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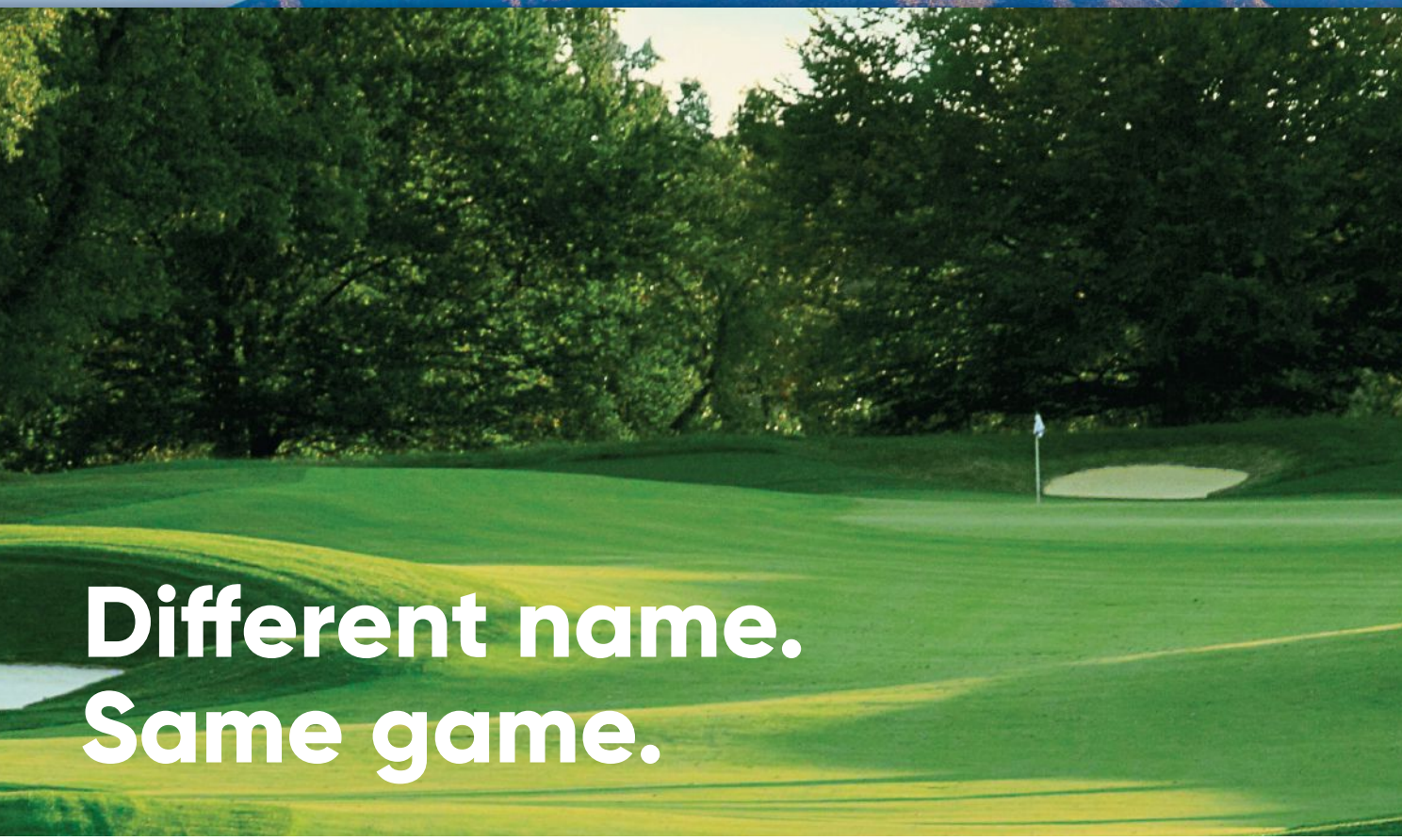




## Feeling the heat? Here's some relief, including:

- Two feature stories by supers
- The 2019 Fungicide Report
- The debut of new columnist Carlos Arraya, CGCS

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# SUMMER SPECTACULAR

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## COLUMNS




## SUPER SCIENCE



## FOCUS ON FUNGICIDES



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"... if you're expecting Mötley Crüe levels of depravity, you're going to be disappointed. But I'm going to give you my version of this month's member/guest."

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

# Behind the music

The member/guest was only 48 hours away. Then two guys pulled a no-call/no-show. Then there was an irrigation line break. Just when it couldn't get any worse, Mother Nature reminded you that she's in charge, and washed out bunkers across the course.

Somehow your team pulled it off, even though you had to fake a few things to get through it. The member/guest was a success. Maybe you got a pat on the back, but you probably didn't. One thing is for sure: None of the golfers wanted to hear about the two jackwagons who no-showed, or about how deep the hole was you had to dig to fix that irrigation line ...

... they were just happy to enjoy the results of your hard work. There was no need for a VH1 "Behind the Music" recap of the rise, fall and rise again of your workweek. The devil is in the details.

Similarly, no one asked for a Behind the Music of this issue of *Golfdom* — and if you're expecting Mötley Crüe levels of depravity, you're going to be disappointed. But I'm going to give you my version of this month's member/guest.

**Starter (page 8):** Note the sidebar on page 9, detailing our recent success at the annual TOCA and Azbee awards. I'm proud to see our magazine recognized, and I'd like to point out that *Golfdom* has reclaimed the "Best Column, Series," award. That makes three of the last four years (Matt Neff in 2016, my column in 2015 and now 2018) that the award resides within the pages of *Golfdom*. And I challenge my fellow *Golfdom* columnists to pry that award from me.

**Cutting to the Chase (page 12):** Speaking of the quality of columns this magazine is known for, three months ago, I was worrying about the hole I had in my stable of regular columnists since the untimely passing of my friend Steve Wright, CGCS. Then an idea ... I should reach out to Carlos Arraya, CGCS at Bellerive CC in St. Louis. Carlos is well known in the industry, not just because of his success hosting the 2018 PGA Championship, but also because of his passion for empowering his crew. I'm thankful he has accepted the challenge of being a columnist for *Golfdom*, and I look forward to seeing what he brings to the magazine. Interesting note: Carlos and Steve were longtime friends. I'm sure Wright would be happy that Carlos is the person stepping up to share his thoughts with the industry.

**Six senses (page 31):** Immediately following this year's GIS, I got an email from Jeff VerCautren, superintendent at Rich Harvest Farms, Sugar Grove, Ill. Jeff had already published this story in the Northwestern Illinois GCSA publication, *Turfgrass Times*. Fellow NIGCSA members told Jeff, "That's a pretty good story ... you should submit it to *Golfdom*." He did, we loved it and here it is. A further nice touch: Jeff refused to be paid for the story and instead asked that we donate to the Wee One Foundation on his behalf.

**Left glove (page 38):** Matt Cavanaugh started writing for us five years ago, when he was a research scientist at the University of Minnesota. The superintendent lifestyle lured him back to the grass-growing game, and now he's back at Rush Creek GC in Maple Grove, Minn. His creativity often is unleashed on the turf world via the Twitter feed @RushCreekGC ... it's like the Saturday Night Live of golf maintenance. I'm glad Cavanaugh is on our side.

**Clark Talks Turf (page 52):** In dramatic VH1 narrator voice — *But then the day came when there were nematodes!*

**19th Hole (page 56):** Always my favorite page of the magazine, always fun to write. But there's no awards category for this page. There's also no need. When you love doing what you do, it shows in the work.

Email Jones at:
sjones@northcoastmedia.net.

# Ladies first

## Women in the golf industry are banding together to build their careers

*(L to R) Jennifer Foote, Trish Sloan, Leasha Schwab, Jessica Lenihan, Miranda Robinson, Bethany Chambers and Amanda Frend at the Women in Turf panel.*

Being the only woman in the room — or on the golf course — never really fazed Miranda Robinson when she entered the turf management industry. She grew up with two older brothers and played co-ed sports, so she was comfortable working mostly with men.

Still, she acknowledges the subtle cues that you're in the minority as a female turf manager are hard to ignore.

Robinson

Take, for example, golfers approaching her for a beer, when she's obviously doing a maintenance task.

"Just because I'm a female doesn't mean I'm on the beer cart," she says.

Luckily, Robinson and other women in the industry are connecting in person and online to support one another.

Robinson recently started as second assistant at Cordova Bay Golf Course in Victoria, B.C. It's an 18-hole championship course on Vancouver Island that's maintained by a staff of about 20. It meant a cross-country move and a big change from her previous role as a superintendent in Ontario.

She is grateful to have been mentored by two female superintendents, including Jennifer Pendrith, superintendent at Kawartha Golf & Country Club in Peterborough, Ontario.

"When I first moved from assistant to superintendent (in my previous job), all (Pendrith) said was, 'You've been doing this job the entire time, now you just don't have anybody telling you what to do,'" Robinson recalls. "It was a good push to let me know I'll be fine."

Likewise, Robinson has had the chance to encourage other women, including Trish Sloan, assistant-in-training at Sun Peaks Golf Course in Sun Peaks, B.C. Sun Peaks is an 18-hole mountain resort course with a maintenance staff of 12.

Sloan's father is a superintendent whom Robinson worked under earlier in her career, which is how they connected.

"Having a dad as a superintendent is amazing, and I have him to go to for specific turf-related questions, as well as my super, who always makes himself available for advice and support," Sloan says. "But it's lovely to have (Robinson) to go to about being a female in this industry and the issues that come with that."

Sloan

Both Robinson and Sloan spoke on a panel about women in golf at the Bayer booth at this year's Golf Industry Show. They keep in touch with each other and other industry women on Twitter.

"I'm really glad there are other women out there who are able to mentor me and younger women who are considering the industry," Sloan says.



PHOTO BY: SAM PATTERSON

# Starter

NEWS, NOTES AND QUOTES

//FRIEND OF *GOLFDOM* IN HOF

## CAROLINAS GOLF HOF GAINS NEW MEMBER

**By Sarah Webb** // *Associate Editor*

The Carolinas Golf Hall of Fame recently inducted Bob Farren, CGCS, Pinehurst's director of golf course maintenance.

"I was very moved by it," Farren said. "I've been to a number of ceremonies of the people honored in the past, and I've always held them in really high regard."

Farren chuckled and added that when Carolinas Golf Association Executive Director Jack Nance asked to speak with him, he assumed Nance was going to ask him to introduce the person who was to be inducted.

Farren, a native of West Virginia, joined Pinehurst in 1982. He has worked on eight USGA championships at Pinehurst, including three U.S. Opens and the U.S. Women's Open. He's received the President's Award for Environmental Stewardship from the Golf Course Superintendents of America in 2007 and *Golf Digest* magazine's Green Star Award in 2014.

He mentions bringing Pinehurst back to relevance in the world of championship golf after it had fallen on hard times as a highlight of his career.

"I have prided myself on the response of Pinehurst's golf maintenance and golf management divisions on being able to be resilient, creative and resourceful," he said. "To stay and remain part of that for almost four decades, it's been special."

As for the sport's future, Farren said it's time to bring more fun into golf, referencing Pinehurst's new par-3 courses.

From left: Pinehurst President Tom Pashley, Pinehurst CEO and owner Bob Dedman Jr., Carolinas Golf Association inductee Bob Farren and golf course architect Gil Hanse.

//THE GRASS IS GREENER

## TROON ACQUIRES GREEN GOLF PARTNERS

**Troon has acquired Green Golf Partners, an Indianapolis-based golf course management firm.**

**Green Golf Partners currently manages 18 public and private golf courses in five states, including Florida, Illinois, Indiana, Iowa and Wisconsin. It was founded in 2011 and the company's employees have more than 100 years of combined experience in the golf and hospitality industries.**

**"This is obviously a game changer for our company," said Matt McIntee, Green Golf Partners CEO. "Green Golf Partners was built using Troon as the model, and we are absolutely thrilled to collaborate and partner with Troon. We look forward to continuing to accelerate our growth in partnership with Troon."**

**The deal follows Troon's acquisition of OB Sports Golf Management in early April.**

//NEW DISTRIBUTOR ON THE BLOCK

## CENTRAL TURF NAMED BASELINE IRRIGATION DISTRIBUTOR

**Central Turf & Irrigation Supply, a North American wholesale distributor of irrigation and landscape supplies, has been named an authorized distributor of Baseline Irrigation Control Solutions.**

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PHOTO BY: JACKSON SWEEN/CAROLINAS GOLF ASSOCIATION / ISTOCK.COM, WELLGLAD (GOLFBALL)

//GOLF TAKES A TRIP

The 2019 National Golf Day in Washington, D.C., featured two days of volunteering, networking and advocacy for the golf industry.

# Hundreds show for National Golf Day

BY SARAH WEBB // *Associate Editor*

The 2019 National Golf Day took place April 30-May 1.

A total of 201 golf insiders signed up for the community service project at the National Mall, and 219 signed up to participate in the legislative day on Capitol Hill, according to We Are Golf.

The National Mall project included laying sod, overseeding, aerating, planting perennials and more. Topics discussed on Capitol Hill included golf business labor and tax issues, environmental issues facing golf and the Personal Health Investment Today Act.

"Even though I have been in the golf industry for many years, I learned a lot about what golf means to our nation's economy, how many jobs across the country are tied to the game and the amount of dollars contributed to charities," said first-time participant Robert Markionni, executive director of the Chicago District Golf Association. "Golf is the sport of a lifetime, and having the opportunity to tell the story of the positive impact the game has to our elected officials is a very important and worthwhile endeavor."

GO FIGURE

**$364,000**

**The amount yielded by the 2019 Rounds 4 Research online auction, making it the most successful in the program's history, up $51,000 from 2018. More than 1,465 rounds of golf were sold.**

*Source: GCSAA*

PHOTO BY: KEVIN DIETSCH

//BRINGING HOME THE HARDWARE

## AWARD TOUR

**This spring, *Golfdom* won 15 awards at the Turf & Ornamental Communicators Association meeting in Charlotte, N.C., and five awards at the American Society of Business Publication Editors meeting in Tampa, Fla.**

**Turf & Ornamental Communicators Association**

- Series of columns (first) "Keeping up with the Jones," Seth Jones
- Ornamental feature article (first) Aug. 2018 – "Wildflower meadows for the busy superintendent," Hannah Schrum
- Operations profile (first) July 2018 – "PGA Championship preview: A superintendent for the people," Seth Jones
- Headline writing (first) Nov. 2018 – "The dollars (and temps) of greens covers," Seth Jones
- Innovative use of social media (first) "2018 PGA Championship social coverage," Seth Jones, Kelly Limpert, Abby Hart, Grace Rybak
- Best single photo (first) June 2018 cover photo, Kevin Dietsch
- Best print magazine cover (first) Nov. 2018 – "Distance Education," Seth Jones, Pete Seltzer, Andrew DeGraff
- Column - commercial publications (merit) April 2018 – "Message in a ceiling," Seth Jones
- Turf feature article - commercial publications (merit) Aug. 2018 – "Thin white line," Paul Koch
- Product information article - commercial publications (merit) Oct. 2018 – "Fully charged," Abby Hart; Feb. 2018 – "He's got a ticket to drive," Seth Jones
- Best single photo (merit) "2018 U.S. Open preview," Seth Jones
- Portrait/Personality (merit) Sept. 2018 cover – "T.A. is Taking Care of Business," Tom Lebsack
- Cover page design (merit) Nov. 2018 cover – "Distance Education," Pete Seltzer, Andrew DeGraff, Seth Jones
- Writing for special projects (merit) Dec. 2018 – "State of the Industry," *Golfdom* Staff

**American Society of Business Publication Editors**

- Group Profile – Regional Gold "Distance Education," Seth Jones
- Individual Profile – Regional Silver "2018 PGA Championship: A superintendent for the people," Seth Jones
- Online Single Topic Coverage by a Team – Regional Silver and Best Social Media Campaign – Regional Bronze, National Bronze "PGA Championship social coverage," Seth Jones, Kelly Limpert, Abby Hart, Grace Rybak

# Golfdom Gallery

2019 PGA BETHPAGE BLACK EDITION

**1** **Rolling fairways** GCSAA CEO Rhett Evans (left) and Bethpage State Park Director of Agronomy Andrew Wilson take a ride to check out the conditions of the Black Course.

**2** **The GCSAA BOD with a past prez** (Left to right) GCSAA President Rafael Barajas, CGCS; Kevin Sunderman; Evans; Mel Lucas Jr., CGCS-Retired; John Fulling Jr., CGCS; and Kevin Breen, CGCS, take time for a photo at the PGA Championship. Lucas served as president of GCSAA in 1980.

**3** **Light reading** Cindy, a future-superintendent-in-training from Shinnecock Hills, checks out the Bethpage Black cover story in *Golfdom*.

**4** **On the divot crew** (Left to right) Paul Walton, Delphine Tseng, Wilson and Jamie Hughes scour the fairways at Bethpage to fix any and all divots.

**5** **Now joining Golf Channel ...** (Left to right) Rich Lerner, Brandel Chamblee, Frank Nobilo and David Duval welcome Wilson to the set.

**6** **They got next** The TPC Harding Park crew visited New York to observe the 2019 PGA Championship. The 2020 PGA comes to their place in San Francisco next May. (Left to right) Geoff Plovanich, managing agronomist; Almar Valenzuela, superintendent; Phil Ginsburg, general manager; Kevin Teahan, director of golf; Jim Semar, assistant director of Bethpage State Park, and Wilson.

PHOTOS BY: DELPHINE TSENG (1-3, 5, 6); MAX GINTY (4)

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"The friend (my mentor) who was assisting me in preparations looked at me calmly and asked me the question that changed my approach to life. 'What,' my mentor asked, 'is your intent?'"

**CARLOS ARRAYA,** *CGCS, Bellerive CC, St. Louis*

# Living with intentionality

It's no secret that social media platforms are the New Age scrapbooks. They provide our friends and families immediate access to the most memorable moments of our life journey. The pictures and videos allow the opportunity to travel back in time to relive, reflect, laugh and cry. It is a precious gift that we get an opportunity to see how we've developed as people and how our life journeys evolve over time.

It is not by coincidence that all our friends and families who like, retweet or repost our social media content serve bigger roles in our life. They knowingly or unknowingly serve multiple purposes in our lives that are unique for each of us. Mine serve as a support group and as mentors. Without them, my life journey is simply absent of accountability, and my development falls short of its true potential. Most of you who have those friends in some form or fashion can relate.

I would like to share a story that taught me the power of mentorship and friendship. I was preparing for an important moment in my life, and the intensity of the preparation was getting the best of my emotions. The friend (my mentor) who was assisting me in preparations looked at me calmly and asked me the question that changed my approach to life. "What," my mentor asked, "is your intent?" At that time, I did not realize the power of those four words in question form. Everything I have done since that moment I've done with a sense of intentionality and purpose.

When asked to be a columnist for *Golfdom,* I jumped quickly at the opportunity. As the days went on and the excitement wore off, the nerves kicked in. I started to doubt that I had anything to contribute that was worth reading. As the doubt took over my mind, I asked myself the question, "What is your intent?" I pondered for a few days, then it became clear to me: Write with the intention of positively connecting with those readers in need. If one reader benefits from my words, it was well worth becoming a columnist.

Now, what happens when our life plans fall short despite having intentionality? What if you mishandle a situation, and it makes you appear unfit? What if you are spending more time at work and less time with your family? What if you lost a big sales account or have lost several greens? What if your health is failing because it's not been your priority? What if you privately struggle with your mental health? Are you divorced because you've neglected the relationship? Simply put, you are going through life's tough times. It's OK, don't be afraid or feel alone, because you are not.

We all will fail or have failed during our lives. We shall experience turf loss, neglect something or someone we love and will fall short of life goals. If we are going to struggle, why not live a life full of intentionality? Live with the intent to share your story, to appreciate each day, even those moments that fall short of your desired expectation, and to experience the joy of living.

As time has passed in my life, I have come to the stark realization that life is simply an opportunity to live with great intent. In the coming months as a turfgrass columnist, I will write columns with the intent to provide *Golfdom* readers a perspective from my eyes. Though I may doubt my ability to write, I have no doubt that my intent will connect to at least one individual. I look forward to connecting, encouraging, sharing stories and challenging the norm with you. Our life journey is a one-ticket ride, no refunds, no rain checks. Live with intent.

**Carlos Arraya, CGCS, is director of grounds and agronomy at Bellerive Country Club in St. Louis. Follow him on Twitter at @carrayacgcs.**

# The Golfdom FILES

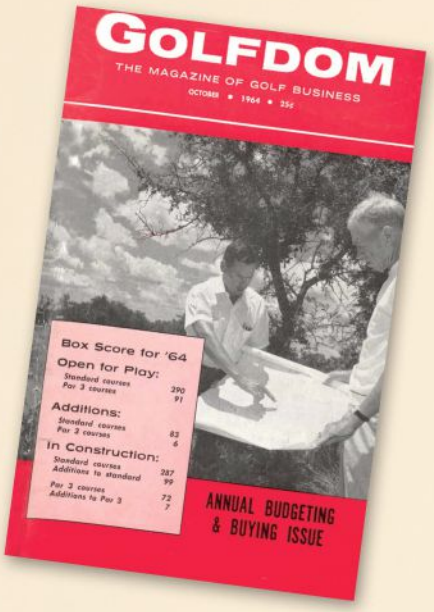
FROM THE ARCHIVE

Devastation! Destruction! Mass chaos! Those are the headlines you'd expect to see when reading an article about a golf course hit by a massive earthquake. Somehow, when a 9.2-magnitude earthquake rocked southeastern Alaska on March 27, 1964, Moose Run Golf Course at Ft. Richardson — about 80 miles east of the epicenter of the quake — came through with hardly a scratch. In fact, the earthquake somehow improved turf-growing conditions at the course. This article, from the October 1964 edition of *Golfdom,* details how the season after the earthquake was one of the best for the course, which was able to open earlier in the spring than usual and saw an 80-percent increase in play as of early September that year. To read the full article, visit **golfdom.com/exclusive**.

# Moose Run rolls with quake, then has its biggest year

The earthquake that last winter shook Alaska to well below its foundation might have occurred on another planet, so far as the golfers at Moose Run GC in Ft. Richardson, Alaska, are concerned. The farthest-north layout in the U.S. wasn't completely immune to the ravages of one of the most severe tremors ever recorded, but it escaped with relatively little damage. A huge stone fireplace in the clubhouse was badly mauled and had to be replaced, and several fissures of no more than finger-width proportion were detected on the course. Otherwise, Moose Run proved to be quakeproof.

It would hardly be accurate to say that the Ft. Richardson course snapped back in a hurry. But in 1964, it has had its best season since it was constructed 13 years ago. According to Mac Taylor, pro, superintendent and manager of the GI layout, play as of early September was up 80 percent over the previous season, pro shop sales were running 60 percent ahead of those of 1963, and from a turf or agronomical standpoint, the course never was in better shape.




Being north of the 61st parallel, Moose Run isn't plagued by high temperatures and high humidity, and turf disease is literally unknown. But this plus factor is counteracted by low soil temperatures, the makeup of the soil itself and winterkill, which more often than not has a devastating effect.

Low soil temperatures inhibit early germination of seeded bent and induce a deep freeze in the winter and consequent slow thawing in the spring. Soil in the Ft. Richardson area is glacial silt, which is similar to clay, and it isn't conducive to deep root growth. On a tract such as a golf course, a constant battle to loosen the soil structure goes on. Taylor aerifies frequently during the playing season and, in his estimation, applies enough of a 3-1 sand/soil topdressing mix to make a continuing elevation change from year to year.

Most winters, Moose Run is afflicted with a series of freezes and thaws that build up solid ice sheets to a depth of 5 to 6 inches. Air simply does not circulate under the ice layer, and winterkill becomes almost intolerable. But they say that Nature has a way of compensating for its misdeeds, and that is what it did in 1963-64. Terrain that wasn't bulldozed by the earthquake came through in excellent shape. Nothing worse than sponge ice covered the Moose Run layout, winterkill was superficial, and in the spring, the course was ready for play several weeks earlier than usual.

In 1963, Taylor experimented with polyethylene as a cover for greens for the first time. He covered half of the putting surfaces on the 18-hole course late in October, anchoring them with brush. But because of a relatively mild winter and since only sponge ice covered the greens, the Moose Run factotum isn't sure that it was worth going to the bother of covering any putting areas at all.

When the greens were uncovered on April 20, which may have been a week or so too soon, the thaw depth was a rather spectacular 15 inches. On greens that hadn't been covered, it was no more than 3 inches.

"Operating an aerator is like wrestling George 'The Animal' Steele. The clamorous nature of the machine makes it painfully loud, difficult to maneuver, a bit spasmodic and, as previously mentioned, painfully slow."

**JOE GULOTTI,** *superintendent, Newark (Del.) CC*

# Rethinking the lamest job

*"The process of aerating is as tough on the crew as the playability of aerated greens is on golfers. It takes time to aerate greens because the machines used for this task run at a turtle's pace. Depending on the size of your greens, it usually takes two operators close to six hours to complete. And that's if one of the machines doesn't break down, which usually seems to happen.*

*The machines themselves are not glamorous. They're basically 3-foot by 3-foot boxes on three wheels, powered by an engine with belts connected to a drive shaft that aggressively moves the aeration tines up and down at a frantic pace. Operating an aerator is like wrestling George 'The Animal' Steele. The clamorous nature of the machine makes it painfully loud, difficult to maneuver, a bit spasmodic and, as previously mentioned, painfully slow.*

*It's also not a gig where you sit on your tuckus soaking in the majestic green that is a golf course while daydreaming about how rad Natalie Portman is because you're constantly stepping with that piece. By the time you're finished punching all those greens, you kind of feel like punching your boss in the face for giving you such a dreadful assignment. Core aerating greens is perhaps the lamest job associated with the profession of greenkeeping."*

I nearly submitted this cynical — yet honest — diatribe explaining core aeration, written nearly seven years ago, to the monthly newsletter of the club where I worked. After letting our assistant proofread what I deemed to be a masterpiece, he suggested I tone it down. Despite my longing to submit this instant classic, the assistant was correct. I went back and busted out some boring slop, making sure it was more appropriate for the club newsletter.

Most greenkeepers know why we core aerate, but I've been trying to do less of it. Earlier in my career, any golfer asking if punching a million holes on a putting surface is necessary would have received an earful.

For example, my brother-in-law — an avid golfer — was going off on how lame it is to putt on aerated greens, so I explained to him in detail why we core aerate. Unfortunately, my explanation fell on deaf ears. No matter how I attempted to stress the importance of alleviating compaction, enhancing gas exchange, developing stronger roots, removing organic matter, along with all the other force-fed lines greenkeepers vomit concerning this practice, he just shook his head in disbelief while countless times uttering, "There has to be another way."

In all honesty, I did not fathom an alternative. However, this conversation stoked a ponder. I asked myself, "If the organic matter or thatch on putting surfaces is in a manageable percentage range, and growth can be manipulated where the percentage of organic matter could remain consistent, then why core aerate?" It was a lightbulb moment, and from that point forward, I shifted my management style in an effort to control the growth rate on greens.

I eliminated from my regimented program granular forms of fertilizer, along with targeting an annual amount of nitrogen applied throughout a season. To the chagrin of my sales reps, I dissed the designer spoon-feeding program and went to the brown bag. I used Pace Turf's growth potential model to time my nitrogen apps and implemented the minimum levels of sustainable nutrition guidelines. I applied plant growth regulators using growing-degree intervals as opposed to bombing trinexapac-ethyl every two weeks. Topdressing more frequently also was in play, along with actually observing the thatch layer.

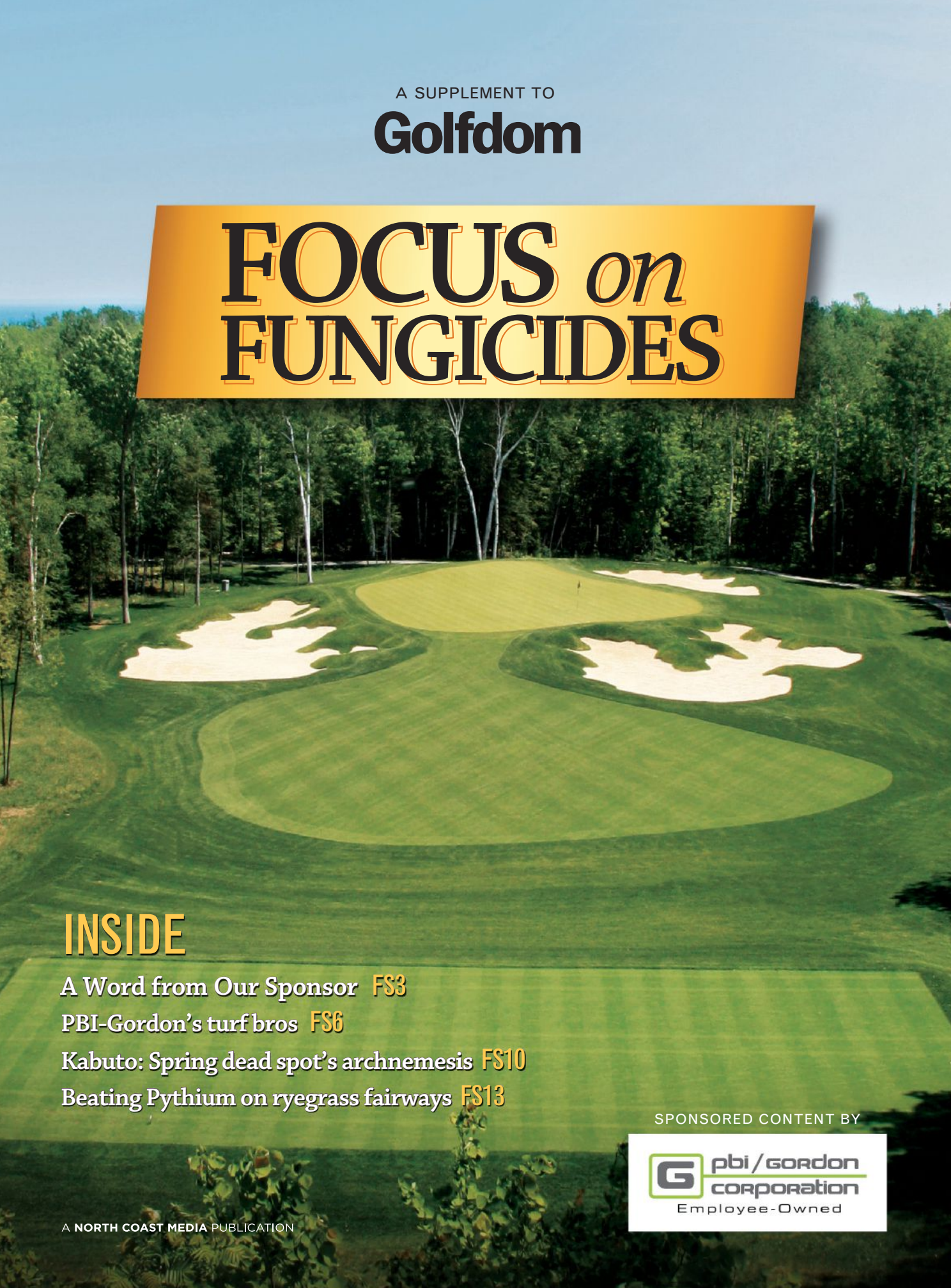
This alternative approach has worked well so far, and the putting surfaces have performed remarkably well despite not being core aerated the past couple of seasons. And now when I talk with my brother-in-law, I can tell him that, yes, there is another way. G

**Joe Gulotti (hardg43@gmail.com) is the superintendent at Newark (Del.) CC. To read his blog, visit thewalkinggreenkeeper.com.**

A SUPPLEMENT TO

Golfdom

# FOCUS *on* FUNGICIDES



## INSIDE



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A Word from Our Sponsor

# Review of 2018: Problematic diseases and fungicide efficacy testing

**BY BRIAN AYNARDI, PH.D.**

Weather in the 2018 growing season varied widely by region. The Midwest and parts of the western United States were dry throughout most of the summer and into the fall. Meanwhile, the eastern U.S. saw one of the wettest years on record, particularly east of the Appalachian Mountains. Accordingly, much of the eastern seaboard turned into a superintendent's worst nightmare, with many diseases remaining active for continued periods and poor conditions for turf recovery.

A variety of diseases caused significant problems for turfgrass managers throughout the eastern part of the country in 2018, including: anthracnose, brown patch, dollar spot, gray leaf spot, mini-ring, summer patch, Pythium foliar blight and Pythium root rot. Commercially available products were given a true test in the field, both for efficacy and longevity. Remember that the best pathogen control (and subsequent disease control) doesn't come from a single product, but from the integration of various products with effective MOAs. This article will review fungicide efficacy from results in various university and private contracting tests, in addition to notable observations from the field regarding disease control.


Brian Aynardi

Anthracnose, found especially on *Poa annua* greens in the mid-Atlantic and northeastern U.S., was as usual, a problem in 2018. Various products provided effective control of *Colletotrichum cereale* in field trials, including: Tekken broad spectrum fungicide (PBI-Gordon), Fame + C (FMC), Tartan Stressgard (Bayer Crop Science), Velista (Syngenta Crop Protection), as well as the new active ingredient mefentrifluconazole, which is currently in registration. This active was effective as a standalone called Maxtima, as well as part of a premix with pyraclostrobin (BASF). Strobilurin fungicides and premix products with this group of fungicides are very effective, except where resistant strains of *C. cereale* are present. Don't forget: Regularly spoon-feeding the plant with quick-release nitrogen in conjunction with your fungicide program is one of the best courses of action in controlling anthracnose.

Brown patch thrived in bentgrass and tall fescue in 2018, and a variety of active ingredients provide excellent control of *Rhizoctonia solani.* New to the market in 2019 will be Pedigree Fungicide SC, a nongeneric SC formulation of flutolanil (PBI-Gordon). This joins other standby brown patch products, including Tekken, Exteris Stressgard (Bayer Crop Science), Velista and Navicon (currently in registration).

Dollar spot exploded in many places early in the season and persisted into early fall. Resistance of *Clarireedia* spp. to SDHI fungicides further complicated control options, as there is already documented resistance to

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*Continued from page FS3*

benzimidazoles, dicarboximides and demethylation inhibitors. If you believe you have an SDHI-resistant population, it is highly recommended that you get it tested by a university.

Resistance among SDHI fungicides is caused by various mutations, and some active ingredients within that group will perform better than others based on the specific mutation. That said, in areas where SDHI insensitivity (or resistance) is occurring, premix products or tank mixes with an additional mode of action provided excellent control. For example, Tekken features two active ingredients (isofetamid + tebuconazole) that both provide strong control of dollar spot. Tekken performed very well at both university trials and in the field, providing up to 28-day control.

Gray leaf spot was problematic in 2018 — not surprising with the excessively wet and humid environmental conditions. This disease is found on St. Augustinegrass and tall fescue, but it is very damaging to perennial ryegrass. No single product provides absolute control of the pathogen. Strobilurin fungicides are strong control tools except among populations resistant to this class. Inclusion of thiophanate-methyl or chlorothalonil (various manufacturers) into a control program or tank mix is essential for disease management.

Mini-ring, formally referred to as Rhizoctonia leaf and sheath blight, seems to be an increasing issue on bermudagrass greens. Research trials with North Carolina State University and Clemson University demonstrated that different locations resulted in varying levels of control with two products, Pedigree and Heritage Action (Syngenta Crop Protection). However, Tekken as a curative treatment provided excellent control in both trials.

The pathogen causing summer patch (*Magnaporthiopsis poae*) begins to cause infection when soil temperatures are approximately 65°F at the 2-inch soil depth. However, symptoms are not observed until hot, wet weather appears in the summer. These conditions were common in 2018, and testing at several university locations demonstrated excellent control from Tekken, Fame + T (FMC), Briskway (Syngenta Crop Protection), Headway and Navicon (currently in registration).

Frequent rains out east in conjunction with warm, humid air provided ideal conditions for Pythium blight development from June through August. The best control was found with Segway Fungicide SC (PBI-Gordon). Since its inception, Segway has consistently provided complete or near complete control in university testing. Of the products currently in federal registration, Union fungicide (PBI-Gordon) provided exceptional control of Pythium blight. This premixture of Segway (cyazofamid) plus azoxystrobin will offer broad-spectrum disease control in addition to unsurpassed control of Pythium diseases. Banol (Bayer Crop Science) and Subdue MAXX (Syngenta Crop Protection) are excellent rotational partners with Segway.

Pythium root rot is a major problem on creeping bentgrass and mixed bentgrass/*Poa* putting greens, especially those with poor drainage. As with other root diseases, infection by the pathogen begins earlier in the growing season but symptoms become especially apparent when significant water and heat become prevalent. Segway is the gold standard in root-rot control, although alternating with strobilurin fungicides and rotating with Banol + Signature or Subdue MAXX is highly efficacious. Union fungicide was also a standout with both preventive and curative control of Pythium root rot.

Weather conditions in the East provided the necessary environmental component for the development of various diseases. While end users have a variety of products available for disease control, travels to various research locations and a review of the results of 2018 trials show the products mentioned in this review were top performers. Remember, one product alone is not the solution. Rather, it is the integration of top-performing products into a well-developed program that not only yields the best results, but also acts as a deterrent for resistance development.

**Brian Aynardi, Ph.D., is the Northeast research scientist for PBI-Gordon. Aynardi is a turfgrass pathologist and has conducted numerous research projects on the management and control of anthracnose, along with many other diseases. You may reach him at baynardi@pbigordon.com for more information.**


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The Golfdom Conversation

# PBI-Gordon's turf bros

The six friends who comprise PBI-Gordon's turf research and development team — four of them former superintendents — discuss the company's investment in golf

BY SETH JONES

**Golfdom:** Gentlemen, thanks for taking the time and getting everyone together here in San Diego. To start off, let's give everyone a chance to introduce themselves and tell us a little bit about themselves ...

**Chris Williamson, Ph.D.:** I'm Chris Williamson, I was a professor at the University of Wisconsin-Madison for about 20 years. I was the Extension entomologist, and the opportunity presented itself, so I came on board here. I am responsible for the Midwest, but I also cover Colorado, Utah, California. My expertise is entomology. I'm also a former assistant superintendent and a research scientist with TruGreen.

**Jeff Marvin, Ph.D.:** I'm Jeff Marvin, director of research. I organize our research internally and externally. I came out of undergrad at Penn State and I went to Florida, where I was a superintendent for about nine years. I wanted a career change, or more of a challenge — I don't know if there is more of a challenge than being a superintendent — but maybe a different set of challenges. I went back to grad school at Clemson, worked on a Ph.D. there with Bert McCarty (Ph.D.) and joined PBI eight years ago.

**Brian Aynardi, Ph.D.:** I'm Brian Aynardi, I'm the Northeast research scientist. I'm a plant pathologist. I got my undergrad from Penn State in grass science in 2007, my Ph.D. from Penn State in plant pathology in 2016. I take leads on fungicide protocols. Then, basically from there, I oversee work on my territory, but I like to sneak into other territories when I can. Other than that, I just take orders from Jim and Jeff!

**Eric Reasor, Ph.D.:** I'm Eric Reasor (pronounced *'razor'*), I was hired back in December. I was an assistant professor at Mississippi State University, where I taught and did research. I have my undergraduate from Virginia Tech, graduate work at Tennessee. I work in the Southeast and the southern part of the country.

**Jay Young:** I'm Jay, an on-site project manager. I oversee all the herbicide business with PBI. I'm a former superintendent, I was a superintendent in Arkansas and an assistant in Atlanta. I'm also a former distributor rep. I've got a degree in turfgrass management from Auburn, and then an MBA from Webster University.

**Jim Goodrich:** I'm Jim Goodrich, fungicide, insecticides and plant growth regulators product manager. I'm a former golf course superintendent. I'm a Kansas State University graduate in turfgrass science. I also was a distributor sales rep for the Lesco Store-on-Wheels. I came to PBI 10 years ago.

**Golfdom:** What is the big news from PBI-Gordon for the 2019 Golf Industry Show?

**Aynardi:** It's Vexis Herbicide Granular, our first proprietary molecule that PBI registered through a partnership with Kumiai Chemical. We received final registration in December of 2018. It has excellent turf safety,


PBI-Gordon's turf brothers. From left: Brian Aynardi, Ph.D.; Jim Goodrich; Jeff Marvin, Ph.D.; Eric Reasor, Ph.D.; and Jay Young. (Not pictured, Chris Williamson, Ph.D.)

PHOTO COURTESY OF PBI-GORDON

even on some really sensitive varieties like St. Augustine, which can be a little bit sensitive to some herbicides.

**Reasor:** We also launched Pedigree Fungicide SC. It controls brown patch, fairy ring, leaf and sheath spot. We're just getting it introduced officially to the golf world. It's a flowable suspension concentrate, safe on creeping bentgrass, Kentucky bluegrass, annual bluegrass, annual and perennial ryegrass, bermudagrass, zoysia and tall fescue.

**Golfdom:** The team of turf experts certainly has grown at PBI-Gordon. When did this investment in people begin?

**Aynardi:** I'm thinking back to when I was at Penn State, and I remember (Marvin) coming to that first field day, so that would've been 2012. So, if you go back to 2010 or early 2011, there was one researcher at PBI. Then in 2011, there were two, so basically from 2011 to 2016, for that whole time, there were never any more than two. And since 2016, it's grown from two to now having four-full time researchers, plus a research farm. We have (Marvin) to thank for that.

**Marvin:** We have had not only an increase in manpower, but probably a four-time or five-time increase in our R&D spend.

**Aynardi:** I'm not saying this because he's my boss, but really it is kudos to (Marvin.) You go back over the years since Jeff has been here, the amount of basic research we have and field work and R&D has just exponentially grown, to where now we have a lot of university guys saying, "Gosh, I'm going back through stuff this year, and you guys are our biggest supporters."

**Marvin:** I was able to bring a true understanding of the need for research for PBI. As PBI grows, we're growing into molecules that aren't 40 years old. We're growing into molecules we have to support from a data standpoint across the board, whether it's registration, whether it's public knowledge, how to use. So, as we move into that, there comes an increase in that knowledge base that we need.

**Golfdom:** This crew strikes me as a group that likes to work hard but also enjoys what they do. You all seem to have an energy for what's going on within this turf team.

**Williamson:** I feel like this is a family. We're like brothers. I mean, we obviously have a job to do. Jeff trusts us, we respect him, trust him, so I seriously don't even think it's a job some days.

**Aynardi:** My wife doesn't understand this all that much, because I'll be on the phone with these guys a lot of the time, like 8 o'clock at night, and she's like, "Why are you still at work?" And I'm like, "I'm not really at work." And she's like, "Well you're talking about work." And I'm like, "Yeah but we're also talking about fun normal

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life things ... but we're also talking about work."

**Reasor:** We talk a lot of hockey.

**Aynardi:** We got to talk Penguins — I'm a big Penguins fan.

**Golfdom:** Not much crossover with golf turf and ice hockey, sorry guys. So, clearly you all get along, but what about the job itself ... why work into the night on these things? Still got the superintendent work ethic in your blood?

**Marvin:** From my standpoint, and I think for any true researcher, it's that idea of what's next, figuring out what's new, how to make something work. I think what probably drives just about every researcher out there is that puzzle piece. Beyond that, I truly enjoyed my time as a golf course superintendent. I look at this role that I have now as a bigger platform to impact the golf industry. You obviously can impact at a local, maybe a national, scenario for golf courses.

**Aynardi:** Working with some of the newer stuff we're working on, including Union (Fungicide SC) along with Pedigree (Fungicide SC), has been really cool to see a lot of that come forward. Having worked with that stuff in grad school, working for a professor where I helped run his fungicide program, it's like Chris said, you don't even consider it working. Your job literally is to come up with things and try out new products that nobody else has gotten to work with! And I get to figure out these new rates and whether or not it's safe. Or go out with crazy rates and see if it works on a disease that nobody expects it to work on. And every once in a while, you hit a jackpot where you come up with some idea, it's a mix of something that's just totally crazy, and it works. And I don't know, to me that's just an awesome thing to be able to get up and do every day.

**Golfdom:** What will we be talking about in a year from now, at the 2019 *Golfdom* Summit, or at the 2020 Golf Industry Show?

**Marvin:** From a standpoint of what's next, I think we have some really nice options on the entomology side of things. I can't go into specific details, but our R&D pipeline, I think, truly would rival any T&O business out there. I can say we have probably five to eight R&D projects and combinations that are on the books that we're working toward. That's what excites me. We will outpace the industry, and that's our goal.

## The *Golfdom* Conversation

**Goodrich:** We have to be able to provide a solution the golf course superintendent wants. If it's a me-too fungicide, we're trying to stay away from that scenario, we want to develop a portfolio that golf course superintendents want to use and recognize the fact that our product is different from everybody else's product. Right now, SDHIs are hugely prevalent in golf, and every time I talk to a golf course superintendent, whether it's at the *Golfdom* Summit or at the Golf Industry Show, they're like, 'We want new products, we want new products, we want new products ... Ah, but we don't want *that* chemistry. We need something other than this chemistry or that chemistry' ... because everything new is a next generation and just seems to be the same or me-too. So that's one of the things we do, and we have that flexibility. When we are overseas looking for molecules, we've had the ability to say, "No, we're gonna pass on that one." Or say, "Yeah, we want that one because it is different."

**Williamson:** We've got some nice opportunities that are going to be presenting themselves, from my wheel house as an entomologist, there's going to be great opportunities, so I'm really excited about that. I feel like we are in a really unique situation. From an entomological perspective, there's some potential products coming down.

When we launched Segway, that was our entry back into the golf industry. Obviously, when we first launched Trimec or Fairway, way back when, the first gallon of that was sold on the golf course. We had that ad in *Golfdom* back in 1970. Segway reinvigorated PBI-Gordon back into golf. We want the golf industry to know that we're here, and we're here to support them, and that's why we do the best at *Golfdom* Summit and we come (to the Golf Industry Show) and we have events for the superintendents. We want them to know we're here and we're ready to support them.

**Young:** I have superintendents sitting in front of me, they're pretty passionate people. I think we still have that passion. We express it in different ways now in-house. Our passions are making solutions. We understand that passion part of it. We feel like we're in a very unique opportunity and place right now because our focus is the turf and lawn care market, whereas some of our major competitors, especially with what's gone on in the ag/chem industry over the last two or three years with mergers and acquisitions, a lot of business may be getting lost in some of our competitors' business now. But our focus is strictly on the golf course superintendent and the lawn care operator. We feel like that's an advantage for us.

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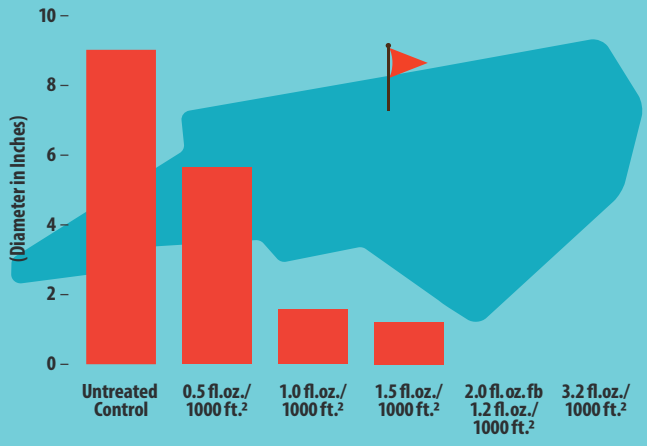


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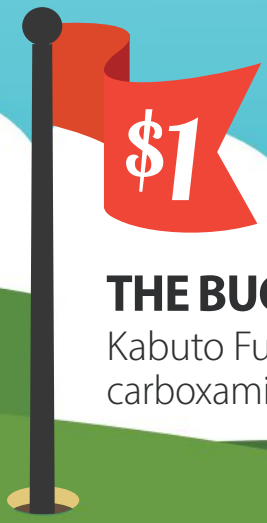


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The scenic Nutters Crossing Golf Club in Salisbury, Md., where Pat Riebe is superintendent.

# Kabuto: Spring dead spot's archnemesis

## To substantially reduce its spring dead spot, Nutters Crossing GC recently conducted a trial with PBI-Gordon

**BY CHRIS LEWIS**

As a severe disease of warm-season turfgrasses, spring dead spot (SDS) is managed throughout the Transition Zone of the United States. Caused by a fungal infection that occurs in the autumn months (particularly as warm-season turf is approaching dormancy), SDS can lead to widespread areas of dead turf that manifest the following spring.

While some cultural practices have been identified to reduce SDS severity, many superintendents often resort to preventive fungicide applications for control. For the last several years, superintendents have widely used tebuconazole as an economic choice, but have observed variability in its efficacy.

Nutters Crossing Golf Club, an Ault, Clark & Associates design located in Salisbury, Md., has battled SDS for several years, as environmental conditions often are conducive for the disease to develop. To treat the issue, superintendent Pat Riebe has sprayed tebuconazole three times a year at three-week intervals.

Unfortunately, he has had little success with the fungicide, as it has not been overly efficacious despite its overall cost effectiveness. Aside from the usage of tebuconazole, Riebe has encountered one other significant issue: Due to a tight budget, Nutters Crossing's bermudagrass fairways do not receive the recommended rates of nutrients all season long.

With this in mind, Joseph Roberts, Ph.D., assistant professor of turfgrass pathology at the University of Maryland, established a relationship with Nutters Crossing in 2015, as he sought to evaluate products for their effectiveness, particularly for controlling the pathogen that causes SDS. He already had been working to identify accepted management practices to reduce SDS,

Pat Riebe

ALL PHOTOS: PAT RIEBE

Riebe noticed nearly 100 percent effectiveness of Kabuto, as seen on the right side of the fairway (top photo).

To compare, fluxapyroxad + pyraclostrobin was +-98 percent effective, as seen in the second photo above; fluxapyroxad + pyraclostrobin was applied on the left side of the fairway.

with a specific interest in examining new fungicides belonging to the succinate dehydrogenase inhibitor (SDHI) class of chemistry.

After two years of the trials, PBI-Gordon Corp. sought to gain more information related to SDS control and began working with Roberts and Maryland's turfgrass pathology program. Because of this association, PBI-Gordon's Brian Aynardi, Ph.D., Northeast research scientist, was introduced to Riebe.

"Dr. Roberts was overseeing SDS fungicide efficacy trials at the course, so I visited to view the trials and meet Pat," Aynardi says. "After I met with Pat, Dr. Roberts suggested a large-scale demo (that) may help him control the disease on several fairways while also evaluating efficacy in a real-world scenario."

At the time, PBI-Gordon had been seeking methods to demo its Kabuto Fungicide SC. Nutters Crossing had severe symptoms of SDS on multiple fairways, along with a superintendent who was willing to help manage trials, so PBI-Gordon had finally found the ideal course to conduct its Kabuto demo.

## Let the trials begin

During the summer of 2018, Riebe and Aynardi developed the following plan. In October, three of the course's most infested fairways would be sprayed with Kabuto. Only half of each fairway would be treated with the PBI-Gordon product, while the other half of the fairway would be sprayed with a competitive product. The nontreated area would be approximately 10 to 15 yards wide; this width would determine the impact of the treatments as well as the ways in which they compare to one another.

"We decided to evaluate Kabuto at the recommended split-application rate (1.6 fl. oz. per 1,000 square feet, followed by another 1.6 fl. oz. per 1,000 square feet) 21 to 28 days apart," Aynardi explains. "This rate has performed consistently well in university trials."

"It would then be compared to two other SDHI stand-alone active ingredients," he continues, "as well as a premix product containing an SDHI. The application would also have to occur when soil temperatures at the 2-inch depth were approximately 70 degrees F for five to seven consecutive days."

This temperature is particularly recommended because SDS begins in

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the fall when soil temperatures decline to 70 degrees F and below (it is always dormant in the spring and summer). Not to mention, fungicides combat the disease — typically renowned as the most destructive bermudagrass disease in the world — most effectively when soil temperatures are between 60 degrees F and 80 degrees F.

Riebe began the trial on Oct.1, 2018, as he applied Kabuto as well as other competitors on three Patriot Bermuda sand-based fairways that frequently had two considerable issues. First, fungicides filtered out of them much faster than Nutters Crossing's other fairways. Secondly, soil temperatures fluctuated more when compared to the other 15 fairways, as they'd either warm up faster or cool down quicker than normal.

All fungicides were applied in a carrier volume of 87.12 gallons per acre, and each fairway had an approximately 5,000-square-foot-wide area left completely untreated. On the first fairway, they sprayed Kabuto at 1.6 fl. oz. per 1,000 square feet on one half, while they sprayed 0.47 fl. oz. per 1,000 square feet of fluxapyroxad + pyraclostrobin on the other half. In comparison, the second fairway was again sprayed with Kabuto (1.6 fl. oz. per 1,000 square feet) on one half, but with penthiopyrad (0.7 oz. per 1,000 square feet) on the other half. Finally, they sprayed the third fairway with Kabuto on one half (yet again 1.6 fl. oz. per 1,000 square feet) and pydiflumetofen on the other half (14 fl. oz. per acre).

This exact application schedule was followed yet again on Oct. 30, 2018. After each application, Riebe personally watered them in with 0.25-inch of irrigation; he also personally sprayed every fungicide during both days of the trial. In addition, Riebe conducted a side trial in which he sprayed Kabuto at a lighter rate (1.0 fl. oz. per 1,000 square feet) on two other fairways. These applications also were conducted on Oct. 1 and Oct. 30 and watered in immediately (once again with 0.25 inch of irrigation).

"The results of the side trial were about plus 90 percent effectiveness," he states. "To compare, when I sprayed three applications of tebuconazole on the fairways in the past, I typically noticed about 20-percent effectiveness."

## The influence of Kabuto

During each application, Patrick Bowers, Delaware, eastern North Carolina, Maryland and Virginia sales representative for PBI-Gordon, viewed each fairway and assisted whenever Riebe needed help. PBI-Gordon provided Kabuto free of charge, while the competitor products were purchased by PBI-Gordon (from a distributor) and personally delivered to Riebe.

Aside from the cost effectiveness of the trials, Riebe also noticed one other substantial positive: results. Each fairway had nearly 100-percent effectiveness regarding the reduction or removal of SDS.

- First Fairway: Currently, there are few symptoms of SDS (primarily circular patches of disease featuring dark and rotten rhizomes, roots and stolons), as the turf has recovered quickly. Fluxapyroxad + pyraclostrobin was 98-percent-plus effective, while Kabuto was almost 100-percent effective.
- Second Fairway: Right now, there are still some vague symptoms of SDS. However, the turf's recovery is nearly complete. Penthiopyrad was 95-percent-plus effective, while Kabuto was once again roughly 100-percent effective.
- Third Fairway: Presently, there are some symptoms of SDS, yet the turf is almost recovered now. Although pydiflumetofen was 90-percent-plus effective, Kabuto continued to maintain its consistency, as it was approximately 100-percent effective.

"From what I have seen over the last three years of multiple trials when I first began working at Nutters Crossing, Kabuto has performed the best of all the fungicides we've used," Riebe says. "Not only has it helped remove SDS considerably, but it has also increased the green-up of the bermudagrass faster than the other chemicals used during the fall."

"Without question," he adds, "it proved to be the very best product for SDS treatment. There's simply no comparison."

Aynardi was also extremely satisfied with the trial results, noting that significant disease was observed only in the areas of the fairways that weren't treated with a fungicide, whereas he noticed outstanding disease control in the Kabuto-treated areas.

"This demo showed that Kabuto provides outstanding control of SDS on a golf course that exhibits severe symptoms of the disease when compared to leading competitor fungicides," he states.

Of equal importance, Aynardi also is pleased about the ways in which Riebe worked in conjunction with Roberts and the PBI-Gordon team to discover new, innovative solutions to better control — and one day potentially eliminate — SDS.

"The trial really demonstrated one of PBI-Gordon's primary core values: partnership," he stresses. "We look forward to partnering with superintendents like Pat Riebe, golf courses such as Nutters Crossing and university researchers like Dr. Roberts once again in the future, as we strive to offer more solutions to courses' most pressing issues."

# Beating Pythium on ryegrass fairways

BY CURT HARLER

If your short game is working and your long game is on, odds are you are going to have a successful round. The same holds for disease control. If one mode of operation is working well and a second can be added for more broad control, diseases don't stand a chance.

That is why the team at Columbia Country Club, Chevy Chase, Md., relies on Segway SC from PBI-Gordon for disease control.

Columbia CC was founded in 1898, and the club's long history is both a source of pride to Superintendent Stephen G. McCormick and a sterling reputation burden to uphold. Every one of the 18 holes must be immaculate and offer players spectacular conditions.

The club's go-to fungicide program is Segway mixed with Primo and spoon-fed liquid nitrogen. It protects

*Continued on page FS14*

A shot of the picturesque fairway on No. 18 at Columbia CC.

*Continued from page FS13*

against Pythium over a period of 14 to 21 days. McCormick sticks to the label timing. He has no desire to stretch it out to see how long the activity would continue. "There is too much disease pressure to risk doing so," he says.

Last year, weather was a challenge. It was much wetter than average, although the area experienced near-average temperatures. In addition to Pythium, McCormick was monitoring fairways for gray leaf spot and brown patch.

If it's not one thing, it's another. That's why superintendents always look for new tools to control disease, and why McCormick attended a PBI-Gordon focus group discussing a new material that should have EPA registration sometime in mid- to late 2019. "To combat disease-resistance issues, I'm always intrigued by and try to use new chemistries as they become available," he says.

**Columbia Country Club still maintains pristine ryegrass fairways and *Poa annua* greens, such as those here on the 350-yard No. 2.**

McCormick recently heard about a new material called Union, another product developed by PBI-Gordon. Union is designed as a preventive and curative treatment of Pythium diseases (blight, damping off, root dysfunction, root rot), brown patch, anthracnose, cool-weather brown patch, yellow patch, fairy ring, gray leaf spot, red thread, summer patch and *Rhizoctonia*. Union is not yet available for sale or distribution.

McCormick already was a big fan of PBI-Gordon's Segway fungicide for Pythium control. Segway is the brand name for cyazofamid, a FRAC 21 chemistry product. Its mode of action basically stops spores from germinating. This preventively inhibits all stages of Pythium fungal development.

"We are very happy with the results," he said. "Despite record-setting summer rainfall totals, we saw no breakthrough of Pythium."

If one solid punch is good, a one-two punch just might be better. A flowable liquid, Union is designed to be that second punch against Pythium. Its label is expected to allow application at 2.9 ounces to 5.75 ounces per 1,000 square feet.

Union gets its name from uniting two active ingredients: azoxystrobin

ALL PHOTOS COURTESY OF: COLUMBIA COUNTRY CLUB

and cyazofamid. Its dual modes of action come from its proprietary combination of chemistry found in FRAC Groups 11 and 21.

Upon EPA approval, Union will be labeled for use on all cool-season and warm-season turfgrasses, including Kentucky bluegrass, fine fescues, tall fescue, perennial ryegrass, bentgrass, common and hybrid bermudagrass, bahiagrass, buffalograss, centipedegrass, kikuyugrass, seashore paspalum, St. Augustinegrass and zoysiagrass.

If McCormick's 2019 is like last year, he will welcome anything he can add to his arsenal.

"Columbia is an old-school club, with the layout being largely the same as it was in 1910 when it was constructed," McCormick says. "We are the only Washington, D.C.-metro private club that still maintains ryegrass fairways and *Poa annua* greens. Those *Poa* greens are amazing," he says proudly. "We are about as far south as you get and still maintain *Poa* greens."

Columbia Country Club is a by-invitation, members-only club.

The design is a beautiful, rolling topography for players. There have been no significant changes to the length of the course.

McCormick, who hails from Peoria, Ill., holds a bachelor's degree in plant and soil science from Southern Illinois University. He worked in St. Louis for five years at Greenbriar Hills Country Club and spent another year at Bellerive Country Club.

"I would say that disease and weather conditions have actually remained fairly consistent in the 16 years I've been here," McCormick says of the course he runs in the humid mid-Atlantic region. "There is always high disease pressure in July and August."

To keep the turf as healthy as possible, the fertility program gets its start in late October with a once-a-year application of granular fertilizer. Typically, McCormick will apply LebanonTurf's Country Club fertilizer with a 21-0-18 or similar analysis. The material, which utilizes Meth-Ex high-activity nitrogen, is available in several formulations.

"That's the only granular we use," McCormick explains. The rest of the year, he supplements with urea, spoon feeding as needed.

"We do not use any preemergence herbicide materials on our fairways or greens," McCormick continues. Rather, they apply a broadleaf control and use Acclaim and Pylex for bermudagrass and goosegrass control. Goosegrass is a real problem at Columbia, and he finds Pylex knocks it out quite well. Still, the crew will do a postemergence or spot treatment to take care of any persistent issues with weeds. Acclaim also works on goosegrass (as well as crabgrass). It is a foliage-absorbed systemic that is rainfast in one hour.

Columbia has been in operation for more than 100 years, so the fertility is fairly established. McCormick has found no need to apply limestone to sweeten the soil, which is deep and loose.

The result is a premium playing experience for members, maintained by a staff of 26 people, including summer and seasonal help.

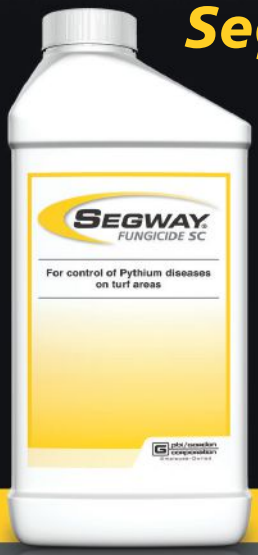
With the course and agronomic program established, there has not been a great deal of modification required at Columbia CC. The club recently renovated No. 2, installing a new bunker and tee complex.

And No. 14 was redone in the spirit of the existing course. The layout plays at 6,600 yards, and anyone golfing Columbia CC can't help but look up and around at the surrounding area. It's an oasis just outside the bustle of Washington, D.C.

"People particularly love the vistas we have," McCormick says of the surrounds on each of the 18 holes. And McCormick loves the turf underfoot that is disease — and weed — free.

**The 16th hole at Columbia Country Club plays at a beautiful 152 yards.**

# NO ONE CAN PUTT WHILE PYTHED.

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# Your 6 senses

BY JEFF VERCAUTREN AND MATT WAGNER

The other day, I was following our train of operators on the way out to their morning assignments. During my travels, I was overwhelmed by the dreaded smell of fuel leaking from something. I immediately radioed my assistants and mechanics to check every fuel cap on every piece of equipment on the course. Fortunately, we got lucky and we were able to locate the leaking equipment before too much fuel spilled on the turf. Most of it was on the cart path.

But what if I didn't have that sense of smell? How long would it have been until someone saw that the fuel cap was not replaced? This got me thinking how much golf course superintendents use all six senses to create the beautiful scenes golfers experience. Let's explore how each of those senses is critical to our job every day.

## Smell

The sense of smell is one of the two chemical senses. I still wonder how the operator didn't smell or feel the fuel as it splashed out of the cart and onto his leg.

Along with detecting those dreaded fuel leaks, superintendents also use smell to detect disease or dead turf. A few years ago, when the Midwest had the hard winter *Poa* kill, our colleague Ed Nagle from the Chicago District Golf Association answered questions like, "Is my *Poa* dead from the ice?" His answer was, "Cut it open and smell it. If it stinks, it's dead." There was no sugar coating it.

For years, supers have used the sense of smell to detect black layer in their soil profile. Imagine how different the golfing experience would be without the smell of blooming crabapple trees on the 17th hole or the smell of the hawthorn tree, which some say smells like rotting flesh. The sense of smell easily is the sense that most people take for granted. How different would your world be without scent?

## Taste

Taste is the other chemical sense. It's probably the least-used sense in our industry, but in certain circumstances it can be a helpful diagnostic tool. Black layer has a distinct taste in addition to the smell.

Superintendents also use taste to identify problems with fertilizer applications. Fertilizers aren't always visually distinct. Multiple applications in a short period of time can result in a variety of different granules on your surfaces.

On one occasion for me, a particular granule just wasn't breaking down. A quick

*Continued on page 32*

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"But what if I didn't have that sense of smell? How long would it have been until someone saw that the fuel cap was not replaced?"

*Continued from page 31*

taste, and it was readily apparent which product was causing the issue. There is a distinct taste to urea compared to ammonium sulfate. This isn't something I recommend, and if you choose this route, use caution and drink lots of water the rest of the day. Maybe review your material safety data sheets just to be sure. I also recommend that once a week you use your taste buds to help your chef out and make sure the steaks are prepared correctly.

If it stinks, it's dead. There's no sugar coating it.

### Touch

The sense of touch has a more obvious daily place on the golf course than smell or taste. I start out each morning by grabbing a handful of clippings from the first greensmower bucket. I feel the clippings to see how much sand is mixed in. How dry was the cut? Have we mowed out enough topdressing sand yet? Do I need more PGR? Less or more fertilizer in this week's spray? A handful of clippings can yield a wealth of information just by touch. Many of you probably also feel the turf for grain. Do we need to verticut or brush soon? How tight does the canopy feel? Does it even feel smooth?

Touch used to be a more critical factor in evaluating the moisture content of your soils. It used to be the way to evaluate your water needs, feeling the plug for moisture to decide what to water. In the heat of the summer, this might be hundreds of plugs a day. Now we have fancy moisture meters that make this a less critical experience. However, I still recommend you break out the probe just to see what your proper moisture level actually feels like. If your TDR fails, you still have to be able to reliably water your course. Ever had a TDR randomly lose its calibration? I have. If you don't know

Use all of your senses to unlock clues about what's happening on your course.

PHOTO BY: CHARLIE DAHLIN (BELOW)

what the ideal soil moisture feels like, you could water incorrectly for a long time before you realize your moisture meter is out of whack.

Along those same lines, walking on the greens barefoot can pinpoint temperature and moisture differences on the turf surface. I wouldn't recommend it after a fresh greens application, but it is amazing what you can feel with your feet, especially in terms of firmness. Shoe cushioning is so good these days that you hardly feel anything wearing shoes. Go barefoot and feel the differences.

### Hearing

4 Hearing seems to be the sense that all superintendents (and husbands, according to my wife) seem to lose, but we absolutely know how important it is. Hearing can be our first indication of a problem, often before we are able to see anything. It's also an important tool for problem solving.

Communication is hugely important for superintendents. To be a good communicator, you also have to be able to hear

Kick off your shoes and walk barefoot across your greens. You'll be able to better tell firmness and moisture levels.

what others are saying. We've all heard the phrase "You hear, but you don't listen." Make sure you are not only hearing your owner, members, golfers and employees,

*Continued on page 34*

*Continued from page 33*

but you are actually listening to them. I can't stress this enough.

### Sight

It doesn't need to be said how important sight is, but I'm going to say it anyway. You can't do your job if you can't see your product. We constantly look at everything. How are the mowers cutting? Are there streaks or skips? Any marcelling or washboarding? Were the bunkers raked well? Are ball marks being repaired and divots replaced? Any obvious irrigation problems from the previous night? I could go on and on. Usually by the time you see it, it's too late.

But just being able to see the golf course isn't enough. You have to be able to envision the golf course. That's more a skill or an art than a sense, but we need it. Your vision for the golf course needs to match member expectations, and you need to be able to visualize a way to achieve it. This is how we decide short-term and long-term goals. What did the golf course look like yesterday? What do we need to clean up or improve? What do we want the course to look like next season or in the next five years?

*Continued on page 36*

From left, Alfredo Tello, mechanic, Jeff VerCautren, superintendent, Matt Wagner, Zane Hartley and Aaron Harvey, assistant superintendents.

PHOTO BY: CHARLIE DAHLIN

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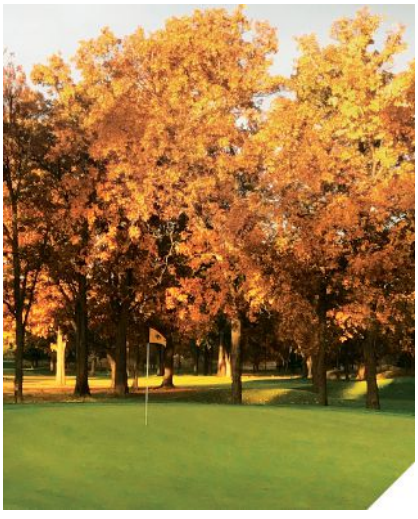
*Continued from page 34*

My former boss, Tim Perez at TPC Prestancia, talks about those seeing those things that need to be fixed but thinking there isn't enough time. "Every time you see something that needs to be done and you drive by it," he'd say, "think of me slapping you in the head. Your head will eventually start hurting and you will find a way to make time to get the job done."

## The sixth sense

Beyond what you smell, taste, touch, see or hear, there's the sixth sense that's intangible but that you absolutely can feel. It's gut instinct. Sometimes, even though your five senses are telling you one thing, your gut will tell you the exact opposite. Many of you have followed your gut and been burned but have had at least as many — if not more — instances where going with your gut was the right thing to do.



When in doubt, go with your gut. Often it's the most important of the six senses.

For example, the weather forecast says it's going to be sunny and 70 degrees for the next week. But your gut is telling you to get that fungicide out now because it's going to rain the next five days and your dollar spot control isn't going to hold. With something as dynamic and inexact as the weather, going with your gut can save your job.

Any of these examples (or the countless others you can think of) could have been much worse without even just one of the six senses. Use all your senses, just as you use all of your tools and equipment. Every day give your finishing touch. Take time to smell the roses. Take time to taste the fruits of your labor. Don't just look; see. Don't just listen; hear. And always trust your gut.

**Jeff VerCautren is golf course superintendent and Matt Wagner is assistant superintendent at Rich Harvest Farms in Sugar Grove, Ill.**

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# HAVE YOU SEEN MY LEFT GLOVE?

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**BY MATT CAVANAUGH**

In October, I found myself once again digging through the two compartments of my golf cart. I lift up the seat to look in the battery compartment, hoping to find what I'm looking for. I take one last hopeful look in and around the irrigation parts that collect in the back of the cart. Through all this, the best I can come up with is three right-handed gloves. So, I flip one right-handed glove over, slip it on my left hand, pull it tight, grab a shovel and start in on the irrigation fix.

*Continued on page 40*

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**John Ashworth**
**President, Goat Hill Park**
**Oceanside, CA**

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**Superintendent**
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Polylast Systems Patent No.: US 8,389,624 B2 issued March 5, 2013

*Continued from page 38*

In 17 years of marriage, I've lost my wedding ring once. I got back to the shop, started washing my hands after an irrigation fix, looked down at my left hand and my ring was gone. I headed back, dug the hole back up, and in the bottom of the hole was a lone left glove with a ring inside.

In January, I was about to head out for a little tree work. My cart has now been replaced by my desk, and I'm looking in and around it for, yes, a left glove. And again, I'm baffled to be holding only three right-handed gloves. Is one of my coworkers playing a joke on me? I don't really know, but I'm going to get to the bottom of this.

**"... I'M BAFFLED TO BE HOLDING ONLY THREE RIGHT-HANDED GLOVES. IS ONE OF MY COWORKERS PLAYING A JOKE ON ME? I DON'T REALLY KNOW, BUT I'M GOING TO GET TO THE BOTTOM OF THIS."**

## LEFT GLOVE OPTION NO. 1

It's rare that any of us have just one thing on our mind. In fact, I just flipped over to check an email as I finished this paragraph. I continually am working on the next thought, the next idea, the next task, what home project to tackle next, what work project needs to get done, what the family will do for fun this weekend. It's a nonstop process in my head, and I assume the same is true for you.

The people closest to me likely would describe me as absentminded or a scatterbrain, as I often forget simple tasks or items in my life. More often than not, I pass this off as a byproduct of trying to be a multitasker, as my life's basics can get lost in the shuffle like a left glove.

I'm a multitasker, and if you are too, we should stop. Research around multitasking continues to show that it's not worth our time. You probably are not multitasking, even if you think you are. You likely are just moving quickly from one task to the next, shifting focus and attention, which drains productivity.

Here are some examples of my multitasking fails at the course:

- Hand watering greens, cutting cups and setting tee markers with 7 a.m. split tees.
  - Issues: Cups are crooked, greens are not watered properly and I always skip moving the forward and back tees.
- Any irrigation work in combination with anything else — that includes talking on the radio.
  - Issues: A routine 50-minute head replacement ends with a piece of plywood put over a hole, left to finish tomorrow.
- Filling up a third tank in the sprayer and setting the job board for second jobs.
  - Issues: There's a 90-percent chance I forget about the sprayer and the tank overflows on me.

You likely can add to this list of fails because like me, you don't have the brain power, and thus are resigned to being ... a monotasker.

*Suspect No. 1 in the missing-left-glove mystery: multitasking.*

## LEFT GLOVE OPTION NO. 2:

If my inability to multitask is not the answer to keeping a grip on my left glove, maybe it centers around the crazy-busy world we live in. My brother-in-law, who also happens to be my pastor said it best in a sermon, "People wear their busyness as a badge of honor." It was a pretty powerful little phrase for me when I heard it. For today's workforce — parents, spouses, siblings, grandparents, retirees and golf course employees — this could not be more true, and often is the answer to the simple greeting, "How's life?" "Busy, but that's a good thing, right?"

But is it?

In the past few years, I've tried to rid my life of distracting little tasks. It started with fantasy sports, where I wasn't even a full-blown fantasy fanatic (triple F), but it was distracting enough that fantasy foot-

*Continued on page 42*

ISTOCK.COM (IMACON)

*Continued from page 41*

ball, baseball and hockey had to go. Next was the news, a huge time suck that seemed only to make me feel bad or angry.

After that, it was the black hole that is the worldwide web — internet searches are streamlined. ESPN, some type of weather source and Home Depot or Menards form 90 percent of my activity.

*Suspect No. 2 in the missing-left-glove mystery: busyness.*

## LEFT GLOVE OPTION NO. 3

I'm always in a hurry, even if I'm not busy. I drive too fast (although I've not had a speeding ticket since September 1997), I respond to most emails and texts as I hear them speeding over the Wi-Fi, I drink a can of Coke with the same sucking force of a vacuum and my hurried-up life can be summed up by my two boys saying, almost nightly, "Dad, slow down, you're eating too fast."

Much of my hurriedness occurs because I try to accomplish too much. I always have. My daily plans at the golf course are almost always too ambitious, which does not help with 7 a.m. split tees Monday through Thursday mixed in with the more-than-occasional 7:30 a.m. shotgun events. This puts me in constant hurry-up mode, which is worse than being busy.

*Suspect No. 3 in the missing-left-glove mystery: hurriedness.*

We work in a time-oriented industry. Tee times always heading our way, a three-hole gap quickly getting smaller, even the irrigation window not being enough to put down what is needed. So, we try to cram some more in before the morning tee times. We all have to multitask because we are too busy and always in a hurry to get completed what is required of us.

As I look down at my desk, I realize that all three of the suspects I've mentioned explain my missing left glove. There are no real answers to be gained by reading this, other than to embrace being a monotasker, streamline as much as possible and take a breath between bites.

My left glove likely was found recently when I took a Predictive Index Behavioral Assessment test. The best line for me in the summary of my behavioral assessment went like this: "Matt has a distinctly low level of interest in details that are not pertinent to the goal."

Mystery solved. My brain has deemed the left glove a detail not worth spending time on. However, if you happen to have an abundance of left gloves, please send one (or three) to me.

**Matt Cavanaugh is golf course superintendent at Rush Creek Golf Club in Maple Grove, Minn.**

ISTOCK.COM (KLEDGE)

# Super Science

// YOUR VWC, OM AND BD DO WHAT NOW?

## WHAT PUTTING GREEN FIRMNESS MEASUREMENTS ACTUALLY TELL US

*By Daniel O'Brien, Doug Karcher, Ph.D., and Mike Richardson, Ph.D.*

Firmness is an important attribute of championship greens, affecting both playability and durability of the putting surface. However, firmness can be interpreted and managed in various ways. Underlying factors often associated with firmness include volumetric water content (VWC), organic matter (OM) and bulk density (BD). Consequently, maintenance practices can include irrigation, aerification, verticutting, topdressing and rolling. By understanding the extent to which firmness measurements reflect each of these underlying factors, superintendents can improve the efficiency and precision with which they manage firmness. The objective of this research was to compare device measurements and ground-truth data for VWC, OM and BD.

Measurement devices used in this research. From left to right: TruFirm, Clegg and TDR350 with Turf Rod Spacers at 0.5-, 1.0- and 1.5-inch depths.

This research was conducted in Fayetteville, Ark., on a USGA sand-based, Penn A1 creeping bentgrass putting green (*Agrostis stolonifera* L.). We used combinations of irrigation, rolling and cultural management practices to create individual plots. Surface firmness was measured using the Clegg Impact Soil Tester (Lafayette Instruments) and FieldScout TruFirm Turf Firmness Meter (Spectrum Technologies). We used the FieldScout TDR350 Moisture Meter to measure VWC at 0.5-, 1.0- and 1.5-inch depths (Spectrum Technologies). We extracted cup-cutter samples so that we could calculate ground-truth values for VWC, OM and BD by weight and thus compare to measurements from each device.

We found that while both Clegg and TruFirm detected differences in VWC, neither did so with the level of precision of the TDR350. For OM and BD, all devices demonstrated a much better ability to detect differences from rolling than differences from aerification, verticutting and topdressing. Based on these results, superintendents should not consider firmness data redundant of, nor a substitute for, TDR measurements. The next phase of this research will include ball-bounce and ball-mark-severity data, so firmness measurement can be better interpreted in terms of playability.

**Daniel O'Brien is a research technician, and Doug Karcher, Ph.D., and Mike Richardson, Ph.D., are turfgrass scientists at the University of Arkansas. You may reach Daniel O'Brien at dpo001@uark.edu for more information.**

PHOTO BY: DANIEL O'BRIEN

## NEWS UPDATES

### ARBORJET, ECOLOGEL FORM NEW SALES DIVISION

Arborjet and Ecologel formed a new turf products sales division, with the addition of three new hires: Rebecca Knapp, Eric Steffensen and Carin Prechtl.

Knapp has 15 years of industry experience, including prior work with both Major League Baseball and Major League Soccer teams. She will support Arborjet and Ecologel products in the golf, sports turf and nursery markets, developing new business and providing technical knowledge and support across the western region of the U.S., covering Arizona, Southern California and Nevada.

Steffensen will serve as eastern regional sales manager. He will cover the Southeast, working to expand sales and distribution of the company's turf product line. He has 20 years of experience and has worked in the green industry his entire career. He owned and operated his own residential turf business before working for Sigma Organics.

As regional sales manager for the Hawaiian Islands, Prechtl is responsible for supporting sales staff and end users of Arborjet and Ecologel products, with a primary focus on sports turf, golf, commercial turf and nursery applications. Prechtl began working at Arborjet in early 2019. Her previous roles include nursery manager and landscape designer.

**"SAND CAPPING IS A GOOD WAY OF IMPROVING DRAINAGE ON POORLY DRAINING GOLF COURSES."**

**Philip Brown, Ph.D.**
*(see story on page 44)*

//HOW'S YOUR MOISTURE-RETENTION CURVE?

# Selecting appropriate sand-cap depths

*By Philip Brown, Ph.D., and Bert McCarty, Ph.D.*

Poor drainage is a major concern for golf course superintendents. It can restrict play, which reduces income, potentially having a long-term negative financial impact on a course. Drainage problems are compounded by demands for perfect facilities and playability, while rainfall events are becoming less predictable and more intense.

The most efficient way to remove water from a golf course is through surface drainage. Most drainage is achieved this way.

However, sloping all fairways, greens and approaches detracts from aesthetics and playability. Alternatively, superintendents may use subsurface drainage, but this typically does not remove water as rapidly as surface drainage, and superintendents often must slope subgrades to provide the required elevation drop to suitable outlets.

Sand capping is a way to use a combination of surface and subsurface drainage. It is done by applying a relatively deep layer of sand on top of an existing turf area — such as a fairway — to improve drainage and playability while providing an acceptable root zone for turf growth.

## A HEAVY TOPDRESSING BEGINNING

Sand capping originated in the Pacific Northwest, a region where ample rainfall and poor drainage reduce playability on golf courses. Sand capping began as heavy topdressing programs designed to increase the infiltration rate. This method is still used, and studies indicate a single application of one-quarter to 1 inch of topdressing sand per month has few detrimental effects on turfgrass health or stability. A downside to this method: The exact depth of applied sand capping becomes difficult to estimate and keep consistent over time. Golf courses currently cap to a known and consistent depth, followed by turfgrass establishment on top of the new sand (Figure 1). At its most extreme, sand capping can take the form of "plating" an entire golf course with 4 to 15 inches of sand.

FIGURE 1

Placement of the sand cap above the soil.

Sand plays an important role in the construction and renovation of golf courses, particularly putting greens, where it's chosen for its ability to drain rapidly and maintain surface stability. It's these desired properties that also make it such a central component of sand capping. Sand is the largest of the soil separates, and when used exclusively, it retains large pores, allowing for free drainage. The more uniform the sand, the more stable the pores; conversely, in nonuniform sands, finer material such as silt and clay can fill gaps between large pores, reducing drainage. Once properly compacted, pore-size distribution in sand changes little when exposed to frequent traffic, so desirable large-pore spaces are retained.

## HOW DEEP?

Determining how deep a sand cap should be is critical when using this technique. The question of the optimum capping depth currently lacks a standardized answer. Potential methods to calculate capping depth have been suggested, and superintendents can find a comprehensive breakdown of these methods in "Applied Soil Physical Properties, Drainage, and Irrigation Strategies." When reviewing these methods, most use a moisture-retention curve to predict capping depth.

A moisture-retention curve helps visualize the relationship between soil

PHOTO BY: BERT MCCARTY

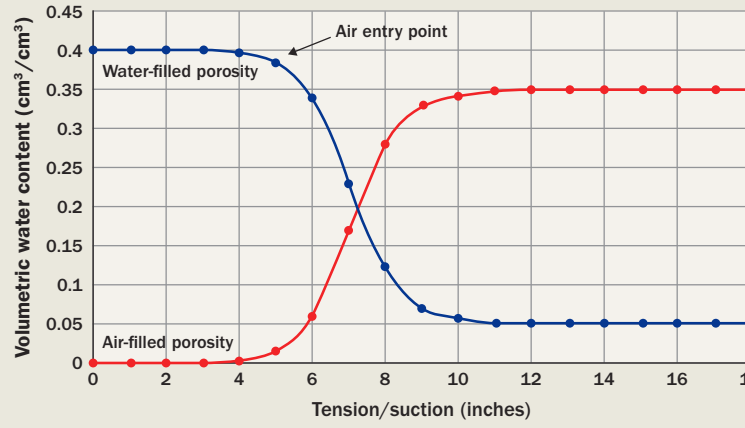
water content and soil water matric potential (or tension). Matric potential is a negative pressure (suction) responsible for binding water in soil pores and occurs because of attractive forces such as adhesion and cohesion. When all pores are filled with water, i.e., the soil is saturated, soil pressure potential becomes positive. Figure 2 shows a moisture-retention curve for a USGA-specified sand.

Zero tension on the x-axis means the soil is saturated. At this point, volumetric water content is the same as pore space. As tension (suction) initially is imposed on the soil, water is not removed because capillary and absorptive forces holding water are too great. Increasing tension to approximately 5 inches creates sufficient suction to empty the largest pores. In uniform textured soils, a characteristic drop in water content occurs at a point called the air entry point (approximately 5 inches in Figure 2), which is where air first displaces water in a previously saturated soil. As tension increases, water begins to drain from smaller pores. Eventually, pore size becomes small enough that increasing tension does not remove any additional water.

Other points of interest on moisture-retention curves are field capacity and wilting point. Field capacity is the quantity of water that remains in a soil after it has been saturated then left until free drainage ceases; as such, a moisture-retention curve represents a soil at field capacity, showing a characteristic increase in water content with depth. Wilting point is the point after which the soil water is bound too tightly in the soil pores for plants to access it. At this point, plants begin to wilt and eventually will die if the soil water is not replenished.

In terms of applying moisture-retention curves to the turfgrass world, tension can be thought of as soil depth. Assuming the soil is saturated at the bottom, you can find zero tension (saturation) at the bottom of the profile, with tension reduction toward the soil surface. Soil depth dictates the tension at which the graph stops. In order to visualize this, you can flip the moisture-retention curve around its axis and rotate it 90 degrees (Figure 3). The region above the bottom of the soil (18 inches) is saturated; little air is available for plant growth. There is a perched water table at approximately 14 inches that corresponds to the air entry point of the soil. As one moves up the profile, air space becomes more available for plant roots, as evident from the increasing space to the right of the graph line. Nearing the top of the profile, the soil becomes dry. Sand-cap depth is a balance of having sand shallow enough to make capping financially viable but deep enough to provide sufficient air for plant growth toward the soil surface.

**FIGURE 2**




An example of a moisture-retention curve showing both water-filled porosity and air-filled porosity, as well the air entry point. One method of determining needed sand-capping depths is based on the air-filled porosity versus the severity of an anticipated rainfall event. Minimal sand-capping depth would be based on 10 percent air-filled porosity and medium capping based on 15 percent air-filled porosity, with 25 percent being the most conservative value. In this example, at 10-percent air-filled porosity, an approximately 6.5-inch cap is suggested, followed by an approximately 7-inch depth at 15-percent air-filled porosity and 7.5 inches for 25 percent porosity. One obviously has to weigh historic rainfall events to costs and material availability.

## AIR-FILLED VERSUS WATER-FILLED

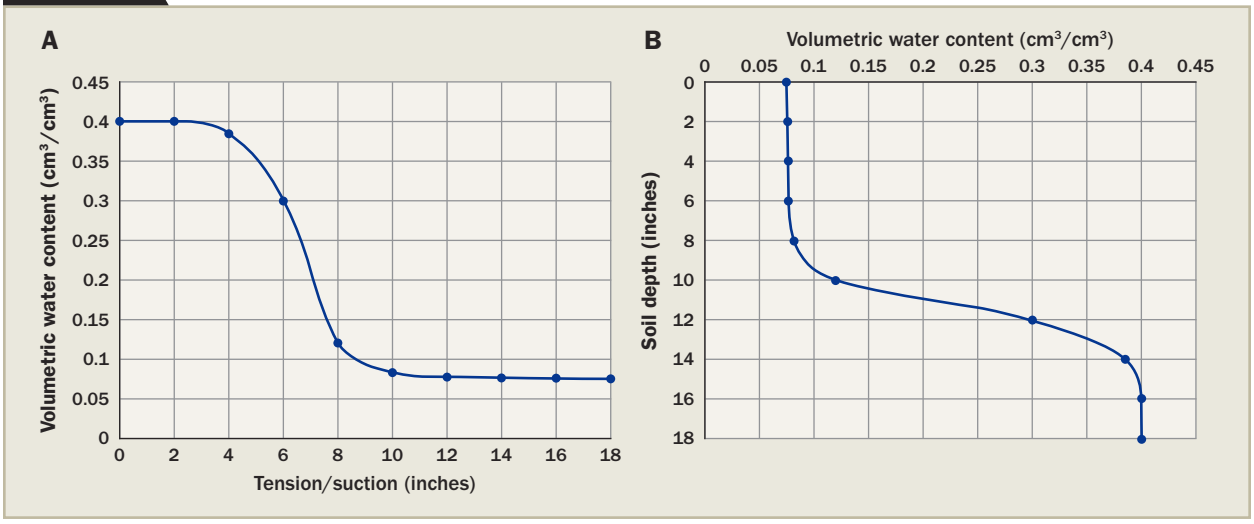
In many previously mentioned methods of calculating capping depth, we've used air-filled porosity to estimate cap depth rather than water-filled porosity. Air-filled porosity is just the reciprocal of water-filled porosity, as any pore space not occupied by water is assumed to be filled with air. Nearly all the methods require a specific air-filled porosity or a range of air-filled porosities to be met; the depth at which this occurs correlates in some way to the depth of the cap. The reasoning behind this is that superintendents can pick a capping depth that provides sufficient air-filled porosity.

This initially sounds like a good idea, as it's possible to pick a depth at which sufficient air-filled porosity is present for drainage and plant growth. Unfortunately, this does not take into consideration the slope of the curve after the air entry point. Moisture-retention curves made using sand have extremely steep slopes after the air entry point, as can be seen in Figure 2. This means that despite the soil having the required air-filled porosity, there is actually insufficient air volume in the soil to accept more water or for plant growth.

A method created at Clemson University uses information from moisture-retention curves to calculate the cumulative volume of air available

Continued on page 46

**FIGURE 3**




Moisture-retention curves can be rotated so saturation is at the bottom (18 inches), providing an idea of how water tension behaves throughout the soil profile. Graph B is identical to graph A, except it has been rotated to show how volumetric water content increases as one goes deeper in the soil profile.

Continued from page 45

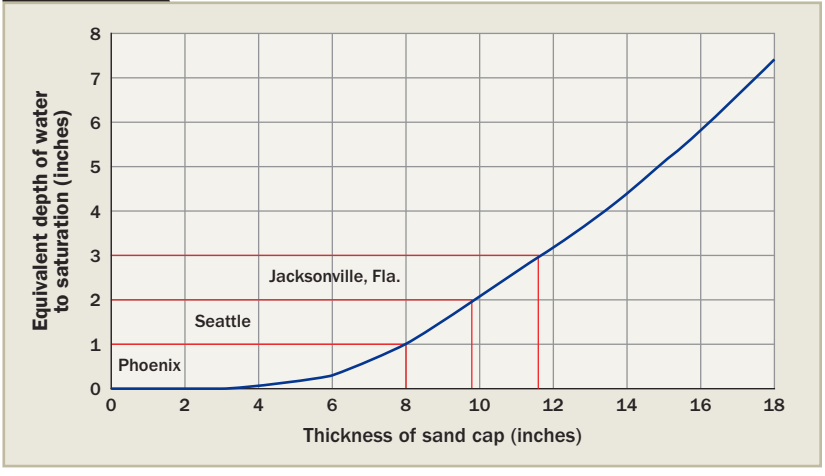
in the soil and uses this to predict how much additional water the soil can hold at certain depths before saturation is reached (Figure 3). In this way, we can engineer sand caps for a worst-case rainfall scenario or just to be able to hold an additional known quantity of rain. A downside of the method is that it assumes the worst-case scenario of the bottom of the soil being saturated.

We suggest 50- or 100-year maximum rainfall events as starting points for determining worst-case scenarios.

Figure 4 shows the capping depth required for three U.S. cities with differing worst-case scenario rainfalls averaged over 50 years. Phoenix averages a heaviest rainfall of about 1 inch per day. Using Figure 3, we can correlate this to a sand-cap thickness of 8 inches. In the same manner, Seattle averages a worse-case rainfall of about 2 inches per day, correlating to a capping depth of 10 inches. Jacksonville, Fla., has the highest average rainfall of the three cities, about 3 inches per day, and as such, correlates to the deepest sand cap required — 12 inches.

It's important to note that drainage is not a closed system and that soils continue to drain during rainfall events

**FIGURE 4**




Sand-cap depths required to accept worse-case scenario rainfall for Phoenix (1 inch), Seattle (2 inches) and Jacksonville Fla., (3 inches), using a method created at Clemson University.

if there is an available outlet. Because of this, space to accept water continuously will be made available in the soil as it drains.

Sand capping is a good way of improving drainage on poorly draining golf courses. However, it's difficult to decide on a capping depth as there is currently no standardized method of deciding how deep to cap. Many methods use moisture-retention curves in estimating capping depth but often underestimate how deep to cap because of steep slopes found in curves of sands used in capping. But using a method that calculates available soil volume to accept more water as described in this article means superintendents can obtain a better estimate of capping depth. G

**Philip Brown, Ph.D., is a post-doctoral turfgrass scientist, and Bert McCarty, Ph.D., is a turfgrass scientist at Clemson University. You may reach Brown at phil_james_brown18@yahoo.com for more information.**

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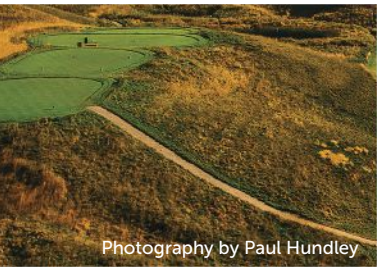
*Director of Course Maintenance for Erin Hills*



Photography by Paul Hundley

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**Dollar spot** foliar lesions on leaf blades of bermudagrass are one of the telltale signs of dollar spot.

# Defeating dollar: Tips for controlling dollar spot

Dollar spot is a fungal disease that affects a wide variety of turfgrasses. The disease pressure of this pathogen can vary by region because its prevalence is dictated by the weather. According to Clark Throssell, Ph.D., research editor for *Golfdom,* dollar spot tends to severely affect turf in the Midwest. It is most prevalent in those areas from midspring to early July and flares up again in late August or early September.

"The presence of dollar spot is due to the combination of warm temperatures starting around this time of year," Throssell says. "It's one of those things that happens year after year on golf courses in the Midwest." He recommends implementing a fungicide spray program early, even before signs of turf damage become apparent.

Thomas Nikolai, Ph.D., senior academic specialist at Michigan State University, says another key to controlling the dollar spot is maintaining good plant and soil microbial health.

"Research has also shown that frequent rolling can be used as a way to reduce the rate of your pesticides or maintain them at the low-label rate," he adds. Nikolai suggests using a roller a minimum of three times per week, but not more than two times per day.

Control of dollar spot may improve as experts learn more about the disease and improve tracking technology, but in the meantime, four experts from different chemical manufacturers offer their advice for combatting the disease.

PHOTO COURTESY OF: BAYER

## Bayer

**PAUL GIORDANO**
Green Solutions Team member, Bayer Turf and Ornamental Division

The foundation of any dollar spot program is going to be the cultural practices. At the heart of that would be nutrition management, so adequate nitrogen fertility. Often, this means spoon feeding nitrogen applications throughout the summer months with at least a tenth of a pound per week. Other cultural practices would involve removing morning dew, avoiding drought stress or any moisture extremes, alleviating compaction or thatch, maximizing air movement and monitoring humidity and temperatures closely. Dollar spot is most severe when air temperatures are between 60 degrees F and 90 degrees F. In the future, on the cultural and chemical side, we'll see things continue to go down the path of biological control methods rather than just strictly chemical control methods.

## PBI-Gordon

**JIM GOODRICH**
Product manager, fungicides, insecticides and plant growth regulators

Dollar spot is the No. 1 disease of concern for golf course superintendents because the disease is so prevalent on high-value turf. There are many cultural practices that can be used to minimize dollar spot's effect on playing surfaces: dew removal to reduce the leaf wetness period, adequate nitrogen fertilization and maintaining proper soil moisture. Rolling also can help reduce the incidence of dollar spot. If the pressure is high, and you are expecting it to be prolonged, there are numerous, effective fungicides for the control of the pathogen. The application of a contact fungicide and a systemic fungicide will mitigate what's active on the surface and what's active on the inside of the turf plants.

## Quali-Pro

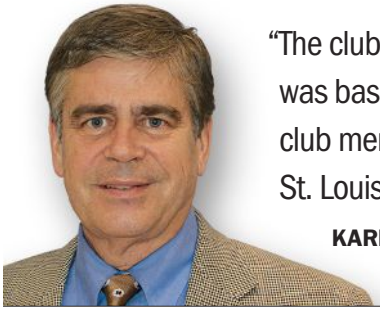
**NICK STRAIN**
Business director, Control Solutions Inc.

Choosing your fungicide to control this pathogen can be like standing at the medicine aisle of your local Walgreens choosing an allergy medication. The advice that anyone will give is to keep it simple. What are you looking to treat? Is there a combination chemistry product that will help treat multiple diseases? Make sure to not overuse one type of chemistry. The time for early-season dollar spot treatments is also a good time to be applying chemistry to prevent other diseases. Look at fungicides that have more than one mode of action and are packaged in a single jug. This will save time and money mixing products. Another common hurdle to jump is rotating products. Look at your FRAC codes when making your spray program. If you use the same FRAC repeatedly, this will result in a resistance.

## Syngenta

**MIKE AGNEW**
Technical services manager

Aside from reseeding with a turfgrass cultivar that is less susceptible to dollar spot, there are several cultural practices that can help alleviate dollar spot pressure. Three practices that can be adapted quickly are: maintaining adequate nitrogen fertility when dollar spot is active; avoiding irrigation in the late afternoon and evening because extended leaf wetness may intensify disease development; and removing dew by mowing, poling or rolling. Other cultural practices that can be added over time include: improving air circulation by selectively removing trees that prevent air movement; aerifying to alleviate soil compaction and reduce thatch; and utilizing the Smith-Kerns dollar spot prediction model to monitor favorable conditions for dollar spot. Fungicide programs should alternate between different fungicide classes, with an emphasis on the use of multisite fungicides in mixtures and rotations.



"The club's decision to go with zoysiagrass was based on observations made by club members who had seen courses in St. Louis with zoysia fairways."

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

# Unique fairways

This spring, I headed to Hyde Park Country Club in Cincinnati to meet Superintendent Pat O'Brien. Hyde Park CC is a stately club, established in 1909 with a nine-hole course designed by Tom Bendelow. The club expanded in 1922 to 18 holes designed by Donald Ross. The course originally was located on the outskirts of Cincinnati, but Cincinnati grew, and it is now near the city's center.

The drive from Columbus, Ohio, to Cincinnati is a two-hour shot straight down I-71. Although a relatively short drive, the change in climate is dramatic. Cincinnati falls in the Transition Zone for managing turfgrasses. It's often stressful to cool-season turfgrasses through the summer because of the heat, but too cold in winter for warm-season turfgrasses to survive, making it a difficult place to deliver quality turf.

Its fairways are what make Hyde Park unique in Ohio. They are comprised of *Zoysia japonica* — the only ones, I believe, in the state. I wanted to learn more about the history and management of *Zoysia japonica* for teaching purposes. I previously had spoken to Pat about the topics I was interested in, and he told me that zoysia is the "easiest grass to manage."

I thought this was going to be a quick visit, but Pat — being Canadian — often downplays or takes in stride any issues he faces. In the late 1970s, *Zoysia japonica* was established as a test on the 14th fairway. The club's decision to go with zoysiagrass was based on observations made by club members who had seen courses in St. Louis with zoysia fairways.

Managing cool-season fairways that were predominantly annual bluegrass through the Transition Zone was almost impossible during the summer months. In areas from St. Louis to Kansas City, a number of golf courses went with zoysiagrass fairways as a long-term plan to provide a superior playing surface during the summer. Conversely, *Zoysia japonica* has excellent cold tolerance, so winter conditions were less likely to cause damage compared with bermudagrass or *Zoysia matrella*.

The course decided to sprig the remaining fairways in 1981. Tom Brehob was superintendent during the period of establishment. *Zoysia japonica* generally is slow to establish, so it took about three years to achieve fully established fairways. Today, golf courses may sod or strip sod to establish zoysiagrass. The downside is cost. There are seeded varieties of zoysiagrass, but establishment still is relatively slow.

Once established, zoysiagrass fairways require few inputs. When Pat arrived at Hyde Park 14 years ago, he made the mistake of trying to maintain zoysia fairways like bentgrass. But, he says the key to managing zoysiagrass fairways is to keep water and nitrogen applications to a minimum. In addition, maintain height of cut at one-half inch, which provides a lie where the golf ball sits up like it's on a tee. Continually sharpening mower blades is critical to maintaining a desirable playing surface.

Few pests are associated with zoysiagrass fairways. The major — and probably only significant — disease is large patch (*Rhizoctonia solani*), which occurs mainly when zoysiagrass is coming out or going into dormancy. Billbugs (bluegrass and hunting) can also be an issue. Given the slow recuperative rate of zoysiagrass, anticipate pest problems and treat before damage is observed.

Zoysiagrass in Cincinnati starts going dormant in September and breaks dormancy in April. Entering dormancy in the fall is much more predictive than breaking dormancy in the spring. Dormancy in fall is, to a large degree, tied to photoperiod. When I visited Hyde Park, the visual effect of dormant zoysiagrass fairways surrounded by the green cool-season turfgrass roughs was striking.

After visiting a superintendent, I always walk away with more knowledge than when I arrived. For more insight from Pat O'Brien on *Zoysia japonica* fairways, visit: **https://youtu.be/HoLZ-B_q8UU.**

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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# On the lookout for nematodes

*Jim Kerns, Ph.D., is a turfgrass pathologist at North Carolina State University. In addition to conducting research on turfgrass diseases, Kerns and his team devote considerable time to understanding nematodes, the problems they cause and their management. You may reach Kerns at jpkerns@ncsu.edu for more information.*

**Q How widespread are nematodes on golf courses?**

Nematodes are the most abundant animal on the planet, and every golf course has them. They are obligate parasites, meaning that to survive, they must feed on living root tissue. We conducted a nematode survey on golf courses in North Carolina in 2012-13 and found them on all golf courses we sampled, often with populations above threshold levels.

I want to stress that the presence of nematodes doesn't equal damage, and published thresholds for nematode damage are just guides. Nematode counts can be deceiving. The healthier the roots, the more nematodes present. Determining a course of treatment depends on factors such as health of the turf, weather, time of year, past experience with nematode damage, budget and upcoming events. Before deciding whether to treat for nematodes, discuss your situation with someone who has knowledge of your golf course and experience working with nematodes to help interpret nematode counts. The decision to treat with a nematicide varies from golf course to golf course. Some greens can tolerate higher populations of nematodes than others.

Nematode damage is almost always seen on putting greens because of stress from low mowing heights and traffic. You may find nematodes on creeping bentgrass, annual bluegrass and bermudagrass greens.

"SAMPLE (FOR NEMATODES) BEFORE STRESS PERIODS BECAUSE NEMATODE POPULATIONS ARE AT THEIR HIGHEST WHEN THE ROOT SYSTEM IS HEALTHIEST."

**Q Describe the results of research you have done on sting and root-knot nematode biology.**

Sting and root-knot nematodes are the most common species of turf-damaging nematodes in North Carolina. We learned that sting nematodes are most active in early spring when soil temperatures are 60 degrees F. Superintendents should treat greens with a history of unacceptable sting nematode damage with a nematicide in April. During the hot summer months, sting nematodes are inactive and are found 6 to 8 inches deep in the soil profile.

Root-knot nematodes are active in May when soil temperatures are 65 to 70 degrees F, and they remain active and reproduce during summer. Treat root-knot nematodes in May or June. You will most likely require two to three follow-up applications.

**Q What are the procedures for sampling for nematodes?**

We recommend sampling if you are uncertain you have a nematode problem and on golf courses with a history of nematode populations. Sample before stress periods because nematode populations are at their highest when the root system is healthiest. Once the health of the turf and root system declines, the nematode population will decline as well.

Each diagnostic lab has specific procedures to follow when collecting a sample for nematode analysis. For our lab at North Carolina State, we require 500 cubic centimeters of soil from each green or area sampled. We recommend breaking down a green into four sections of similar size and taking 15 or 20 soil cores 1 inch in diameter to a depth of 6 inches from each section. Remove the turf and combine all individual samples into a single composite sample for a given green.

There is tremendous variability in nematode populations within a green. You may see low numbers of nematodes in one location, but 6 feet away, you may see a high population. It's possible to get an accurate nematode count by collecting a large number of soil cores from a green.

**Q Once nematodes are identified as present through sampling, will they be present every year?**

Yes, they will be present every year, but they may not cause turf damage every year. Damage depends on weather and the amount of stress present from mowing at low heights.

**Q Is there anything else you would like to add?**

There is a possible interaction between the presence of turf-damaging nematodes and root-borne fungal diseases. While an interesting problem, it will be a difficult one to sort out.

Clark Throssell, Ph.D., loves to talk turf. Contact him at clarkthrossell@bresnan.net.

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## // MUST-HAVE NEW PRODUCTS


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3

### 1 ProCore 648 aerator

Innovative wheels within the coring path and a large 48-inch aeration swath characterize **TORO**'s ProCore 648 walk-behind aerator, according to the company. It has an operating weight of 1,590 pounds and features an aeration depth of up to 4 inches. The unit is equipped with a 23-horsepower Kohler gasoline engine and can reach speeds of up to 3.5 miles per hour.

*Toro.com*

### 2 PondSeries fountains

The PondSeries line of floating fountains by **AIRMAX** includes 0.5-, 1- and 2-horsepower models that showcase a lightweight drop-in design, three spray patterns and no oil or seals to change. The fountains feature oil-free motors and a cooling shroud to ensure maximum motor life and durability, according to the company. They're ideal for golf course ponds and recreational bodies of water, Airmax says.

*AirmaxeCo.com*

### 3 Exteris Stressgard

Exteris Stressgard from **BAYER** is a solution for stress mitigation and foliar disease management on fairways. With Leaf-Cote technology, Exteris Stressgard offers improved product retention on the leaf surface, sticking at the site of fungal activity. It provides both preventive and curative activity in controlling most turfgrass diseases across a range of spray volumes. The product also features excellent tank-mix compatibility, Bayer says.

*Bayer.com*


4

5

6

## CHECK OUT MORE NEW PRODUCTS ONLINE

To stay up to date on all the latest products and services, visit **golfdom.com/category/products**

### 4 | Secure Action fungicide

Secure Action fungicide is one of the latest dollar-spot-control products from **SYNGENTA**. It includes *acibenzolar-S-methyl* to help protect against turf diseases and abiotic stress. Including multisite contact fungicides like Secure Action in an agronomic program can help reduce the risk of resistance, the company says. Superintendents may visit **GreenCastOnline.com/programs** to view agronomic programs for their area.
*Syngenta.com*

### 5 | Ultra 15 fairway roller

Results from a rolling study at Michigan State University School of Agriculture found that using a **SMITHCO** Ultra 15 fairway roller with a filled 150-gallon water ballast tank results in decreases in localized dry spot, firmer surfaces, decreased clipping yield and reduced dollar spot. The five-gang roller with a balanced hydraulic system keeps ground pressure even over its 15-foot swath. At 10 miles per hour, the Ultra 15 can roll 18 acres an hour.
*Smithco.com*

### 6 | U.S. Aqua Vac pond cleaning services

**U.S. AQUA VAC** has a nondestructive cleaning process to help clean and remove sediment from golf course ponds. The company's machines won't tear up landscaping, and superintendents won't need to worry about repairing ruts or irrigation systems. U.S. Aqua Vac's machines also are safe for pond liners and plumbing.
*USAquaVac.com*

# The 19th Hole

## Mike Chrzanowski

**SUPERINTENDENT** // Madison (Conn.) CC

**Mike, what are you having?** I'll have a Heineken.

**Tell me about your family.** My son Mike and his wife Ashley live in Denver with their two children, Maya, 4 and Ben, 2. My daughter Amy and her husband Nick live in Saratoga Springs with their 2-year-old son Charlie and their 3-week-old son Teddy. I have 17-year-old twins, Teagan and Max, and my amazing wife of 22 years, Kathy.

**What should I know about Madison CC?** Madison is a really nice small town on the water. The club has been there over 100 years. It's a diverse membership. I remember when I got there in 1980, I was told that whenever I was golfing with a member, I could be golfing with the CEO of Exxon or the guy pumping the gas at the Exxon station. It's still that way.

**Did you say 1980? How have you lasted that long at the same club?** I've been very fortunate to have a great group of people to work for. I make a real effort on communication. Every one of my green committee chairs comes in and says, "What's this guy all about?" But in two or three years, we'll become friends. And I have a great staff, and maybe a lot of good luck.

**What would a Polaroid photo of you taken in 1980 look like?** It would look like a 6-foot, 6-inch tall, 175-pound fence post.

**What teams do you root for?** I root for any team that is playing against any team from Boston. My second team — any team from New York.

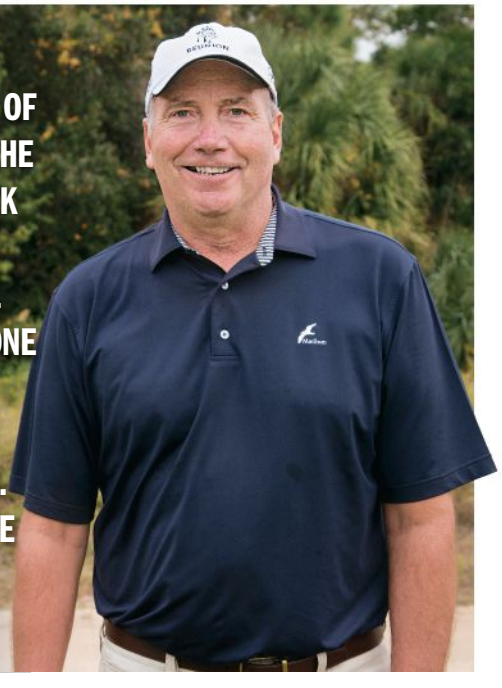
**What's your favorite tool in the shop?** My golf clubs. I've got a unique situation here; I'm considered a member. I've played in the member/guest, the member/member. I've played in the club championship. I actually won the club championship in '96 or '97. That's another thing that's helped my career — I enjoy playing with them, and they enjoy playing with me.

**What's your favorite song?** "Take it Easy," by Jackson Browne, not the Eagles. Jackson Browne wrote it and played it first. I love that song. "Take it easy," that was my dad's motto.

**As interviewed by Seth Jones, April 22, 2019.**

**//BEST ADVICE**

**"IT'S THE FIRST 10 MINUTES OF CLASS, DR. TROLL, UMASS. HE ASKED, 'WHAT DO YOU THINK IS THE MOST IMPORTANT THING TO BE A SUCCESSFUL SUPERINTENDENT?' EVERYONE SAYS, 'GOOD GREENS,' AND HE SAYS, 'NO.' WE KEEP GUESSING FOR 30 MINUTES. FINALLY, HE SAYS, 'YOU HAVE TO COMMUNICATE WELL WITH YOUR BOARD.'"**



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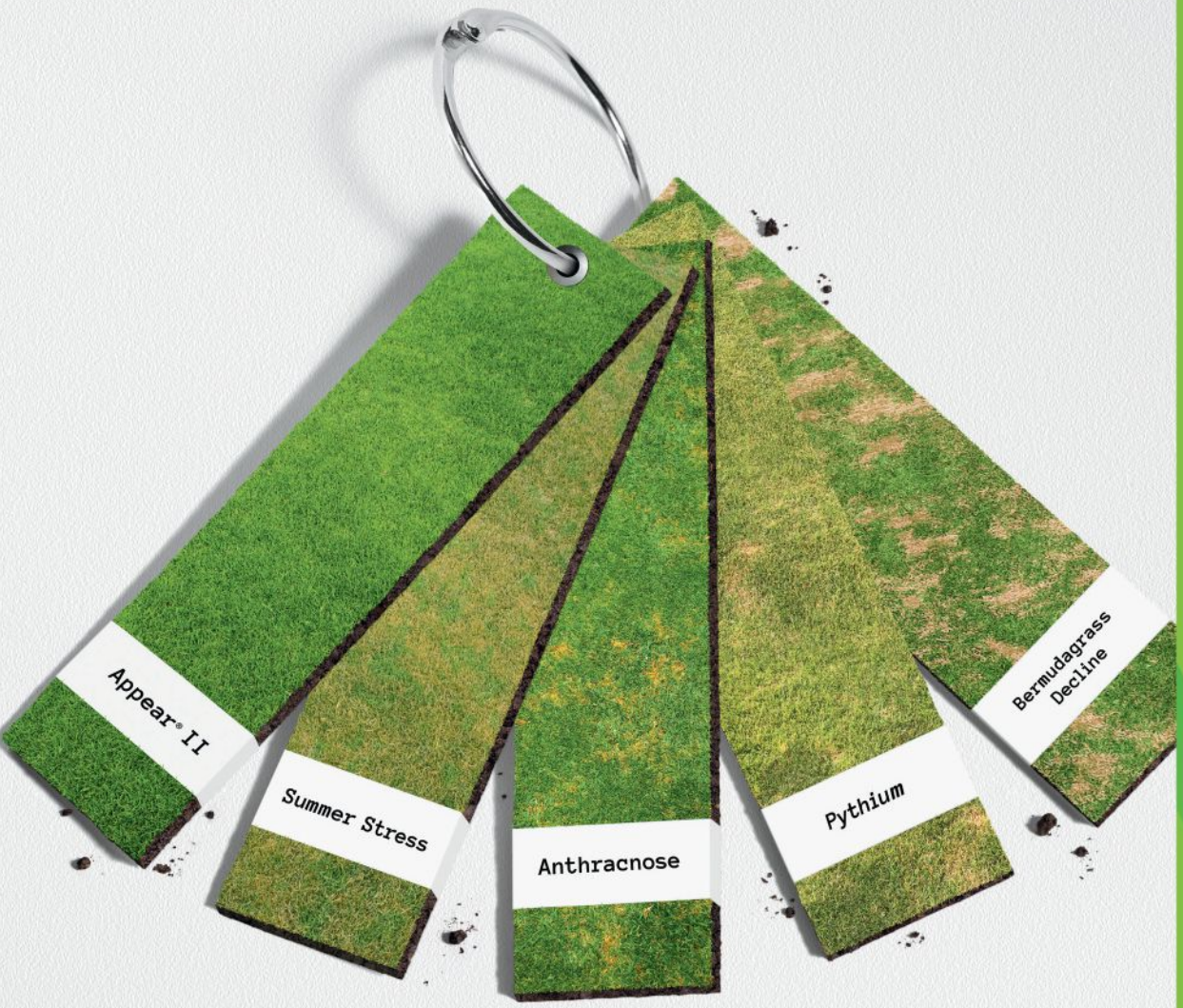
Fame® SC Fungicide

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