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PLUS
Drone applications to native areas
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POWER TO DEPIPPO

At Bel-Air CC, Justin DePippo uses the USGA's GS3 to gain knowledge on his greens — and knowledge is *power*

DePippo, director of golf course and grounds at Bel-Air CC, with Penny (@pennydepuppo on Instagram), his 5-year-old goldendoodle.



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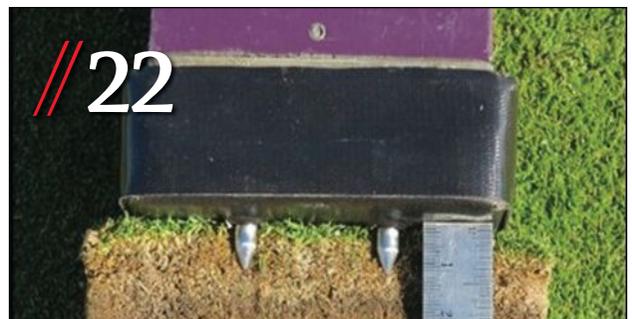
Justin DePippo uses the USGA's GS3 golf ball to gain knowledge on his greens — and knowledge is *power*

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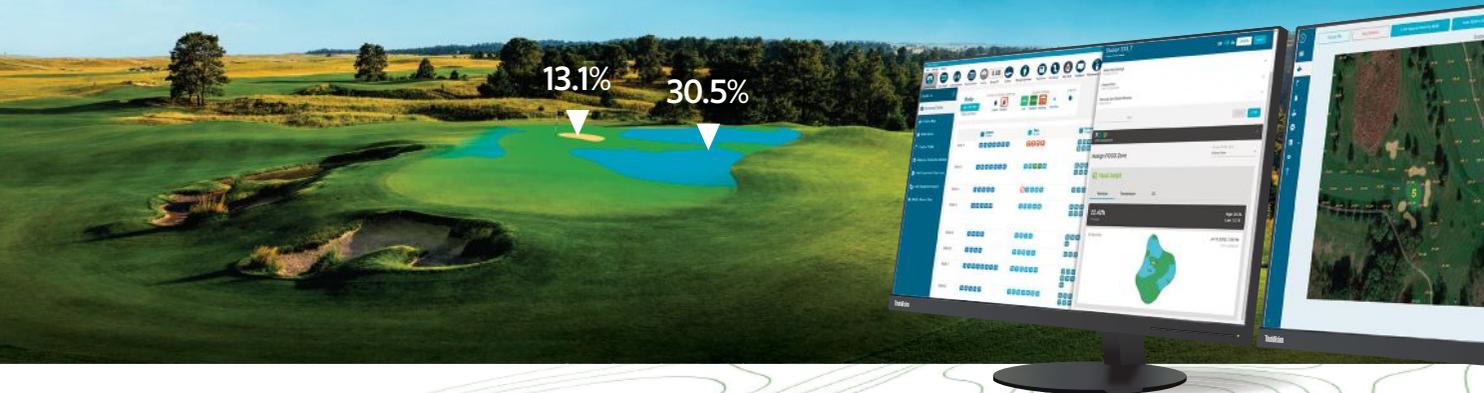
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“New technologies like artificial intelligence are coming at us fast. The contents of this month’s cover story gives the science fiction fan in me a thrill.”

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

Power to DePippo, power to the people

A few years ago, I was in Denver on an assignment. The Rocky Mountain Chapter has always been good to me and I was invited to be a speaker at their annual conference. My host was kind enough to pick me up from the airport. From there, we grabbed lunch, followed by a tour of a few of Denver’s breweries. (Yes, it was a good assignment.) Turns out, Denver has a great brewery scene.

It was sometime after the second brewery when I asked my tour guide how he thought robotic mowers would impact his job in 10 years.

He laughed a big laugh and told me that by then, he was pretty sure he’d arrive at work in the morning, open the shop door and watch little robotic mowers crawl out like crabs. He might not even need to leave the shop anymore, he said.

He was joking. The IPAs had taken hold and he was incapable of holding back his sarcasm. While I wasn’t necessarily suggesting that robotic mowers would take his job away, I could tell by his answer that he was cynical

that anything could change his job too much in the next 10 years.

I was in a similar situation — only the roles were reversed — at a recent industry event. In a crowded ballroom during a cocktail hour, a reader asked me how I foresaw ChatGPT changing the way I do my job. The biggest difference in my answer was, rather than laugh and respond with sarcasm, I had to ask, “What’s Chat GVB?”

ChatGPT — the artificial intelligence chatbot built to mimic human conversations — was just starting to make headlines at the time. Personally, I hadn’t heard of it yet. And with that strange name

... you can imagine hearing the name *chat-gee-pee-tee* for the first time in conversation in a crowded room ... I’m pretty sure I stood there with a dumb look on my face trying to register what it was we were talking about.

Since then, I’ve been hearing about it more and more and all the work it might be able to take off our desks and in our day-to-day lives. Who knows, maybe it could write a magazine article for me? Maybe it could write this column one day?

I don’t think it can. ChatGPT can’t go to that Denver brewery and learn from a source. What we do here requires talking to you, the

experts, earning your trust and learning about how you do your jobs. We learn about where you see the industry heading. About how you’re utilizing, or foresee utilizing, the latest technology. We take those insights and then deliver this publication back to you every month (OK, we overachieved and sent you two issues this month).

New technologies like artificial intelligence are coming at us fast. The contents of this month’s cover story gives the science fiction fan in me a thrill. We’ve got a superintendent using a Bluetooth-enabled golf ball to analyze his greens, another superintendent going out on his own to make drone applications from up high and a robotic mower now paired with TurfCloud.

New technologies will keep coming our way. I welcome them and we will keep reporting on them. But the key to any of this technology is that it is surrounded and supported by talented, passionate people. People make the golf course maintenance industry charge onward and upward. And people — my team — make this magazine the magazine that it is.

Only time will tell how much new technology will change our lives. But as I read this month’s cover story, I couldn’t help but think about my own job, how I do it and how fast things are moving. **G**

Email Jones at:
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THEY'RE SUCKING THE LIFE OUT OF YOUR ROOTS.

“

“Tank-mix applications of Zelto and Crescendo show great promise for root-knot nematode management in turf.”

Dr. Billy Crow

Landscape Nematologist, University of Florida

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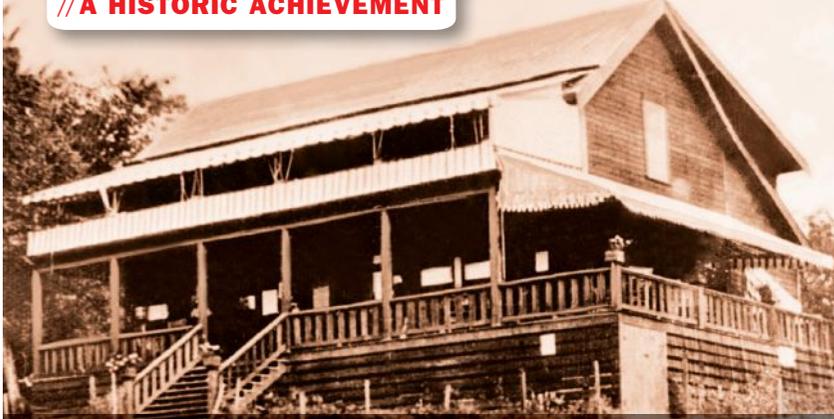
THE SOURCE MATTERS

Starter

NEWS, NOTES AND QUOTES



// A HISTORIC ACHIEVEMENT



Built in 1928, the Portland (Ore.) GC clubhouse is the birthplace of the Golf Writers Association, founded after the 1946 PGA Championship.

PORTLAND GC JOINS THE NATIONAL REGISTER OF HISTORIC PLACES

The 108-year-old course joins Winged Foot GC, Shinnecock Hills GC and others on the illustrious list

➔ The National Parks Service (NPS) recently added the Portland (Ore.) Golf Club's clubhouse and course to the National Register of Historic Places.

"This was a team effort," said Lonnie Lister, general manager/COO of Portland GC. "Achieving this respected designation from the National Park Service is an important part of the club's history and one that will be part of our future legacy."

With the honor, Lister said Portland Golf Club now joins clubs and courses such as Baltusrol Golf Club (N.J.), Oakmont Country Club (Pa.), Merion Golf Club (Pa.), Shinnecock Hills Golf Club (N.Y.), and Winged Foot Golf Club (N.Y.)

Jason Dorn, director of agronomy, leads the maintenance department.

The course opened for business in

1915 after the Firlock Station, along the Oregon Electric Railroad. The course transitioned to 18 holes in 1927. In 1928, the original clubhouse opened, and it retains much of the historical integrity of the original building today.

"Although the course itself has been lightly altered to better suit modern needs, the building remains adjacent to the greens and fairways at the south and east," the club's application to the NPS reads. "Outside the course grounds, the setting remains largely residential to the west. As such, the Portland Golf Club Clubhouse and Golf Course retain the integrity of the setting."

In 1946, the Club hosted the PGA Championship, and the 1947 Ryder Cup, the first held in the U.S. since the beginning of World War II.

// WELCOME ABOARD

SYNGENTA ADDS TO ITS STAFF

Syngenta recently appointed two new territory managers and one technical service representative across its golf and aquatics businesses.



Jordan Brazinski

Jordan Brazinski joins Syngenta Professional Solutions as territory manager for western Pennsylvania, western New York and West Virginia, where he will support customers in the turf market.

Tracy Tudor will serve as territory manager for Indiana and northwest Ohio. In his new role, Tudor will work with customers and distributors in markets including lawn care and aquatics.



Tracy Tudor

Ron Townsend is the western technical service representative for the turf and ornamental businesses. In his new role, Townsend will provide technical support to turf managers and professional ornamental growers in the Western U.S., conducting customer training and coordinating technical service trials.

// FUNDING THE FUTURE

GCSAA TO FUND FOUR RESEARCH PROJECTS

The Golf Course Superintendents Association of America (GCSAA) will support four new university research projects in 2023, including:

- Comparing wetting agent application strategies for efficacy and longevity in sand-based greens by Wendell Hutchens, Ph.D.
- Suppressing dollar spot through adjustment of leaf surface pH by Paul Koch, Ph.D.
- Effects of moisture management on ABW movement, oviposition, larval survival and turfgrass damage by Ben McGraw, Ph.D.
- Influence of nitrogen rate on growing degree-day models for plant growth regulator reapplication intervals on annual bluegrass putting greens by Alec Kowalewski, Ph.D.

// **SAVE SOME FOR THE FISHES**

USGA pledges \$30M for water conservation

\$\$\$ The United States Golf Association (USGA) will invest \$30 million over the next 15 years to accelerate its work toward reducing golf's use of water.

The association said its \$30 million commitment will advance underutilized strategies and technologies that golf courses can use to economically reduce their use of water. The work will focus on irrigation optimization, advanced conservation innovation and water sourcing and storage.

USGA said this effort will integrate the USGA's Green Section with university researchers, golf course owners, superintendents, the Golf Course Superintendents Association of America

(GCSAA), regional golf associations, architects, industry partners and water agencies.

Over the next 15 years, the USGA said, along with industry allies and practitioners, it will

- Launch and continuously update a water-resilience playbook for the game of golf,
- Demonstrate underutilized and emerging research-based practices,
- Understand and break down barriers to the adoption of proven strategies (including financial barriers)
- And continue to support water resilience research and turfgrass breeding programs.

// **A NEW CHALLENGE**

GCSAA'S FINNEY TO TRANSITION TO A NEW ROLE

Shelia Finney, senior director of member programs for the Golf Course Superintendents Association of America (GCSAA), will step down from her position and begin a new role as manager of Certified Golf Course Superintendent (CGCS) certifications, beginning Aug. 21.

"I truly love my current role and GCSAA, but I need to step back and make some time for all of the other things in my life," Finney said. "I am really excited that I now have the chance to stay with GCSAA and focus on helping members achieve certification."

Before joining the GCSAA staff in 2016, Finney, a 34-year GCSAA member, was superintendent at Gaylord Springs Golf Links in Nashville, Tenn., for 25 years. She served as executive director of the Tennessee GCSA and the Tennessee Turfgrass Association. As a member, she served on several GCSAA task groups and committees, was a GCSAA grassroots ambassador and was a chapter delegate for 11 years.

As manager of CGCS, she will oversee the certification program and continue her participation in GCSAA women's initiatives.

// **HARD WORK REWARDED**

PBI-GORDON MAKES PERSONNEL MOVES

PBI-Gordon recently added Brent Flander as a national account manager and promoted Conrad Pannkuk to a sales representative for Kansas, Missouri and Arkansas.



Brent Flander

As national account manager, Flander will manage national turf and ornamental accounts in the golf market. Flander will be an active member of the key accounts team and will lead cross-functional teams to support the development and implementation of strategic business plans with key customers.



Conrad Pannkuk

In his new role as a sales representative, Pannkuk will be responsible for PBI-Gordon product sales to golf course and turfgrass management customers in Kansas, Missouri and Arkansas.



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Brian Bonlender

@bbonlender79

Superintendent, West Bend (Wis.) CC

May 1st?? ... Why not ... after all this is Wisconsin.



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“Being a superintendent means you’re part of a family that loves what they do — protecting and beautifying the environment.”

ALAN FITZGERALD, CGCS, MG
LedgeRock GC, Mohnton, Pa.

You might be a superintendent if ...

As golf season ramps up in the Northern states and winds down in the Southern ones, I thought it might be a good time to remind ourselves why we do what we do. Look at it as motivation for those starting the season and as an encouragement to those finishing up and putting another one behind them.

So, here are the top 25 things you know if you are a golf course superintendent — or at least work in turf — in no order of importance:

25 You take immense pride in your perfectly mowed lawn or, conversely, have the worst one on the street. There is no in-between.

24 You get so involved in a project or work that you lose track of time.

23 You are not officially a superintendent until you have lost turf. If you never push it, you’ll never know what it can take and how far you can go in the future.

22 You have survived losing turf — although, it seemed like the end of the world at the time.

21 You’ve got those glorious tan lines.

20 A 10-hour day in season feels like you’re leaving early.

19 At some point in your life, you briefly looked like a Smurf (you can’t deny it, tracker dye has an incredible ability to get on you no matter how careful you are).

18 You have no idea what it is like to have every weekend off. How are these regular people not bored all the time?

17 You still haven’t found the perfect work boots.

16 You have lifelong friends from turf school and when you were coming up through the ranks.

15 You’ve been soaked by a quick coupler or sprinkler.

14 You know that Mother Nature will always have the upper hand.

13 You’re a literal jack of all trades and the one everyone calls when there is a problem.

12 You can take the superintendent off the course, but you can’t take the course out of the superintendent. All my friends who went to the dark side still miss the beauty and satisfaction of the job.

11 You know never to say it’s too hot, cold, dry or wet. As soon as you do, the opposite becomes true.

10 Stuff (mostly irrigation) always breaks or sticks exactly 13 minutes before you plan to leave — usually on a Sunday.

9 You know golf carts usually turn their operators into extremely bad drivers. Especially since, at least once, you have been that bad driver.

8 Problems usually don’t phase you. Superintendents usually have the answer or know someone who does.

7 You diagnose problems with people’s lawns as you drive by.

6 You know what a sunrise looks like.

5 You have a magical ability to get the most out of every dollar and get the job done no matter the resources you have.

4 You know perfection is an unachievable goal, but you still strive for it.

3 You can’t drive past a golf course without slowing down to admire it.

2 You love the time of day when the sunlight angles just right. The way the shadows are perfect, the turf is happy and all is right in the world.

1 No matter what, you know deep down that you have the best job in the world.

We all have those days when we question our sanity and why we do what we do. However, the positives usually outweigh the negatives.

Being a superintendent means you’re part of a family that loves what they do — protecting and beautifying the environment. The sense of accomplishment and achievement when it all comes together is immensely fulfilling and burns through your soul.

No other job can rival that. That is why we are a lucky group of people who get to enjoy it. **G**

Alan FitzGerald (alan@ledgerockgolf.com) is superintendent at LedgeRock GC in Mohnton, Pa.



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SPONSORED CONTENT



Tradition Golf Club at Oak Lane (Woodbridge, Conn.) took care of its ABW challenge with Quali-Pro's Suprado Insecticide.

UNMATCHED CONTROL

New mode of action wins fight against ABWs

With a brand-new class of chemistry, Quali-Pro's Suprado Insecticide offers superintendents a unique mode of action to win the battle against annual bluegrass weevils (ABWs). Powered by Novaluron (IRAC Group 15), Suprado has become a valuable rotation option to fight against insecticide resistance on golf courses.

ELIMINATE ABWS

Controlling ABWs has been a historically difficult problem for Brett Richards, golf course superintendent at Silo Point Country Club in Southbury, Conn.



Brett Richards

"We had a huge issue property-wide. In the past, we were applying chemicals on it that got mediocre results at best and required repeat applications," Richards says. "That's not how we want to be perceived as superintendents."

When he heard about Suprado's new chemistry, Richards says he was anxious to try the insecticide at Silo Point. After using Suprado course-wide, he says it's been a breath of fresh air.

"The results were as good as — if not better than — expected. I couldn't even find an ABW, even in my worst areas. I was shocked," Richards says. "ABWs have been a battle for years. I had to pinch myself because it worked that good."

Using Suprado has also taken the guesswork out of what the course needs to do to control ABWs, Richards says. Suprado provides flexibility in the timing of applications, reducing overreliance on chemical groups at the early- and middle-life stages.

"The simplicity with using it takes the timing window and opens it up for you," Richards says.

While application at the adult peak migration stage is likely the best opportunity for the prevention of damage, Suprado can control post-hatch — smaller larval stages that feed internally. It is also effective against billbug larvae, turf caterpillars, white grubs and chinch bug larvae.

Richards says Suprado is an innovative product with a lot of positive results, and he encourages other superintendents to use it on their courses.

"Very few things in my career have worked this well from a technical standpoint," Richards says. "It's everything we thought it would be and more."

REDUCE APPLICATIONS

Going from needing several applications a year to only one to control ABWs has made a huge difference for Kevin Collins, CGCS, golf course superintendent at



Kevin Collins

Tradition Golf Club at Oak Lane in Woodbridge, Conn.

To combat ABWs at Traditions, Collins and his team made two to three

applications for larvae and then one for adults each year. When Collins heard about the new mode of action with Suprado, he says he decided to try it on his greens.

"We just made one application of Suprado one week after peak adult activity, and it was nothing short of spectacular. Before, I was doing several applications a year," Collins says. "I scouted all year long after that and didn't see anything."

In addition to the greens, he's also going to apply Suprado on his tees and fairways this year — completely cutting out the adult spray he previously used for ABWs.

"Last year was unbelievable," Collins says. "I'm excited to have Suprado in my arsenal." 

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(Photos: Ben McGraw, Penn State University)



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BY THE GOLFDOM STAFF

GS3

By Seth Jones, Editor-in-Chief

In two short years, Bel-Air CC in Los Angeles will celebrate its centennial anniversary. What better way to ring in the occasion than hosting three United States Golf Association (USGA) Championships, starting with the U.S. Women's Amateur this August, then the 2026 Curtis Cup Match and finally the 2030 U.S. Mid-Amateur Championship.

Located in the foothill canyons of one of the world's most famous cities, Bel-Air CC is one of America's most prestigious courses. The course, originally designed by George Thomas, recently underwent a restoration by Tom Doak and Renaissance Golf Design to bring back the course's open vistas and minimalist management style. 'Minimalist management' means only three heights of cut: greens, fairways and rough. Members can walk off a green, on the green surround and then step on the next tee having never stepped on a differ-

ent height of cut the entire time.

Expectations there are high, spelled out in all-capital letters like the nearby Hollywood sign.

"The name is Bel-Air Country Club, but we're a golf club," says DePippo, who has worked at the club for 10 years, the last 5 as director of golf course and grounds. "People come here to play golf and they want to enjoy golf. They expect the best conditions you can get anywhere in the country. So, we tend to operate at a high level here."

That's how he rolls

DePippo, a Penn State grad, is a superintendent who constantly analyzes data to gauge the golf course's health. When a USGA consulting visit gave him his first look at the GS3 smart golf ball, he was immediately interested.

The GS3, launched at this year's GCSAA Confer-

Continued on page 16



USGA's GS3 is a Bluetooth-enabled golf ball that measures speeds, firmness, trueness and smoothness. Measurements upload to USGA's Deacon app. Superintendents place the ball in a drop fixture to measure firmness.

Continued from page 15
ence and Trade Show in Orlando, is a Bluetooth-enabled golf ball that measures green speeds, firmness, trueness and smoothness. Upon taking measurements, it instantly uploads the information to the USGA's Deacon app.

Using the GS3 is easier than a Stimpmeter reading, he says. Roll the ball once each way. A tape measure is unnecessary. For the firmness measurement, a superintendent places the ball in a drop fixture.

"The goal is consistent performance from green to green," says John Petrovsky, CGCS, manager of Green Section Education for the USGA. "Just wake up your (GS3) device and go into your Deacon app on your phone. It's all tied together."

DePippo says he likes that he or his assistants can use the GS3 and the information is instantly available to all of them.

"We've really committed to using it every day that we're open," DePippo says. "Six days a week we're pulling data and getting green speeds, firmness, smoothness and true-

ness. I wanted a consistent way of taking data instead of using different meters."

The fresh tool at Bel-Air

The GS3 arrived at Bel-Air CC last fall. Members are typically interested in the maintenance practices at the course, and the GS3's arrival was no different.

"It's obviously new technology and they can tell," DePippo says. "I share our green speeds verbally, but I don't post them. In my opinion we give them the best conditions every day. This tool is for our maintenance practices along with tracking and for keeping things consistent."

The goal of any new tool is to make the work easier, and DePippo says the GS3 has done that for him and his team, and he thinks other superintendents will also appreciate the benefits of the ball.

"It's simplified all of the data collection. We don't need to record anything on our phones or take a note or send a text. And I don't need to go to the computer," DePippo says. "I'm interested in seeing other superintendents at

similar courses and see what data they're getting. I think it can help us share our conditioning and our practices and compare to other courses and find out what they're achieving with different practices they may be doing. It's relatable because it's all the same ball, we're all taking firmness measurements the same way. For anybody who tracks data, it's a great tool."



Jason VanBuskirk

them more time back in their pocket so that they can spend that time on things that matter most," he says. "Whether that's the golf course or family, we're here to make our users better managers of time and labor."

When GreenSight launched in 2015, its primary focus was utilizing drone imagery to provide superintendents data for reducing water usage and better planning applications, VanBuskirk says.

That evolved in 2018 when the company acquired TurfCloud, along with its "TurfCloud dashboard."

"We wanted it to be a one-stop shop where superintendents can track everything they need to from labor to applications," he says. "Being able to have all of their information under one umbrella is really valuable. You know where your job board, spray sheet, soil information and more are going to be."

GreenSight × Husqvarna

By Rob DiFranco, Associate Editor

GreenSight vice president of sales, Jason VanBuskirk says superintendents tell him his company's TurfCloud program makes it so they almost rarely have to leave their office.

They're joking, of course, but VanBuskirk says his company's software does free up some time for a busy superintendent.

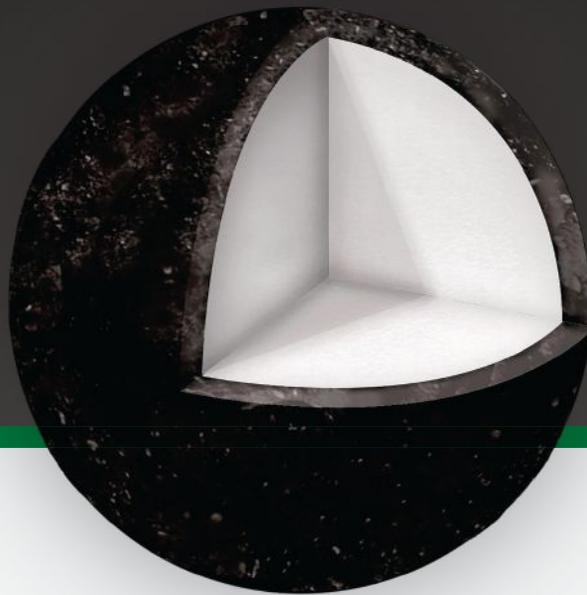
"The vision was to give

Continued on page 18



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Automation nation

Robotic mowers have been around for a while—Husqvarna first launched a solar-powered robotic mower in 1995.

The company's Automowers have come a long way in those 28 years, as on golf courses, they now mow fairways, rough surrounds and tee boxes, says Dave Plaster, director of business development and golf.

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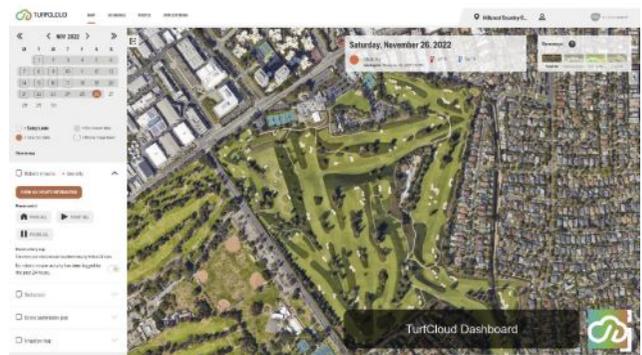
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Integrating Husqvarna's Automowers into TurfCloud provides superintendents with up-to-date mower positioning and coverage.

The only thing the machines can't handle — as of now — are greens.

"We can mow sub-300 (300ths of an inch) and we go up to about 2 1/2 to 3 inches," he says. "And the great thing is, one machine can manage both. So, they're multi-purpose machines. A single Automower can go from a rough in one area to a fairway in another."

Automowers, as the name suggests, run autonomously, meaning they'll keep working — mowing a fairway and then a rough — until they're called back or need a charge. The mowers are smart enough to change blade height on the fly before entering a new work area, Plaster says, eliminating potential headaches.

"When it goes into a speci-

fied work zone, it's all programmed so that the machine knows when it goes into a work area, what the height and the pattern is," he says.

Just as the machines have evolved since the 1990s, there's still a lot of growing left, Plaster says.

In the future, he adds, superintendents can expect robotic mowers to become more versatile in terms of what they can cut. He also suggests the mowers will continue to up their level of precision, offering tighter cuts and lower mowing heights.

"We are striving to get to a level where a superintendent can use Automowers to maintain any area of the course that they need," he says. "We want to provide a full suite of solutions."

IMAGES BY: HUSQVARNA (TOP), TURFCLOUD (BOTTOM)



The more the merrier

As a step towards providing that “full suite of solutions,” Husqvarna and GreenSight recently partnered to incorporate Automowers into the TurfCloud dashboard.

Through the partnership, the TurfCloud dashboard allows superintendents to see an Automower’s battery life and positioning. It also gives them complete control with the ability to start, pause or send them back to their charging stations.

“My favorite feature is the ability to see a 24-hour activity map,” says VanBuskirk. “At a glance, (the superintendent) can see how much area any individual mower has covered.

That’s a powerful tool because, if you have one robot or a hundred robots, you want to see how much work they’ve actually been able to accomplish.”

HawkEye Spray Drone Applications (HSDA)

By **Brian Love, Associate Editor**

It’s an uncommon sight to see a drone flying over and spraying rough or native areas of a golf course. Most golfers expect manual applications, usually

from a team delivering pest control through handheld or ride-on sprayers.

Tim Reinagel, the owner of HawkEye Spray Drone Applications (HSDA) and superintendent at Hawk Pointe Golf Club in Washington, N.J., saw an opportunity to try something new in 2020.



Tim Reinagel

ments ensure accurate spray patterns with GPS technology that utilizes 18 satellites. This eliminates drift and overspray.

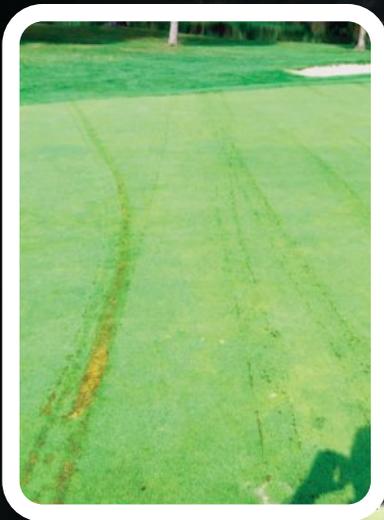
“I was always a drone guy because I did aerial photography,” Reinagel says. “As a superintendent, dealing with and treating native areas became an issue. This was especially true during shortgrass seasons. I wanted an option that treated it faster and didn’t trash my sprayers. It was discovered out of necessity, but one thing led to another. It has

Continued on page 20

A new opportunity

HSDA is a distributor of drones that apply herbicides and insecticides to areas on the golf course without exposing crew members to chemicals and reducing labor. Field measure-

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HawkEye Spray Drone Applications help superintendents cover more ground with spray applications, thus lowering the cost of labor.

Continued from page 19

grown and proven to be incredibly useful."

The Federal Aviation Administration (FAA) licensed and certified HSDA to provide aerial herbicide applications in New Jersey, Pennsylvania, New York, Rhode Island and Vermont.

Ten golf courses currently deploy HSDA's services, but the company hopes to bring more courses online within the next year or so.

"We found a really interesting niche in agriculture," Akasha Raddalgoda, technical officer at HSDA, says. "Drones are blowing up in farming. They are available all over the country but are not regularly used in golf. Tim found that drones can fill a need in the golf industry. We have been targeting golf courses with native areas that need attention."

More to come

This summer, HSDA will study granular and liquid herbicides and how the applications effectively control broadleaf

and grassy weeds in the rough. A multispectral camera will monitor the results throughout the season. Reinagel said HSDA plans further experiments to study the quality of granular fertilizer applications on the tees.

"In a time of unpredictable labor, we wanted to provide a great tool for all superintendents to use," Reinagel says. "I have been in this industry since 1990. I love being outdoors and being a superintendent. With this tool, I felt that, unlike a normal sprayer, it would be more efficient to treat the same area with two or three guys using drones. It can be quicker and prevent people from being sprayed with pesticides, which can be very dangerous." 

PHOTO COURTESY OF TIM REINAGEL



Super Science

// **READY, SET, SAVE**

INSIDE THE USGA'S PLAYBOOK ON GOLF'S WATER USAGE

By Mike Kenna, Ph.D.

Regarding water use and turf, the USGA is a near-bottomless reservoir of information. Check out the USGA Water Resource Center if you don't believe that. The byline states, "It is essential for everyone involved in the game to strive to conserve and protect the world's most vital resource."

The website is a great start. But, as recent USGA Green Section hire Matteo Serena, Ph.D., says, "Much of that information is scattered."

As the senior manager of irrigation research and services, Serena is the point person to translate the vast publications into a summary called "The Playbook."

The purpose of the USGA's playbook is to provide readily digestible information about irrigation in one place. The USGA will not dictate a course's operations but offer practical guidance rooted in the latest science.

Serena and a team of experts will assemble nine "buckets," or categories, where golf courses can save water. One is cutting back on irrigated turf because, as Serena suggests, "the less grass you have to water, the less water you have to use."

You also use less water if you water more precisely. That's another bucket: targeted irrigation, powered by technology like subsurface irrigation, which directs carefully calibrated amounts of water straight into the root zones.

Some golf courses have adopted these subsurface systems on tees and bunker faces. The USGA will explore how to expand subsurface irrigation to fairways with minimal disruptions and at manageable costs. However, using this method on severely sloped layouts won't be easy.

The USGA once preached an eco-conscious message centered on "brown is the new green." Serena jests that it was a good idea, but it didn't fly. Partly, because it put course operators in a corner. Brown grass was a course condition that many of their customers didn't like. Golfers will need to get serious about how much water golf courses use.

"We're not talking about color anymore — whether the grass should be yellow or brown or something else," Serena said. "That's not where the focus should be. The message now is about playability and performance."

The game of golf and its relationship with water continues to evolve. "The Playbook" will help us all better explain steps to conserve and protect the world's most precious resource. 



The USGA Green Section's Matteo Serena, Ph.D., (left) and Brian Whitlark (right) survey a tee with subsurface irrigation on The Club at Las Campanas, Santa Fe, N.M.



This project was funded in part by the USGA Green Section.

NEWS UPDATES

SYNGENTA LAUNCHES NEW HERBICIDE

Syngenta's new Recognition herbicide controls more than 40 weeds, including all major sedges, dollarweed and clover in St. Augustinegrass, zoysiagrass, buffalograss and kikuyugrass.

"We're excited about the new control options Recognition will bring golf course superintendents ... and sod growers," said Lane Tredway, Ph.D., technical services manager for turf at Syngenta. "It will fill the gaps in their ability to control weeds with unprecedented turf safety."

Recognition features a proprietary safener — metcamifen — allowing for broadcast applications rather than repeated spot treatments.

Syngenta said superintendents can also tank mix Recognition with Fusilade II herbicide to remove bermudagrass (common and hybrid) from established zoysiagrass as an alternative to burndown herbicides.

"Compared to current options for bermudagrass suppression in established zoysiagrass, the combination of Recognition and Fusilade II is more effective on bermudagrass with significantly improved turf safety to zoysiagrass," said Tredway. "For turf managers considering a conversion from bermudagrass to zoysiagrass, this tank-mix combination makes it possible to sprig zoysiagrass directly into established bermudagrass through oversprigging."

EVA SPACER BLOCKS PROVIDED A SIMPLE METHOD FOR EXPANDING A TDR300'S MEASUREMENT CAPABILITIES ... "

Daniel O'Brien Ph.D., Michael Richardson, Ph.D., and Douglas Karcher, Ph.D.

(see story on page 22)

// DEPTH PERCEPTION

How a modified TDR affects surface moisture estimation on putting greens

By Daniel O'Brien, Michael Richardson, Ph.D., and Douglas Karcher, Ph.D.

Managing root zone moisture is critical to both the health and performance of sand-based golf course putting greens. Ensuring adequate water for root uptake while preserving firm, dry surfaces is an ever-present challenge.

Time domain reflectometry (TDR) has become an accepted technology for obtaining objective, nondestructive volumetric water content measurements (VWC) of putting greens. However, portable TDR meters cannot describe VWC near the surface, the region that ultimately defines putting green quality.

This is because a minimum rod length is required for portable TDR devices to produce reliable, accurate measurements (7). This requirement has limited the ability to bring VWC measurements closer to the putting surface.

From a manufacturer's perspective, the issue involves limitations with the TDR meter's circuitry.

In research, errors with short rods are particularly problematic in dry soils (7). For putting greens seeking dry surfaces, an alternative approach involves taking the current minimum length and blocking the penetration

depth of the rods to focus measurements closer to the surface.

This impermanent adaptation to a portable TDR meter could preserve the minimum rod length and allow a single device to measure VWC rapidly at multiple depths and locations.

This research aimed to expand the measurement capabilities of an existing TDR meter to estimate VWC in the uppermost half and 1 inch of sand-based putting greens. The hypothesis was that we could correlate the raw travel time of the TDR wave to ground truth VWC at 0.5 and 1 inch with the use of spacer blocks.

MATERIALS AND METHODS

We conducted this research at the Milo J. Shult Agricultural Research and Extension Center in Fayetteville, Ark., in 2013 and 2014. We collected samples from sand-based research putting greens constructed according to USGA recommendations (3) and managed under representative maintenance practices for the region.

Turfgrass species and cultivars include creeping bentgrasses Penn G-2 and Tyee, and Tifeagle. Putting green

ages ranged from one year (Tyee) to more than 10 years (Penn G-2).

Our team utilized a Field Scout TDR300 Soil Moisture Meter (Spectrum Technologies Inc.) equipped with 1.5-inch-long stainless steel turf rods to gather time domain reflectometry measurements.

We set the TDR300 to Period Mode and reported all measurements in microseconds (μ s) and determined independent VWC measurements gravimetrically. We based the procedure on the manufacturer's soil-specific calibration for maximum accuracy (9).

We achieved new measurement depths of 0.5 and 1 inch with spacer blocks — made from ethylene vinyl acetate (EVA) foam mat wrapped in a double layer of weather-resistant tape — that fit over the base of the TDR300's 1.5-inch rods. We also drilled two holes in each block, allowing them to fit onto TDR300 rods while avoiding the formation of air pockets adjacent to the rods.

We then extracted 4.1-inch diameter turfgrass samples using a cup cutter and cut them to a uniform depth of 2.5 inches below the soil surface from the greens with a brass cylinder. Critically,

FIGURE 1



Field Scout TDR300 Soil Moisture Meter and (a) standard 1.5-inch turf rods. Researchers fit spacer blocks (black) onto 1.5-inch rods to achieve new measurement depths of (b) 1 inch and (c) 0.5 inches.

PHOTO BY DANIEL O'BRIEN, MICHAEL RICHARDSON, PH.D., AND DOUGLAS KARCHER, PH.D.

TABLE 1

Regression models for estimating volumetric water content using TDR300 with spacer-blocks

Model	p-value	R ²	RMSE	CV	Parameter estimates		
					β ₀	β ₁	β ₂
0.5-inch depth							
Quadratic prediction model	<0.0001	0.93	0.076	20.3	-20.184	0.017	-3.43 × 10 ⁻⁶
Linear prediction model	<0.0001	0.91	0.084	22.3	-4.584	2.34 × 10 ⁻³	
Two-point calibration model					-4.399	2.25 × 10 ⁻³	
1-inch depth							
Quadratic prediction model	<0.0001	0.96	0.043	11.5	-7.116	5.43 × 10 ⁻³	-9.32 × 10 ⁻⁷
Linear prediction model	<0.0001	0.95	0.052	13.8	-2.372	1.22 × 10 ⁻³	
Two-point calibration model					-2.490	1.27 × 10 ⁻³	

Note: p-value for all parameter estimates in all models were highly significant (<.0001).
Abbreviations: CV, coefficient of variance; RMSE, root mean square error.

we removed no turfgrass tissue and left the verdure intact as a part of the sample.

We saturated all samples at the bottom using deionized (DI) water for 16 hours. Following removal from saturation, all samples dried for various time intervals until we took VWC measurements. The goal was to produce as diverse and well-distributed VWC data as possible. Therefore, there were no fixed intervals or overall time frames for when we collected VWC measurements.

To create as many unique data points as possible, we compared measurements on each sample to those previously recorded and adjusted drying intervals accordingly. We collected Initial measurements < 15 minutes after removing the samples from saturation and continued at the author’s discretion until all samples were measured.

For each sample, we took two separate VWC measurements. First, we inserted the TDR300 fit with one of the spacer blocks into the top of the sample and recorded a Period Mode measurement in μs.

Then, we reinserted the sample into the brass cylinder. We cut it to the corresponding depth of the TDR300 measurement and weighed it to the nearest 0.1 grams. We subsequently dried cut selections at 105 degrees C for 24 hours and reweighed to calculate ground truth VWC according to Equation 1:

$$WVC = (M_1 - M_2) / (\rho_w \times V) \quad (1)$$

Where M_1 was the initial mass of the cut section, M_2 was the mass of the oven-dried section, ρ_w was the density of water, and V was the volume of the cut section.

Following gravimetric VWC measurements, we determined the total organic matter (OM) present in each sample through the loss on ignition (LOI) method (1).

Additionally, we created a two-point calibration model for each new measurement depth. The TDR300 fitted with spacer blocks recorded Period Mode measurements in air and DI water.

We took three measurements in the air and three measurements with only the exposed portion of the rods in DI water and calculated the average μs value for each. Our team conducted the process separately for the 0.5 and 1-inch spacer blocks. We used values of 0 and 1 for the VWC of air and DI water, respectively.

We then developed prediction models for each depth using SAS PROC REG (SAS 9.4, SAS Institute Inc.). And plotted Period Mode readings on the x-axis and gravimetrically determined VWC on the y-axis.

We collected and processed samples on three separate occasions. Each putting green sample served as a single unit for either 0.5 or 1 inch.

RESULTS AND DISCUSSION

At both 0.5 and 1-inch, TDR300 spacer block measurements were highly significant (p <.0001) predictors of VWC within putting green samples (Table 1). For both 0.5 and 1-inch data sets, we ultimately selected a quadratic prediction model (Figures 2 and 3).

Quadratic models and all parameter estimates were highly significant (p <.0001), with R² values of 0.93 and 0.96 at 0.5 and 1-inch, respectively. These results indicated that with this modification to an existing moisture meter, we could estimate VWC at shallower depths closer to the surface of sand-based putting greens.

At 0.5 inches, we used 80 total samples to construct prediction models. Within these samples, VWC ranged from 0.01 to 0.88 m³ m⁻³ (mean = 0.38; median = 0.36), and TDR300 Period Mode readings ranged from 1970 to 2350 μs. Organic matter content ranged from 0.04 to 0.20 g g⁻¹ (mean = 0.11; median = 0.12). We based our 0.5-inch two-point calibration model on μs values of 1953 and 2397.

At 1 inch, we used 55 samples to construct prediction models. Volumetric water content ranged from 0.01 to 0.72 m³ m⁻³ (mean = 0.38; median = 0.40), and TDR300 measurements ranged from 1970 to 2610 μs. Organic matter content ranged from 0.02 to 0.16 g g⁻¹

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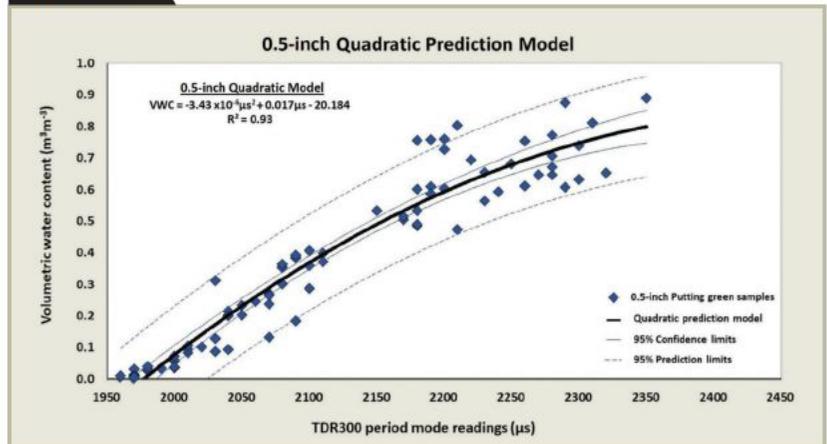
(mean = 0.08; median = 0.07). We based the 1-inch two-point calibration model on μ s values of 1957 and 2743.

The 1-inch models resulted in greater R^2 values, with reduced RMSE compared to 0.5-inch models. This was not surprising, given the 50-percent longer rod length for differentiating TDR signal travel time.

The 95 percent prediction limits evidenced greater variability in estimating VWC at 0.5 inches. Nonetheless, the highly significant relationship ($p < .0001$) at 0.5 inches indicated that the TDR300 could estimate VWC at depths as shallow as 0.5 inches.

It is important to interpret VWC appropriately as it applies to the samples in this research. Volumetric water content is traditionally understood as “soil VWC,” implying that it represents the water contained within

FIGURE 2



Empirically derived quadratic prediction model for estimating volumetric water content of sand-based putting green samples at 0.5-inch depth, using a TDR300 with spacer-block and measuring in microseconds (μ s).

the pore space of the soil.

Solid soil constituents are generally considered to be approximately 50 percent of the overall volume, so maximum soil VWC becomes limited to the remaining approximately 50 percent.

In this research, VWC was >70 percent at 1-inch and >80 percent at 0.5-inch depth. These larger, gravimetrically determined VWC values reflected the fact that samples included water within living plant tissue and accumulated OM, in addition





WATCH
Dr. Brosnan introduces innovative rootzone research

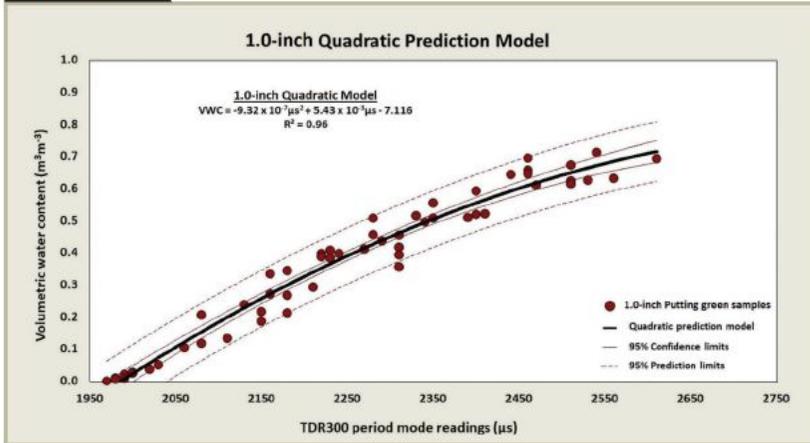


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FIGURE 3



Empirically derived quadratic prediction model for estimating volumetric water content of sand-based putting green samples at 1-inch depth, using TDR300 with spacer block and measuring in microseconds (μs).

to root zone pore space.

As we estimated VWC at increasingly shallow depths, plant tissue and OM became even greater proportions of the overall sample. When comparing 0.5- and 1-inch VWC to

other standard TDR300 measurement depths it is important to appreciate that prediction models for other TDR depths may not have included water within living turfgrass plant tissue.

We constructed prediction equations

in this research as single-step models relating TDR travel time directly to VWC for the expressed purpose of providing models that were intuitive to end users. Single-step calibration models of this type are well-represented in the literature (2,4,5 and 6) and acknowledged as a method for calibrating a specific instrument in a particular situation (8).

EVALUATING PREDICTION MODELS

Data were initially fitted with linear models at both depths, taking on the general form:

$$WVC = \beta_0 + \beta_1 \mu s + \varepsilon \quad (2)$$

Where μs was the Period Mode reading of the TDR300, β_0 and β_1 were intercept and slope, respectively, and ε was the model error.

At both 0.5 and 1-inch depths, linear

Continued on page 26



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Continued from page 25

models and β coefficients were all highly significant ($p < .0001$), with R^2 values of 0.91 and 0.95, respectively. However, linear models at both depths consistently overestimated VWC at water content $< 0.20 \text{ m}^3 \text{ m}^{-3}$ (data not shown).

This overestimation led to the evaluation of alternative prediction models. To better estimate VWC at $< 0.20 \text{ m}^3 \text{ m}^{-3}$, a β_2 term was added, creating quadratic prediction models of the general form:

$$\text{VWC} = \beta_0 + \beta_1 \mu\text{s} + \beta_2 \mu\text{s}^2 + \varepsilon \quad (3)$$

For each depth, quadratic models reduced overestimation and created a more balanced distribution of studentized residuals at $\text{VWC} < 0.20 \text{ m}^3 \text{ m}^{-3}$, producing 18 positive and 23 negative residuals without compromising random scatter of residual values at greater VWC (data not shown).

Quadratic models themselves and all β coefficients were highly significant ($p < .0001$). For both depths, quadratic models increased R^2 values and reduced RMSE and CV compared to linear models (Table 1). In summary, the β_2 term offered meaningful contributions to characterizing the relationship between TDR300 measurements and VWC at both of the new shallower depths.

CONCLUSIONS

The use of EVA spacer blocks provides a simple method for expanding a TDR300's measurement capabilities to include new shallower depths of 0.5 and 1 inch.

At both depths, there was a highly significant relationship between Period Mode measurements in μs and ground-truth VWC of putting green samples.

We assessed linear, quadratic and third-order polynomial models. We ultimately selected quadratic models for both depths as they demonstrated an improved ability to relate TDR measurements to VWC at the lower end of the observed range.

Generally, 1-inch VWC estimations tended to be more accurate. A

Research Takeaways

- Spacer blocks expand portable time domain reflectometry (TDR) meter measurement capabilities.
- Modified TDR meters can estimate volumetric water content (VWC) at new shallower depths of 0.5 and 1 inch.
- Quadratic prediction models provide good estimates of VWC across a range of conditions.
- Linear models tend to overestimate VWC at the lower end of observed values.
- Surface VWC measurements have potential use beyond golf course putting greens.

two-point calibration based on air and DI water offers a simplified alternative to constructing empirically derived linear models. However, as with other linear models, the two-point calibration tended to overestimate VWC for water content $< 0.20 \text{ m}^3 \text{ m}^{-3}$.

Multiple turfgrass varieties, species and putting green ages were well-represented by a single prediction model at each depth. The improved model performance occurred when $\text{OM} < 0.10 \text{ g g}^{-1}$. 

Daniel O'Brien and Michael Richardson, Ph.D., are in the department of horticulture at the University of Arkansas, and Douglas Karcher, Ph.D., is in the department of horticulture and crop science at the Ohio State University. For more information, contact Daniel O'Brien at dpo001@uark.edu.

References

1. O'Brien, D., Richardson, M., and Karcher, D. (2023). Adapting time domain reflectometry to measure surface moisture of sand-based putting greens. *Agronomy Journal*, 115, 595-606. <https://doi.org/10.1002/agj.21263>
2. American Society for Testing and Materials. (2002). *Standard test methods for organic matter content of putting green and sports turf zone mixes*, ver. F1647-02a. ASTM International. <https://www.astm.org/f1647-02.html>
3. Chandler, D. G., Seyfried, M., Murdock, M., & McNamara, J. P. (2004). Field calibration of water content reflectometers. *Soil Science Society of America Journal*, 68(5), 1501-1507.
4. Green Section, U. (1993). *USGA recommendations for a method of putting green construction*. Green Section, United States Golf Association.
5. Hook, W. R., & Livingston, N. J. (1996). Errors in converting time domain reflectometry measurements of propagation velocity to estimates of soil water content. *Soil Science Society of America Journal*, 60(1), 35-41.
6. Kelleners, T. J., Seyfried, M. S., Blonquist, Jr, J. M., Bilskie, J., & Chandler, D. G. (2005). Improved interpretation of water content reflectometer measurements in soils. *Soil Science Society of America Journal*, 69(6), 1684-1690.
7. Ledieu, J., De Ridder, P., De Clerck, P., & Dautrebande, S. (1986). A method of measuring soil moisture by time-domain reflectometry. *Journal of Hydrology*, 88(3-4), 319-328.
8. Noborio, K. (2001). Measurement of soil water content and electrical conductivity by time domain reflectometry: A review. *Computers and Electronics in Agriculture*, 31(3), 213-237.
9. Robinson, D. A. (2001). Comments on Field calibration of a capacitance water content probe in fine sand soils. *Soil Science Society of America Journal*, 65(5), 1570-1571.
10. Spectrum Technologies Inc. (2011). *Field scout TDR 300 soil moisture meter product manual*, item #6430FS. Spectrum Technologies.

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Feed carefully. Experts say superintendents should avoid applying fertilizer on turf near ponds and lakes to avoid algae buildup.

The inside scoop on water feature maintenance

Experts say superintendents should follow up their algaecide treatment with a phosphorus-binding agent

By Chris Lewis

As superintendents strive to maintain their courses' water features, they'll typically encounter two common pitfalls; unwanted aquatic plants and algae growth. According to Byran Fuhrmann, Ph.D., aquatic technology development scientist at SePRO Corp., excessive phosphorus is often the main culprit.

"Many aquatic plants have roots that can penetrate deep into the sediment, so it's usually infeasible to thwart their ability to access a large pool of sediment phosphorus," Fuhrmann stresses. "Therefore, aquatic herbicides are generally the best strategies to prevent or manage unnecessary aquatic plants."

In his opinion, systemic herbicides are the best options, as they offer superintendents long-term control. Additionally, superintendents can utilize them proactively throughout the winter to prevent undesirable aquatic plant growth the rest of the year.

On the flip side, most algae rely on water column phosphorus or phosphorus located at the sediment's surface, which is ultimately a smaller pool. Consequently,

superintendents often find that, by managing phosphorus with binding agents, they have a practical, cost-effective technique as they strive to prevent excessive algae growth.

"It's also an incredibly efficient method to improve aesthetics, as just 1 pound of phosphorus can grow more than 500 pounds of algae," he says. "In turn, 500 pounds of algae is enough to change the color of 4 acre-feet of water from blue to lime green and even give 10 acre-feet of water a slightly green color."

He continues, "In general, the removal of 1 pound of phosphorus only costs a few hundred dollars. This can be the key difference between a superintendent having a beautiful, blue pond and an ugly, green swamp."

It's also important to remember that algaecides will often release phosphorus into lakes or ponds, leading to new algae growth after the algaecides dissipate a few weeks later.

"With this in mind, superintendents can follow up an algaecide treatment with a phosphorus binding agent, which will help limit future algae growth," he adds. **G**

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As superintendents strive to manage lakes on their courses, they will encounter one key issue: algae. To avoid algae infestations, superintendents must be very careful when fertilizing next to lakes and water features to ensure that no fertilizer is applied directly or indirectly to the water. Fertilizer runoff into the water will provide nutrients for algae and aquatic weeds. In fact, only 5 parts per million of phosphorus can cause an algae bloom — an incredibly small amount. Superintendents must consider providing good circulation. In doing so, they'll maintain adequate oxygen content in their courses' water features. In addition, good circulation will help break up algae mats and feed beneficial microorganisms in the water.



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The primary issue in maintaining the appearance and quality of water on the golf course is algae control. Chemical algae control may be environmentally or economically prohibitive, and physical removal is impossible. The best — and most cost-effective — way to control algae is to limit sunlight and remove nutrients. Bacteria consume nutrients to starve out algae; apply by simply tossing in tablets or blocks monthly. Subsurface aeration inexpensively and unobtrusively circulates the bacteria throughout even the largest water features, while surface aeration fountains are attractive but not as effective for circulation. Finally, pond dye tints the water and blocks the sunlight that algae and other submerged weeds need to grow. Together, this three-pronged approach ensures that water features look their best.



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To address their water bodies, I advise superintendents to have a preventative strategy versus a reactive, firefighting approach. The offseason is an excellent time for superintendents to address water features, especially before algae and toxic blue-green algae become major issues as temperatures rise. Superintendents should seek proactive strategies, along with the latest technologies, to ensure their courses' water features remain stable, eye-pleasing and odor free, while also eliminating harmful blue-green algae — which can be toxic — and nuisance green algae. They can use a solution that hinders algae growth as long as they install it early. It also allows them to focus on their golf courses rather than overgrown algae issues. Consequently, they'll be better stewards of the environment and their communities.



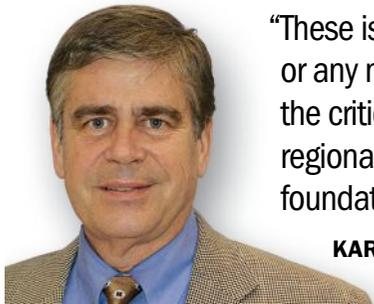
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Water treatment division manager

Superintendents should have a maintenance agreement with a local distributor for service to ensure their biological wash water treatment system runs as it should. Distributors' networks will train agronomy staff members on how to properly use their reclaim systems. And they'll help ensure that staff members conduct everyday tasks — such as the inoculation of microbes — and yearly tasks — like system draining and cleaning — on time. Local distributors are also promptly available for service calls whenever necessary, particularly if problems arise. Without question, superintendents will eventually have to service any piece of equipment. However, by having a reliable resource who can help with that task, superintendents can focus on their other daily duties instead.





“These issues like frost heave, desiccation or any number of other events, reaffirm the critical role that local, state and regional golf organizations and turfgrass foundations play in turf research.”

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

A lesson on frost heave from Iceland's best

This past winter, I had a chance to speak with Bjarni Hannesson, golf course superintendent at Keilir Golf Club in Iceland, about frost heave. While frost heave occurs in Ohio, and throughout the Midwest, it is mostly a minor problem that we often ignore.

If frost heave occurs here locally — in Columbus, Ohio — a superintendent might roll, under proper conditions, in the early spring to smooth or push slightly-raised turf back down. But, in most cases, allowing for natural settling is the default practice.

For many golf courses in Iceland, frost heave is not a minor problem that quickly disappears.

Hannesson is a young aggressive golf course superintendent considered one of the leaders in the Icelandic golf industry. Through our communication, I was struck by how visually dynamic frost heave is under the proper conditions.

Frost heave occurs during late winter/early spring, often during freeze-thaw periods. Those of you who live in a wintery climate and experience potholes on your daily commute share a commonality with frost heave. Pothole formation is similar to the frost heave process.

WHAT IS FROST HEAVE?

Frost heave is an upward swell of soil during freezing conditions caused by the presence of ice as it grows toward the surface. An ice layer forms just below the frozen soil layer at an interface where water is in both a frozen and liquid state.

The ice layer then expands when water freezes and pushes upward, forcing the soil above the ice to pop up.

Ice growth depends on a water supply being delivered to the freezing front. The weight of overlaying soil restrains vertical ice growth and promotes formation of a concave lens-shaped area of ice within the soil.

Severe frost heave can result in the turf being lifted over a foot. Visual symptoms appear as freshly filled graves ... or maybe being a little less morbid, like “church-pew” bunkers.

Turf soil conducive to heave, referred to as frost-susceptible soils, are silty or loamy textured.

Frost-susceptible soils are sufficiently porous to feed ice formation and allow capillary action.

The soils, however, are not so porous as to break capillary continuity. Instead, the soil must strike the correct balance between porosity and the ability for capillary action to occur.

THE MORE YOU KNOW

During my conversation with Hannesson, I was curious about some of his management strategies. He conveyed a few thoughts I listed below.

“We try to roll (the frost heave) out. But this is very hard to do since the thawing is uneven and the timing needs to be perfect,” he said. “If you hit them with the roller while there is still some ice below, you can damage the surface by digging in with the roller. If the frost has thawed and water quickly drains out, it can be a bit too hard and you get minimal effect from the roller.”

Throughout my career, I have been curious about how agronomic issues that I might consider nonstarters locally can have a significant impact in a different location or region. These issues like frost heave, desiccation or any number of other events, reaffirm the critical role that local, state and regional golf organizations and turfgrass foundations play in turf research.

Whether it is local or international, curiosity drives us to find solutions. No matter how localized or “insignificant” a research study or observation is judged to be, it could help a turf manager somewhere.

Critical to that is a concerted effort to publish that research so someone can find it. **G**

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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Debunking common myths about spotted lanternfly

Brian Walsh of Penn State Extension shares some good news, and some bad news of these unsightly pests

By Christina Herrick

It's September and your course has one final tournament for the season. A week before the event, 1-inch-long pests — spotted lanternflies (SLF) with gray wings and black spots — descend upon the course in swarms. Brian Walsh, Penn State Extension horticulture educator for Berks County helps debunk some common myths about these pests before they infest your course.

Myth ❶: They're hard to kill

Walsh says plenty of chemicals kill spotted lanternfly adults. "Even the softest insecticides can kill them," he says. "Even soaps and low-toxicity insecticides are very effective."

Walsh warns, though, that superintendents who apply insecticides to reduce large adult populations may need to remove dead adults.

"You should have a plan for vacuuming them up," he says. "When they pile up, it can start to smell like roadkill on an August day."

Myth ❷: Spray everything

Walsh says superintendents should avoid blanket insecticide applications to control every spotted lanternfly population, especially in wooded areas. A Penn State University Extension guide (link in the QR code) breaks down the pest's favored hosts, which can help superintendents time and



target applications effectively. He says the pest's preferences in hosts change depending on the season, so it's



When spotted lanternflies first infest a new area, adults will swarm properties.

important to understand SLF's behavior before applying.

"If you target those preferred hosts with your treatment, you get more bang for your buck with the treatment," he says.

Myth ❸: They're easy to control

"You can spray them, kill 'em, and they can keep coming in," he says. "Populations can just suddenly jump by thousands on a property overnight and it's a reality that we have to deal with. We have to reset our expectations of what we can actually control."

Walsh suspects lanternfly populations can move seven to 10 miles per year. Spotted lanternflies — originally detected in Berks County, Pa. — are now found as far west as Indiana, as far north as Vermont and as far south as North Carolina, thanks to the pest's penchant for hitchhiking. Mid-fall, adults make dispersion flights, where the pest will swarm a property.

"That's when you see those sudden onslaughts of numbers that blow people away," he says.

Myth ❹: It'll always be bad

Walsh says there are ebbs and flows to spotted lanternfly infestations. When the pest first arrives in an area, superintendents worry populations will build over several seasons into swarms of biblical proportions. That won't always be the case, he says.

"It seems like the first wave in a new area builds and builds. It seems like it's not going to end season after season, but then it does," he says. "We've seen them dissipate down to almost nothing. Then, unfortunately, on a couple of those properties, we've also seen them rebound."

Myth ❺: They harm people

While spotted lanternflies won't harm golfers and members, the pest is a nuisance. It damages trees as it feeds. Spotted lanternflies secrete a honeydew following feeding, which can attract yellowjackets, wasps and hornets. The honeydew can also cause sooty mold on trees.

"From a golf course management standpoint, the nuisance aspect can be phenomenal," he says. "The honeydew dripping down makes it unpleasant for people who are paying to be there."

It's important to understand the pest and educate your members about economical treatment options.

"Depending on if the trees are around the clubhouse, management might need to be stepped up a little bit to prevent an economic loss," he says. "Education will make a huge difference in how dollars are potentially spent." **©**

PHOTO BY: BRIAN WALSH

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The Atom Pro Max edger from **SEAGO** is a shaft-driven edger, which the company says transfers power from the engine directly to the blades. The edger features a Honda GX-50 commercial-grade engine. The machine's wheelbarrow style puts the weight of the machine over the single wheel for operator comfort, and the fully enclosed blade guard and debris deflector provide added safety. The machine also has an optional wire wheel brush blade for edging asphalt or as a crevice cleaner. SeagoInternational.com

3 952 Series rotors

The 952 Series rotors from **RAIN BIRD** include three models, such as an IC version compatible with the Rain Bird IC System, which connects irrigation central control directly to every rotor and valve. Electric and Stopmatic (SAM) models are also available. All 952 Series rotors are top serviceable with a snap-cover design allowing for quick access to internal components. The 952 Series also includes a self-adjusting stator and a single nozzle set with consistent rotation speeds. The rotors' wide range of throw provides more installation flexibility with fewer parts to stock. RainBird.com/Golf



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BrassKnuckleProtection.com

The 19th Hole



Kyle Harrigan

NORTH COURSE SUPERINTENDENT // Silverado Resort, Napa, Calif.

Kyle, it's my treat — what can I get you?

I'm a craft beer guy. But since you're buying, I'll have a whiskey (laughs).

But my favorite brewery out here is Hen-House Brewing Co. Their big thing is fresh beer. They have a beer festival this weekend called The Freshtival. They have 110 breweries from the Bay Area and Nevada. All the beer is less than 7 days old.



Sounds awesome! Tell me about Silverado Resort.

It's awesome. It's a big property with two different courses. We have about 200 acres of irrigated turf on both courses and then another 130 acres of resort grounds, so 330 acres total for the whole property. The great thing about Silverado is there is always something going on. It's always exciting. But that's also the most frustrating thing — if there's a wedding with 300 people, you don't want the backup beeper going off on the dump truck.

I know summer can be hard on you guys, but are you looking forward to anything this summer?

Actually, yes. My wife and I are going on our honeymoon. We got married at the end of February. I feel bad because it's so close to the (PGA Tour's 2023 Fortinet Cham-



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pionship), but at the same time, you go on your honeymoon only once. We're going to Paris, Amsterdam and Belgium. My wife has been before, but this will be my first trip to Europe.

You live in a well-known area, but as a local, what would you suggest a visitor do? Besides wine tasting?

Yeah, I'm not much of a wine guy.

There are a lot of cool things. Oracle Park, where the Giants play, is a nice stadium. There are a lot of good craft breweries here. My wife and I went on the Sonoma Zipline Adventure ... you're like 200 feet up in these giant sequoias and redwoods. It's pretty cool.

You're volunteering at the Wells Fargo Championship this week.

Do you know how you'll celebrate Cinco de Mayo there in Charlotte?

The main thing is, I'll be on the East Coast and my mom's birthday is May 5. I always try to be the son that calls first. I think this year I'll definitely be the son that calls first.

Not only will you be the first one to call, but you'll also be the only one to mention your mom in a magazine article.

Yeah! My brother and I used to fight all the time. When he became a senior in high school, we started getting along — I think he realized he was leaving soon and I really wasn't that bad. Now we're really good friends. We just went to a music festival in San Francisco to celebrate his birthday.

As interviewed by Seth Jones, May 1, 2023.

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