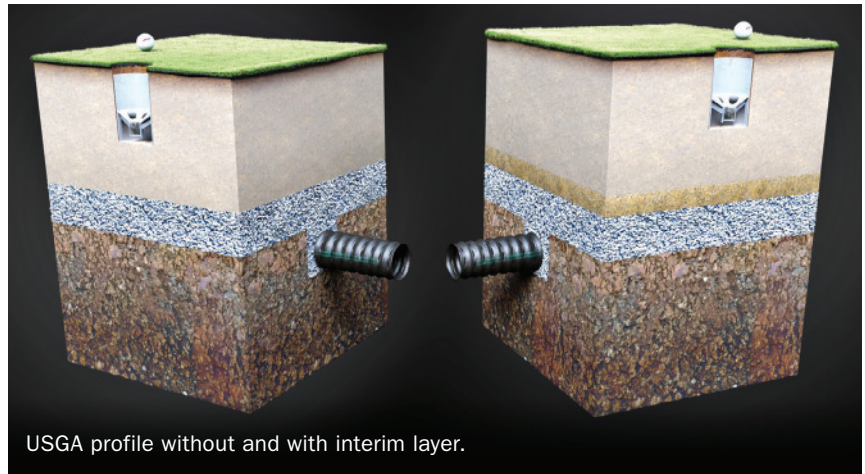
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precipitate at the interface of the root zone mixture and gravel layers, reducing drainage. Iron oxide may precipitate at the interface of the root zone mixture and gravel layers when the root zone mixture is acidic, the gravel is neutral or alkaline and iron is added to the system through the irrigation water or fertilization.

There are no known solutions to prevent the precipitation of iron oxide under the conditions I just described, or for dissolving the iron oxide precipitate should it form. The USGA currently is funding a study aimed at finding solutions to this issue.

5. THE ROOT ZONE MIXTURE

An improved explanation was added to help end users select the components for the root zone mix with the goal of helping end users customize the root zone mix to local conditions while still following the recommendations.



USGA profile without and with interim layer.

Coefficient of uniformity (CU) was added to the recommendations. The CU ranges are 1.8 to 3.5 for root zone mixtures with peat, and a CU of 2.0 to 3.5 for root zone mixtures of sand only or sand with an inorganic amendment. It's thought that a root zone mixture with a higher CU will be firmer. This allows a golf

course to customize the root zone mixture within the recommendations for a course's individual preference. Keep in mind sand shape also plays a major role in root zone mixture firmness.

There is an expanded discussion on quality control testing.



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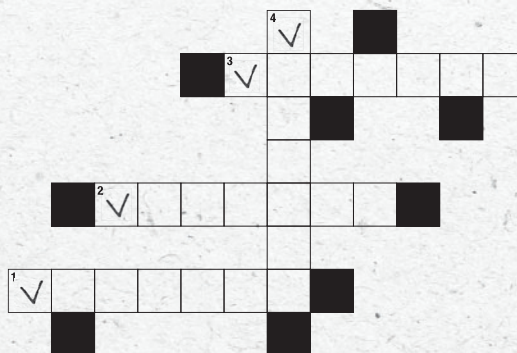


Cleanout ports should be installed at the highest and lowest points of all drainage lines, and there is a now a single, improved test for gravel stability.

6. ROOT ZONE INSTALLATION

The potential for the root zone mixture to settle along the edges of the green has been identified as a problem. It's difficult for the large equipment used to spread the root zone mixture in the cavity to firm the mixture along the edges of the green. Therefore, small hand-operated vibratory packers are needed to firm the mixture along the edge of the green.

Continued on page 30



ACROSS

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Continued from page 29

7. PRE-PLANT PREPARATION AND ESTABLISHMENT

Recognize that turf on the green can be established using seed, sod or sprigs.

8. GROW-IN

Grow-in procedures vary depending on local conditions and are covered in the Tips for Success document. (*Editor's note: visit <http://archive.lib.msu.edu/tic/usgamisc/monos/tipsforsuccess-2018.pdf> to view the Tips for Success.*)

Golfdom: How do you think the changes will impact the construction and performance of putting greens?

Whitlark: The original intent of the USGA recommendations was that they could be used successfully under a wide range of conditions. This original intent and integrity of the recommendations remain intact.

The revisions will allow more customization within the recommendations to address local conditions. Tolerances for materials have increased, which continues the trend of the last few revisions.


A golf course does not have to build greens following the USGA recommendations to be successful. It's possible to use local materials and an alternate method to build putting greens. In these

situations, use the scientific principles presented in the recommendations and the expertise of USGA agronomists to guide the process without sacrificing putting green quality or performance.

Golfdom: What aspects of putting green construction need more research before they can be considered for inclusion in the recommendations?

Whitlark: We identified several things in our revision process that we just don't know enough about to include in this update. We hope research can be conducted that will help answer these questions. Some of those things identified were: variable depth root zone mix construction; interface of the green cavity and green surround; interface of the green cavity and the approach; iron oxide layers; the pros and cons of the wicking barrier; the integrity and longevity of geotextile fabrics that potentially could be placed over a locally sourced — and we hope cheaper — gravel layer; and cheaper alternatives for gravel.

Golfdom: Is there anything else you would like to add?

Whitlark: The USGA Recommendations for a Method of Putting Green Construction are a living, breathing, dynamic document. We plan to update the recommendations as new information becomes available. Technology allows us to easily make changes to the documents and to widely disseminate the new recommendations. 



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// IF IT'S BAD, HOW BAD?

WINTER BERMUDAGRASS OVERSEEDING: DOES IT HURT OR HELP?

By Cale Bigelow, Ph.D., Gregg Munshaw, Ph.D., Mike Richardson, Ph.D.,
Xunzhong Zhang, Ph.D., Mike Goatley, Ph.D., and Kevin Jackson

Bermudagrass (*Cynodon dactylon*) is the choice for golf course fairways and tees in the South and in the Transition Zone because it tolerates close mowing (less than 3/4 inch) and forms a dense, durable and persistent turf. One of the major drawbacks to bermudagrass is the straw-brown color during dormancy. To provide green color during winter and sometimes improve playability during slow-growth periods, superintendents often overseed with perennial ryegrass (*Lolium perenne*).

Several questions remain regarding winter overseeding. Poor spring density of bermudagrass is not uncommon after removing the overseeded species, but exactly why remains a mystery.

To examine this question, a study was initiated in 2014 at four locations — Blacksburg, Va.; Fayetteville, Ark.; Lexington, Ky.; and West Lafayette, Ind. Mature bermudagrass was overseeded with a perennial ryegrass blend at three



At the University of Kentucky site, bermudagrass density declined in spring and was strongly associated with overseeding rate.

rates (0, 650 and 1,300 pounds per acre) and surface soil temperature, carbohydrate content of rhizome/stolon tissue and visual observations of quality/green coverage were measured.

Soil temperature was quite variable, with only slight increases (1 to 1.5 degrees F) in the overseeded plots compared with non-overseeded turf at some sites on some dates. Physiological measurements during dormancy revealed that total carbohydrates and starches (long-chained sugars) declined with time regardless of overseeding rate at the most northern site, West Lafayette, Ind. Spring bermudagrass density declined at some sites, like Lexington, Ky., which was strongly associated with overseeding rate.

These studies reaffirm the potential negative effects of winter overseeding on bermudagrass spring density and physiological health. Continued research to examine the mechanisms responsible for decline and management practices that maximize bermudagrass winter health and survival would be helpful.

Cale Bigelow, Ph.D., and Kevin Jackson are at Purdue University, Gregg Munshaw, Ph.D., is at the University of Kentucky, Mike Richardson, Ph.D., is at the University of Arkansas, and Xunzhong Zhang Ph.D., and Mike Goatley, Ph.D., are at Virginia Tech University. You may reach Cale Bigelow at cbigelow@purdue.edu for more information.

NEWS UPDATES

THE IRRIGATION ASSOCIATION'S D.C. SUMMIT URGES CONGRESSIONAL ACTION ON WATER INFRASTRUCTURE

The Irrigation Association (IA), in partnership with the National Ground Water Association and the Water Quality Association, hosted the annual Water Resources Congressional Summit March 6-7.

The two-day summit began with a meeting between IA members and Kiel Weaver, House Speaker Paul Ryan's senior advisor on natural resource issues. IA members then joined attendees from the National Ground Water Association and Water Quality Association for presentations on water resources and the federal budget.

IA members told their personal stories of the benefits of efficient irrigation and sought changes in the farm bill, support for water infrastructure and authorization of the WaterSense program.

"This IA fly-in could not have come at a better time," said IA Government and Public Affairs Director John Farnier. "Issues directly affecting our industry are front and center this legislative year. IA members had the unique opportunity to ensure Congress heard directly from the irrigation industry as policy decisions are made."

The summit was capped off with IA members taking their stories and the industry's policy recommendations to their representatives' and senators' offices.

“... SUPERINTENDENTS CAN EXPECT TO SAVE A MODEST NUMBER OF FUNGICIDE APPLICATIONS WHILE MAINTAINING THE SAME LEVEL OF DISEASE CONTROL.”

Allison Anthony

(see story on page 32)

// EVERY DOLLAR SPOT COUNTS

Predicting dollar spot just got easier

By Allison Anthony, Jim Kerns, Ph.D., Paul Koch, Ph.D., and Damon Smith, Ph.D.

As spring approaches, some especially devastating diseases once again rear their ugly heads. Argued to be the costliest disease of turfgrass worldwide, dollar spot will be on a lot of minds and in a lot of budgets. With warmer temperatures, our cool-season grasses become especially susceptible, and proactive management of this foliar disease is necessary to prevent severe damage.

Dollar spot is a particularly aggressive and destructive disease caused by the fungal pathogen *Sclerotinia homoeocarpa*. This fungus overwinters in plant tissues, quite often re-emerging in multiple epidemics throughout the year over the spring, summer and fall. The symptoms on highly maintained, closely mown turf typically consist of small, sprawling patches of bleached plants that are unsightly and can affect playability of putting greens or fairways.

S. homoeocarpa stands out for its ability to acquire resistance relatively quickly to many fungicides, making long-term control strategies tricky at best.

The pathogen is ubiquitous and has many survival strategies, including colonizing seed and plant tissue during the winter months. Dollar spot management traditionally consists of frequent, calendar-based fungicide applications because the onset of disease can be unpredictable and epidemics ebb

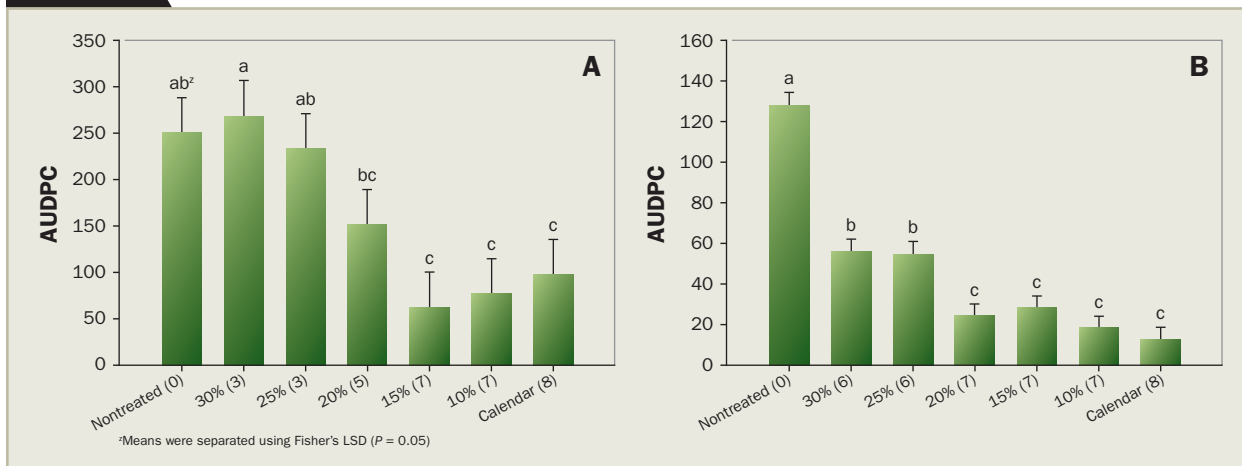
FIGURE 1



This image depicts how the model initially was developed at Oklahoma State University and the University of Wisconsin-Madison. Each day, dollar spots were counted and painted with a color corresponding to the day of the week. These data were used to correlate disease development to various weather parameters.

PHOTO BY: DAMON SMITH

FIGURE 2



This figure shows variability in disease control with different thresholds in the Smith-Kerns Dollar Spot Prediction Model. Each graph represents a different year. AUDPC stands for area under the disease progress curve and is a summary of disease intensity over time. Notice in graph A that the 20-percent threshold worked well and saved fungicide applications, but in the subsequent year did not save as many fungicide applications. These thresholds were developed for Penncross creeping bentgrass and can be adjusted according to expectations and cultivar.

and flow during the season.

This management method quickly becomes problematic financially and biologically. Not only can these frequent applications strain budgets, but increased exposure of the pathogen to fungicides can promote fungicide resistance in the population. To combat these complications, a method of predicting disease development to avoid unnecessary fungicide applications would be an extremely valuable tool for superintendents.

THE SMITH-KERNS DOLLAR SPOT PREDICTION MODEL

Fortunately, *S. homoeocarpa* relies on specific weather conditions for infection and subsequent epidemics. Uncovering and monitoring the relationship between weather and disease development has allowed researchers to create a helpful tool to use fungicides more effectively. By spraying only when weather has made an outbreak more likely, superintendents may reduce the number of yearly sprays. This may ease some financial burden associated with recurring epidemics. More importantly, such a tool should

***“S. homoeocarpa* relies on specific weather conditions... Uncovering and monitoring the relationship between weather and disease has allowed researchers to create a helpful tool to use fungicides more effectively.”**

lessen the risk of the fungal population developing resistance as unnecessary exposures are avoided.

Damon Smith, Ph.D., and Jim Kerns, Ph.D., developed a model that can more appropriately pinpoint application timing based on recent weather conditions. This model originated with Smith when he was at Oklahoma State University. His expertise is in the development of predictive and spray-advisory models for plant diseases. Initially, Smith and Kerns established plots in Oklahoma and Wisconsin to create a database to develop weather-based models that explain dollar spot development. To do this, plots were established and weather stations installed near the plots. Dollar spots were counted each day and painted to avoid counting the same spots on

subsequent days (Figure 1). Smith and Kerns used statistics and their knowledge of fungal biology and epidemiology to develop models to predict the occurrence of dollar spot foci that can help time fungicide applications. What resulted was the first iteration of the Smith-Kerns Dollar Spot Prediction Model.

The model is a logistic regression using five-day moving averages of daily average air temperature and relative humidity to predict the likelihood of dollar spot symptom development. Using these data, the Smith-Kerns Model determines the probability that new dollar spots will form on a given day. However, this model does not tell the superintendent when to spray, since there are numerous site-specific

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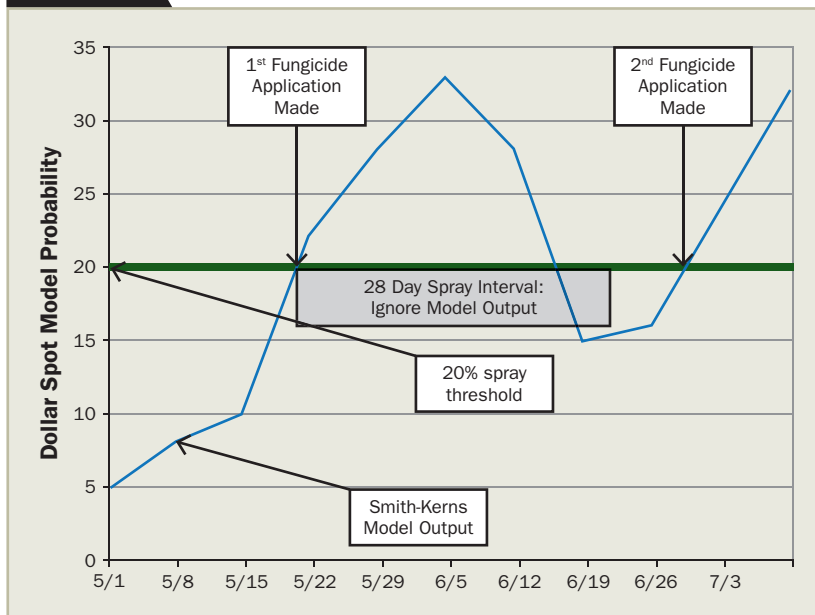
factors (grass cultivar, air movement, fertility, irrigation, etc.) that affect the onset of symptoms. Instead, superintendents need to set the model spray threshold appropriate for their course. This threshold is the chosen probability at which the user will make applications, which means the model is adaptable for different micro-environments. However, choosing an individual threshold may require a little experimentation.

ESTABLISHING PROBABILITY THRESHOLDS

Research carried out at Wisconsin established an effective threshold of 20-percent probability, which users can tweak until it's most efficient for a particular situation. This original threshold was determined from Penncross creeping bentgrass (*Agrostis stolonifera* L.) in a more northern climate, so thresholds chosen across other locations may differ (Figure 2). This threshold value worked well in numerous climates, including Pennsylvania, New Jersey, Oklahoma, Mississippi and Tennessee. However, turfgrass managers can adjust the threshold based on cultivar, location and amount of risk they are willing to accept. The 20-percent threshold worked as well as applying fungicide every two weeks through the summer months, and normally resulted in saving one to two fungicide applications.

Once you've determine a threshold, spraying is appropriate any time the threshold is met. Once you've sprayed and you know your interval of expected suppression, another application is not necessary until the suppression interval is met and the advisory predicts onset of disease. At the end of the suppression interval, revisit the model. If the threshold is met on the day the spray interval has passed, another fungicide application is in order. If the threshold has not been met, spraying is not necessary

FIGURE 3



This figure depicts how the Smith-Kerns Model works in practice. The length of residual control is determined by the product used and from the expectation of the golf course superintendent.

(Figure 3). This way, you could reduce applications or extend the period between some fungicide applications.

Conveniently for users of the model, multiple online tools are available to calculate dollar spot-event probabilities. Paul Koch, Ph.D., at the University of Wisconsin-Madison has compiled a thorough page on his lab's website (<https://tdl.wisc.edu/dollar-spot-model>) outlining model details, providing links to online tools and offering downloads of easy-to-use Excel spreadsheets for both Fahrenheit and Celsius temperatures.

The downloaded spreadsheet will appear with numbers already populated (once opened), demonstrating its utility and making it easy to follow and adjustable for the individual user. For each day, average relative humidity and the daily high and low temperatures are all you need to calculate dollar spot probability with the Smith-Kerns Model.

This example illustrates that you use the first five days to create the running averages, so a probability of dollar spot

occurrence will not be created with the Smith-Kerns Model until the fifth day of data. This doesn't mean you have to wait for the spreadsheet to be helpful because obtaining this past data through any weather service makes this tool immediately useful to superintendents. There also are two sites from which you may access and use the Smith-Kerns Model: GDDTracker of Michigan State University (found at gddtracker.net) and the GreenKeeper App from Bill Kreuser, Ph.D., at the University of Nebraska-Lincoln (found at greenkeeperapp.com). The model also is available on uspest.org.

THE POINT IS ELIMINATING APPLICATIONS

Based on the model work conducted in Wisconsin, Oklahoma and elsewhere, superintendents can expect to save a modest number of fungicide applications while maintaining the same level of disease control. A two-year study using the model at the O.J. Noer Turfgrass Research Facility in

Madison, Wis. resulted in saving three fungicide applications in 2015 compared to a 21-day calendar program. In 2016 at the same location, a lengthier, more conducive season for dollar spot, only one fewer fungicide application was achieved. As with most things in turfgrass management, weather controls our actions, and the Smith-Kerns Dollar Spot Model is no different.

The model will not work unless temperatures are above 50 degrees F (10 degrees C) and below 95 degrees F (35 degrees F). Research demonstrates that dollar spot is most prevalent between these temperatures, therefore the model was amended to prevent false positives if relative humidity was conducive but temperatures were not within this window.

From recent research, we know that the species *Sclerotinia homoeocarpa* may be redefined and distinguished as several different species. When this taxonomical adjustment occurs, we may be able to observe management differences among species that result in altered models based on dollar spot species. In this case, to provide even more precise prediction models, populations on individual courses can be tested and described in terms of which species are present in what proportions. This may be some time in the future, but possibilities exist for more efficient customized disease prevention.

When dealing with difficult populations of the pathogen *S. homoeocarpa*, spray programs that are calendar-based quickly can become costly and have a higher chance of promoting resistance to valuable fungicides. The Smith-Kerns Dollar Spot Prediction Model can limit these risks and costs by adjusting a spray program to account for the preferred weather patterns of disease development. With many intuitive online tools available to superintendents, this model is an easy and cost-effective addition to any fungicide program meant to protect against dollar spot.

Allison Anthony is a graduate student and Jim Kerns, Ph.D., is a turfgrass pathologist at North Carolina State University. Paul Koch, Ph.D., is a turfgrass pathologist and Damon Smith, Ph.D., is a field crop pathologist at the University of Wisconsin-Madison. You may reach Kerns at jkerns@ncsu.edu for more information.

References

Smith, D.L., J.R. Kerns, N.R. Walker, A.F. Payne, B. Horvath, J.C. Inguagiato, J.E. Kaminski, M. Tomaso-Peterson, and P.L. Koch. 2018. Development and validation of a weather-based warning system to advise fungicide applications to control dollar spot on turfgrass. PlosOne <https://doi.org/10.1371/journal.pone.0194216>.

Koch, P.L. and Hockmeyer, K. Dollar Spot Model. <https://tdl.wisc.edu/dollar-spot-model/>

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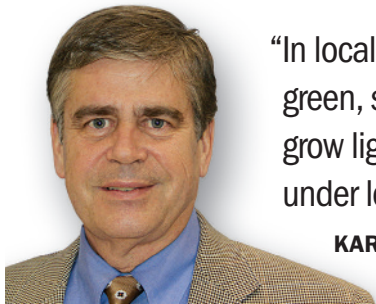
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“In localized areas such as a putting green, some golf courses are looking at grow lights to promote more healthy turf under low-light conditions.”

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

Grow light use is, well, growing

Sunlight is one of the holy grails of turf, one that golf course superintendents recognize as an essential element for overall turf health. Trees are the most common culprits in causing low-light conditions. There are numerous reasons why trees appeared in such abundance on golf courses, including courses that were cut out of wooded areas, trees being used as a “safety net” protecting golfers from flying golf balls from adjacent holes, and golfers and the public in general just liking trees.

Although tree removal to promote more light and air movement has become a common and accepted means of promoting turf health, there are situations where tree removal is more complicated (playing strategy, aesthetics, protected environment, etc.). In localized areas such as a putting green, some golf courses are looking at grow lights to promote more healthy turf under low-light conditions.

The lights themselves have their origins in greenhouse production. That technology was adapted for use on athletic fields — especially soccer fields in the United Kingdom and Europe — to promote growth during winter. The large grow light apparatus can cover a field or move slowly across it. This technology has been adapted by a few athletic stadiums here in the United States.

The use of artificial lights is built on

a basic understanding of radiant energy and what turf requires. The first is how radiant energy is measured. Units like foot candles and lumens are associated with light intensity for *human eye sensitivity* and have nothing to do with plants. In the case of plants, we use the units $\mu\text{moles m}^{-2} \text{sec}^{-1}$, which is the number of photons falling on an object (photosynthetic photon flux density [PPFD]). This is the energy the plant uses for photosynthesis.

The minimum level of light required — referred to as the light compensation point (photosynthesis = respiration) — for cool-season turfgrass plants is around 40 to 150 $\mu\text{moles m}^{-2} \text{sec}^{-1}$, and for warm-season turfgrasses is around 200 to 300 $\mu\text{moles m}^{-2} \text{sec}^{-1}$. Maximum light intensity (often referred to as the light saturation point) for cool-season turfgrasses ranges

from 500 to 1,000 $\mu\text{moles m}^{-2} \text{sec}^{-1}$, while warm-season turfgrasses range from 1,794 to 2,139 $\mu\text{moles m}^{-2} \text{sec}^{-1}$.

To make a point, I’ve conducted a few class demonstrations measuring the light intensity of various types of light bulbs. Shining a 60-watt halogen light bulb set 5 inches above a flat surface, I’ve measured 147 $\mu\text{moles m}^{-2} \text{sec}^{-1}$ at the surface. Not accounting for the light spectrum, this is barely enough to reach the compensation point of cool-season turfgrasses.

The light bulbs used in greenhouses or on athletic fields are termed high-intensity discharge (HID) lamps. Two types of HID lamps are metal halide and high-pressure sodium lamps. There is generally not much difference, but the metal halides tend to favor the blue spectrum while high-pressure sodium lamps tend to favor more of the red spectrum. More athletic fields use high-pressure sodium lamps because of lower cost and longer life compared with metal halide.

Conducting a similar class demonstration with a 400-watt metal halide lamp (the norm now on soccer fields throughout Europe is 1,000 watts) set 5 inches above a flat surface, I measured 1,500 $\mu\text{moles m}^{-2} \text{sec}^{-1}$. However, the temperature at the surface was 102 degrees F. Besides illumination, heat is generated from light bulbs and lamps. When I raised the lamp to 12 inches, the light intensity was 600 $\mu\text{moles m}^{-2} \text{sec}^{-1}$ and the surface temperature dropped to 84 degrees F.

Duration is important when using artificial lights, as is the relationship between desired light intensity and the height of the lamp above the turf. From an agronomic perspective, adding supplemental light is an option for greens and tees whose problems cannot be remedied by tree removal.

Karl Danneberger, Ph.D., *Golfdom's* science editor and a professor at The Ohio State University, can be reached at danneberger.1@osu.edu.

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2017 Highlights



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Built to withstand lightning conditions, the module works with Lynx Smart Hub to protect flow-managed irrigation schedules, even in the event of a central failure. The system can provide diagnostic data for up to 1,000 sprinklers within seconds, allowing superintendents to address issues efficiently and reduce downtime.

Toro.com



2

2 G885 rotor

HUNTER INDUSTRIES' G885 golf rotor features a powerful gear drive, efficient nozzles and full-circle and part-circle capabilities. Designed for new construction, retrofit and system upgrade situations, the G885 comes standard with Hunter's Total Top Service and Decoder-In Head technology. Other features include a ratcheting stainless steel rise, water lubricated gear-drive and QuickChange, which allows for dual trajectory nozzle capabilities. The rotor features a discharge rate of 8.2 to 57.5 gpm, a pressure range of 50 to 100 psi and a pressure rating of 150 psi.

Hunterindustries.com



3

3 PondHawk aeration system

Nearly all ponds need management to help keep the habitat, water quality and clarity in a healthy balance. From Linne Industries, the **PONDHAWK** is a solar powered subsurface aeration system that works without the need for grid electricity. The construction is durable and reliable, working year-round to aerate the water, even under partly cloudy or freezing conditions. Proper aeration minimizes algae and pond scum and reduces or eliminates the need for repeated chemical treatments.

Linneindustries.com



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4 Biological Water Treatment System

Installing a customized **MI-T-M** Biological Water Treatment System can save a golf course water, time and money, according to the company. The system uses microbes to destroy bacteria and other contaminants and has a closed-loop system design to recycle wash water for reuse. The additional waterfall filter accessory separates grass clippings, leaves and other debris from your wastewater. Each system features a CSA listed NEMA-4 rated corrosion-proof control panel, easily accessible hose connectors and a 1/2-hp surface mount sump pump. Mitm.com

5 The Chief bunker rake

The newest bunker rake from **STANDARD GOLF** — The Chief — is a two-in-one bunker rake designed for the “Aussie Style” bunker. One side is smooth for rolling the vertical face of the bunker and the other side has ridges to scrape the bottom of the bunker for a consistent lie. The result is a more consistent finish than traditional bunker rakes that leave deep plow marks in the playing surface. The Chief is available in a 20-inch head and will have three different handle options. Standardgolf.com

6 Golf car solar panel

Golf cars equipped with a PowerDrive Golf Car Solar Panel from **POWERFILM** experience increased battery health due to trickle charging and last up to two years longer than batteries in cars without this solar solution, the company says. The PowerDrive panel weighs less than five pounds and installs in minutes. PowerDrive panels are sold in four variations to fit E-Z-GO RXV and TXT cars, Club Car Precedent models and a generic option to fit most other electric vehicles. *Golfdom* readers are invited to download the complete field test report for more information, available at: powerfilmsolar.lpages.co/powerdrive-golf-car-golfdom/Powerfilmsolar.com

The 19th Hole



Brian Birney

SUPERINTENDENT // The Club at Admiral's Cove (East Course), Jupiter, Fla.



You want to stick with beer?



Let's stick with Chancellor (Ale, Tequesta Brewing Co., Tequesta, Fla.), it's flowing good.

What time does Florida play tonight?

10 p.m. And you know it's going to start way later than that. It makes me so mad. I'm going to have to record it and watch it at 5 in the morning.

You met (wife) Amanda while you were at Florida, right?

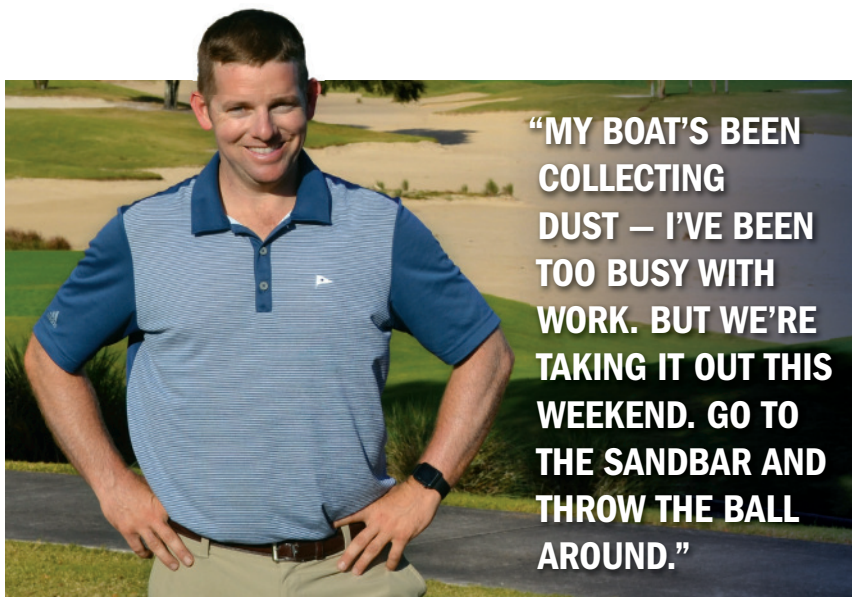
Yes, our freshman year. It was my birthday, Oct. 10th, 2004. It was at a tailgate for the Florida/LSU game.

I hate to ask this, but how many championships did you see while at Florida?

I was enrolled for three of them. Amanda was their good luck charm, she was there for all four. It was a good run, but then I got used to winning — I don't know why we can't get back to that. Maybe I need to go back for my master's.

Tell me about Admiral's Cove.

It's 45 holes of golf, but it doesn't stop there. We've got a marina, a fitness center, a spa, restaurants... members never have to leave. It's one of the top 10 residential clubs in the nation. And, it's a great place to work — Mr. Herring (general manager/CEO) and Blair (Kirby, director of golf course maintenance) maintain a great culture with a lot of positive energy.



"MY BOAT'S BEEN COLLECTING DUST — I'VE BEEN TOO BUSY WITH WORK. BUT WE'RE TAKING IT OUT THIS WEEKEND. GO TO THE SANDBAR AND THROW THE BALL AROUND."

What's (2-year-old) Colton up to these days?



He's the Energizer Bunny! And he's growing like a weed. He doesn't sleep much. He loves to be outside, loves to hit (golf) balls off the mat. And somehow, he's a lefty.

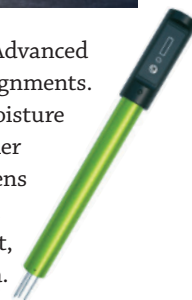
How do you keep things light when the crew is just getting their butts kicked during a hard week?

Our most difficult time is during aerification. I'll go to Costco and buy a bunch of Gatorades. We'll grab a spot with some shade and shoot (the breeze). I just want to show them some compassion that I appreciate that they're grinding.



What's your favorite tool in the shop? I just love how the industry is utilizing technology. We use SPaRKS for

chemical tracking. We use Advanced Scoreboard to track job assignments. We use the Pogo to track moisture and salinity. It makes it easier when we present to the greens committee — we're not just pulling things out of our hat, we're giving them hard data.



Fill in the blank: I knew this was the career for me the day I _____.

It was after working the first week of an internship for Craig Currier at Bethpage State Park. At some point that week I sat down and said to myself, "Man, this is pretty cool." I've loved it ever since.

So how far are you taking your Gators?

I hate to say this... I've got your Jayhawks knocking them out.

As interviewed by Seth Jones, March 15, 2018.

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