SINCE 1927—The Resource for Superintendents // Golfdom.com

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02.19

WHERE TURF MASTERS MEET

A recap of the numerous solutions presented at the largest *Golfdom* Summit yet

PLUS

A LESSER OF TWO WEEVILS?

SPRING DEAD SPOT RETURNS

THE BIG IDEA OF THE MINI COURSE

A NORTH COAST MEDIA PUBLICATION VOL. 75 // NO. 2

The Experts Put Fairway Rolling to the Test.

"Research confirms that fairway rolling results in firmer surfaces significantly decreased clipping yield, localized dry spot

RESEARCH AT MICHIGAN STATE UNIVERSITY

Results from a 2-year fairway rolling study using a Smithco Ultra 15 Fairway Roller with filled 150-gallon water-ballast tank.

- Fairway rolling decreased clippings yield on research fairways mowed 2x/week compared with fairways mowed 3x/week and not rolled.
- Fairway rolling also increased volumetric moisture content which significantly reduced localized dry spot.
- Results indicate fairway rolling is agronomically sound and fiscally responsible and can lead to reduced inputs and economic savings on fairways.
- Additionally, surface firmness was increased on rolled fairways which indicates longer ball roll will result and most likely increased divot fill-in on stoloniferous fairways.

RESEARCH AT UNIVERSITY OF MASSACHUSETTS

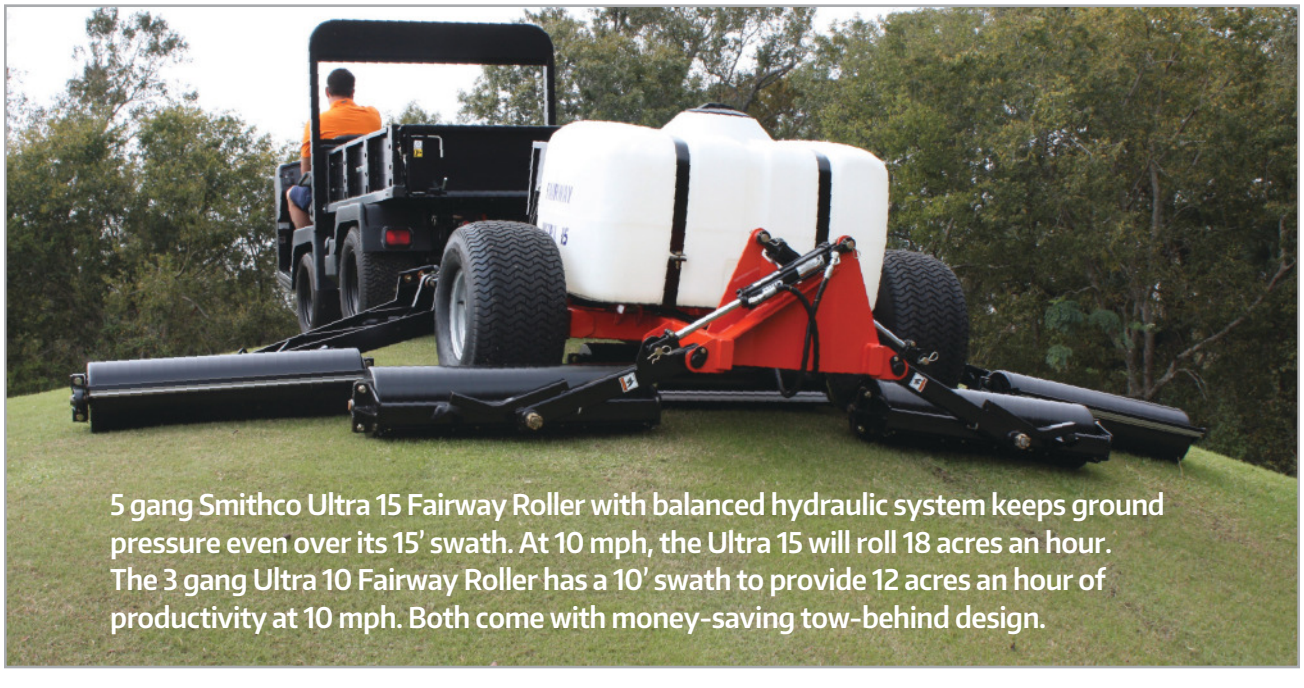
"Third year of testing indicates up to 65% reduction in dollar spot."

–Geunhwa Jung and Jay Popko; University of Massachusetts

- 8 out of 9 rolling studies reduced dollar spot.
- Increased rolling frequency increased dollar spot control.
- Threshold-based programs can reduce dollar spot apps with rolling (2-3 apps vs 5 apps).
- Rolling = better spring green-up/turf quality
- Does not provide complete control, but can extend fungicide-control intervals at golf courses with difficult-to-control dollar spot.

which should lead to longer ball roll. Most important it and dollar spot which should lead to economic savings."

–Thomas A. Nikolai, Ph.D., College of Agriculture , Michigan State University



5 gang Smithco Ultra 15 Fairway Roller with balanced hydraulic system keeps ground pressure even over its 15' swath. At 10 mph, the Ultra 15 will roll 18 acres an hour. The 3 gang Ultra 10 Fairway Roller has a 10' swath to provide 12 acres an hour of productivity at 10 mph. Both come with money-saving tow-behind design.

Research Brings Out the Best! **Smithco.com**

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VOL. 75 // NO. 2

SINCE 1927—The Resource for Superintendents // Golfdom.com

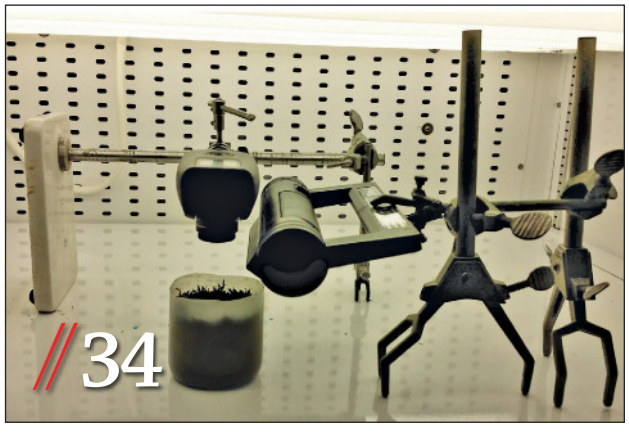
Where Turf Masters Meet

The largest-ever *Golfdom* Summit brought superintendents from around the country to meet with 20 of the industry's most cutting-edge companies

//20

The Big Idea of the Mini Course //29

COLUMNS



//34

SUPER SCIENCE

DEPARTMENTS

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100 YEARS IN GOLF
1919 2019

"I may have missed my wife's Uncle Rick, but the significance of connecting with my Uncle Vince was not lost on me."

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

Say 'uncle!'

I am off to a fast start in 2019, as I've been on the road every week except one so far. As I write this, the Golf Industry Show in San Diego is staring me down, kicking off another jam-packed travel month for February.

In January I enjoyed St. Pete Beach in Florida, then a couple cold days in Omaha. Luck was on my side and I caught beautiful weather in San Francisco and Pebble Beach. January travel concluded with two days in Phoenix at the Sports Turf Managers Association annual conference, then home.

I'm back in the office too close to deadline to share photos from Pebble Beach this issue ... which include those from a once-in-a-lifetime trip to Cypress Point Club (well, I hope it's not once-in-a-lifetime). I'll post those photos on my Twitter accounts, **@SethAJones** and **@Golfdom**. I'm sure we'll use them in the magazine at some point. Between my time at Pebble Beach Golf Links and Cypress Point Club, I got lucky — a perfect day. The golf gods were smiling on me.

If I was in your city for these trips and didn't give you a call, forgive me. With two young kids at home, I never have much free time when I travel. It's always point A to point B, then back to point A. Heck, in San Francisco, I never got to see my wife's Uncle Rick ... and I stayed at his house! I arrived late, was out the door well before sunrise, and then back late both days.

But good news: On the trip to Phoenix I got to see my Uncle Vince for the first time in seven years. It's been since we laid his mom, my Grandma Joyce, to rest in 2012 that I saw "U.V." The hugs were abundant, the stories were rapid-fire and then it was back to the airport.

I'll spare you the stories (although the one of my then-girlfriend-now-wife's late three-legged cat "Elton John" getting smoked out of the house by U.V. before we went to the Nine Inch Nails show in 2005 is an all-time classic). Sitting in the airport I texted my boss and thanked him for allowing me this awesome job where I get to travel the country.

I may have missed my wife's Uncle Rick, but the significance of connecting with my Uncle Vince was not lost on me. I've complained about air travel in this space before. Let me take this moment to commend it.

Traveling from city to city is essential to my job. I had a guilty feeling every time I sauntered through Transportation Security Administration (TSA) Precheck security on my way to the next golf paradise, while the people working to keep me safe hadn't seen a paycheck in over a month. Roughly 800,000 government workers and contractors have been either furloughed or told to work without pay for 35 days — the longest-ever government shutdown. And all we know currently is that there is a three-week spending package to keep these people working through Feb. 15.

Here at *Golfdom* we talked about the government shutdown and what might happen if it continued up to the Golf Industry Show. What would it mean for our industry if "worse comes to worse."

It doesn't matter whose side of the fence (or wall) you're on. We're in this together. After a day in Pebble Beach, I'm as high on life as Elton John the three-legged cat was back in 2005. That wouldn't be possible if it wasn't for the hardworking people of the TSA.

I don't care who says "uncle" first. I just want both sides to figure it out so we don't have to do this again, and we can keep enjoying the spoils of this beautiful industry. 2019 is right there before us ... let's avoid a downward spiral.

Email Jones at: sjones@northcoastmedia.net.

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NEWS, NOTES AND QUOTES

//KEEPIN' IT GREEN

The FairWays Foundation is centered on environmental stewardship, education and conservation.

AQUATROLS CEO LAUNCHES THE FAIRWAYS FOUNDATION

By Sarah Webb // *Associate Editor*

With environmental stewardship top of mind, Aquatrols has founded a new nonprofit organization, The FairWays Foundation.

Dedicated to safeguarding the environment, the foundation will fund local and global projects that advance conservation, stewardship and education, said Matthew Foster, Aquatrols' president and CEO.

"I believe Aquatrols can take a leadership position in making a difference in a way that goes beyond a conversation," Foster said. "Everyone who works in this industry doesn't just like to be outside, they love to be outside. Shouldn't we do everything we can to preserve that? Aquatrols is."

Still in its infancy, the organization is in the process of seeking potential board and committee members. It hosted its first soft launch at the BIGGA Turf Management Exhibition in the U.K. and hosted its second at the Golf Industry Show in San Diego. The foundation has been well received so far, according to Graham O'Connor, Aquatrols' product manager, who oversees The FairWays Foundation.

"In our industry, people appreciate the environment, and Aquatrols wants to inspire others to make a difference in a way that goes beyond just talking about it," O'Connor said. "Sometimes finding the resources and time to do that, though, can be challenging. The FairWays Foundation wants to help change that."

The FairWays Foundation expects to begin accepting formal applications by the end of 2019. Those interested in the foundation can visit its website for more information: **thefairwaysfoundation.com.**

//COOL NEW DIRECTORS

COOL PLANET ADDS 2 TO BOARD

Cool Planet has announced multiple changes to its board of directors.

The company appointed Rik Miller, former president of DuPont Crop Protection, as chairman of the company's board of directors. He will replace Howard Janzen as chairman. Janzen, the ex-CEO of Cool Planet, will remain on the board.

Rik Miller

The company also added a new director, Dwight Armstrong, Ph.D., the former CEO of the National FFA Organization and vice president of the Global Group at Provimi, an animal nutrition company.

Dwight Armstrong

Armstrong will replace Dennis Weibling, who has resigned from the board to facilitate the change to a heightened agricultural-focused board of directors. All board changes will go into effect immediately.

//WINNER, WINNER

MICHAEL T. HUCK TO RECEIVE USGA'S 2019 GREEN SECTION AWARD

The USGA has named Michael T. Huck, a turfgrass and irrigation specialist from Orange County, Calif., as the recipient of its 2019 Green Section Award.

Currently a principal at Irrigation and Turfgrass Services in Southern California, Huck is widely recognized as a visionary in water conservation and water-use efficiency. He has authored nearly 50 articles and continues to share news and insights on water regulations, supply issues and the future of golf course irrigation with a worldwide audience. He also regularly works with regulators, golf facilities and allied associations on developing best practices and policies that conserve water while ensuring sustainability.

"Mike's continued dedication to elevating the topic of water conservation in golf and advocating for education and dialogue has benefited courses across North America and the world," said Kimberly Erusha, Ph.D., USGA Green Section managing director.

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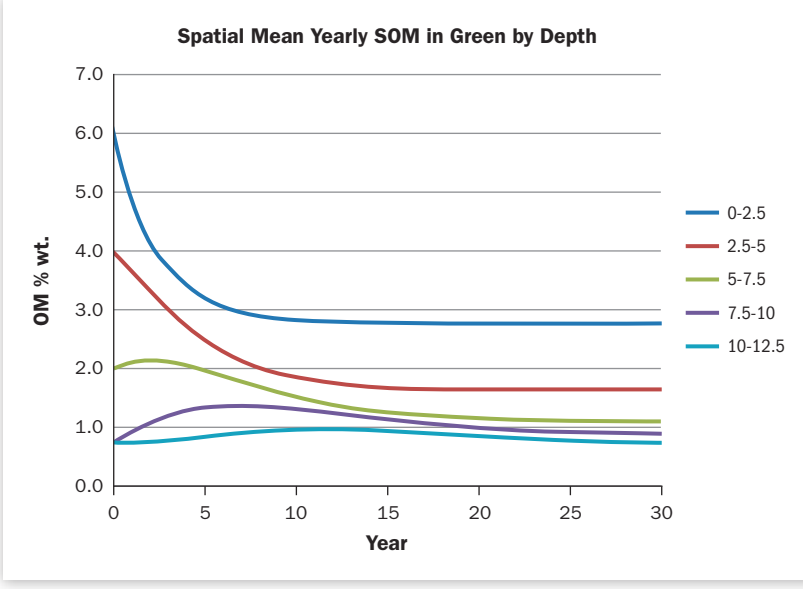
//THE REAL MCCOY

A tool for managing organic matter

Ed McCoy, Ph.D., associate professor of soil physics at Ohio State University, has expanded upon previous research to develop a greens organic matter management tool that can project out as far as 30 years regarding organic matter (OM) growth, natural decay and methods to remove and dilute the OM layer(s).

According to Jeff Broadbelt, vice president of operations for DryJect, who aided McCoy with his initial research, the tool is site specific, allowing superintendents to enter monthly mean temperatures, which influence OM growth. This is important when planning aeration and topdressing dilution programs to match OM growth.

The tool is meant to be used by superintendents to plan aeration, injection or topdressing times and quantities, Broadbelt said.



This figure shows a starting point of organic matter (OM) of 6 percent in the first 0-2.5 cm range. After implementing a topdressing, core aeration and injection program repeated year after year, the OM's percent dropped significantly by the fifth year, then stabilized or reached an equilibrium after the fifth year.

//NEW DIGS

NEW HQ FOR BAYER

The Environmental Science business unit of Bayer's Crop Science division has opened its new U.S. headquarters in Cary, N.C.

"Environmental Science has had a steady growth through the years," said Mark Schneid, head of Environmental Science for Bayer, North America. "Our new headquarters will give us room to accommodate this growth, provide a modern and interactive environment for our employees and continue to be part of the fabric of the greater Raleigh-Durham-Cary community."

EMAILS @ TEXTS # TWEETS

"I just wanted to take a quick minute to say what a great job you did on your article of Jimmy and Steve. I loved that you quoted some of Steve's past employees that are now superintendents in their own right, in part by Steve. Who better else to know the grooming, mentoring, etc., he gave them than me? I loved that you noticed that and spoke about it in your piece. I've had some great feedback from it and have also shared with members of his family that aren't on social media. Please pass on to John Torsiello how grateful the family and I are for the continued respect you both have shown for him in writing this article. I always knew he was a 'celebrity superintendent.'"

Sheree Wright
Wife of the late Steve Wright

GO FIGURE

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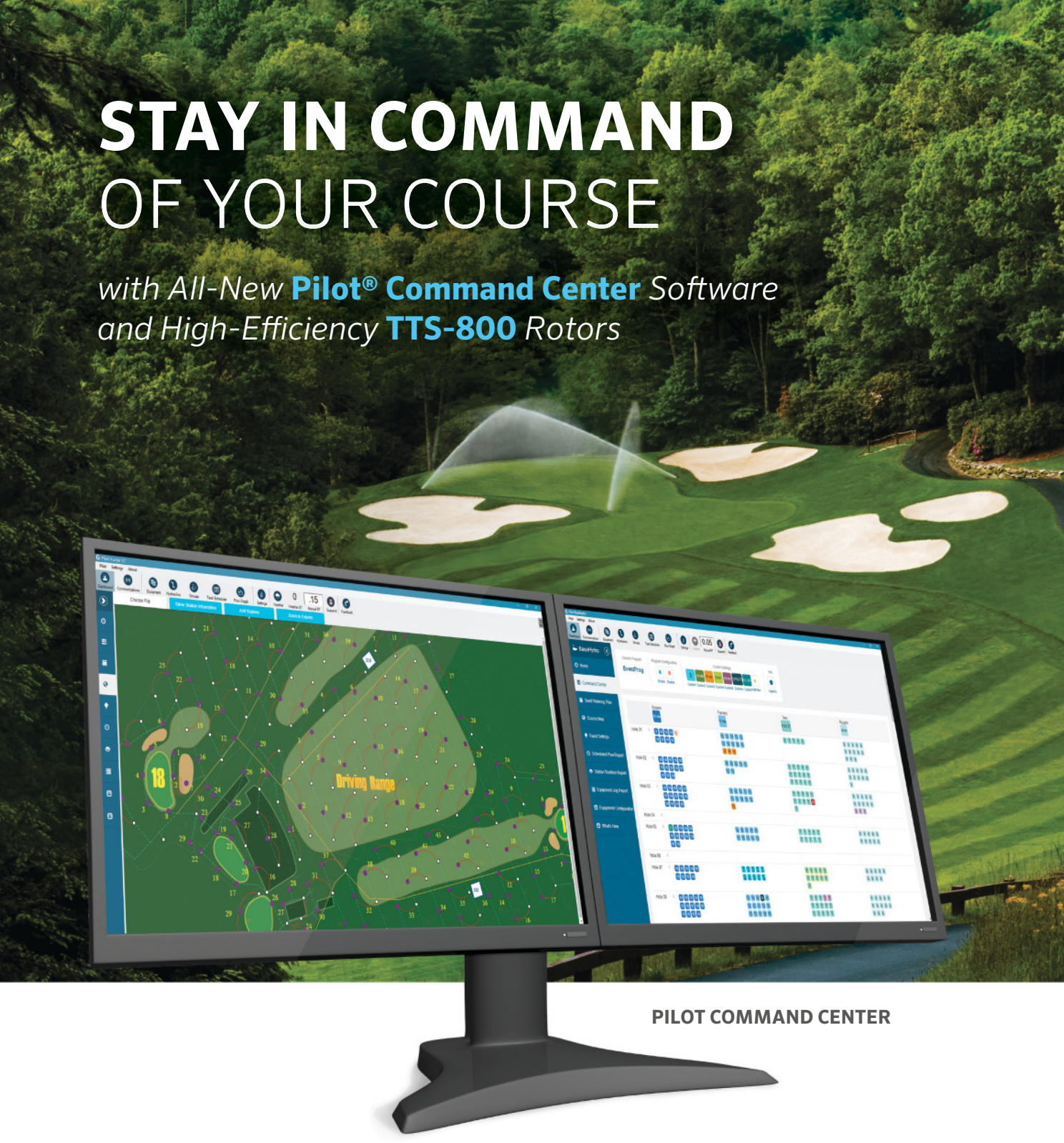

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Golfdom Gallery

Golfdom Summit EDITION

1 Dolla' dolla' bills, y'all! After a hard-fought game of Left-Right-Center, it was Ian Daniels, superintendent at Teugega CC in Rome, N.Y., who walked away with the cash.

2 Making Connecticut-Wisconsin connections (Left to right) Ben LaBarre, The Legend at Bristlecone Pines, Hartland, Wis.; Mike Chrzanowski, Madison (Conn.) CC; and Joel Larsen, North Shore CC, Mequon, Wis., take a break from discussing the finer points of maintaining turfgrass in their regions.

3 The battle lines are drawn An annual tradition at the *Golfdom* Summit is to see if anyone can take down the reigning pingpong champ, Jeff Leuzinger of Healthy Grow (left). Many tried, including Alan Davis, Willow Creek CC, Sandy, Utah (right) ... but the champ still left with his belt.

4 Any possible advantage We caught North Coast Media CEO Kevin Stoltman (center) discussing pin placements and green speeds with Reunion Resort superintendents Robert Guerra (left) and Ron Sharps in advance of the scramble tournament. But how many advantages does a guy who's hitting the ball straight down the middle really need?

5 Johnson & Johnsen Aaron, Aaron. Johnson, Johnsen. Doctor, doctor. We couldn't resist putting Aaron Johnson (right), CGCS, Dacotah Ridge GC, Redwood Falls, Minn., in the same cart as Aaron Johnsen, sales director, WinField United. It turns out great names golf alike.

PHOTOS BY: SETH JONES (1, 4, 5); ABBY HART (2, 3)

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"This was my first experience working with a majority Mexican crew, and I couldn't help but gain a deep respect for who they were as a group."

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

The day we let the Mexicans rip

During my assistant years, the course management I worked for decided to do a bunker renovation. A project of this magnitude is usually contracted to an outside construction company, but our superintendent decided this Herculean task would be accomplished in-house.

I wasn't down using just our crew, but to alleviate our pressure, the club purchased a hand-operated mini excavator equipped with a trencher attachment. We were all pretty stoked about this purchase, assuming it would eliminate a ton of handwork.

Unfortunately, it didn't, and we quickly discovered this machine was tough to maneuver within the small confines of our irregularly shaped bunkers. A team of greenkeepers armed with shovels removed the sand much faster than one person operating the mini excavator.

Despite the setback, we knew the excavator would be ideal for trenching the drainage lines, but again, the problem of maneuverability became an issue. Along with the challenge of maneuverability, the underlying soil was littered with boulders of varying size, and the trencher couldn't run for a reasonable amount of time before coming into contact with a stupid rock. We were constantly stopping the trencher in order to hack at the boulders with picks and shovels until they were out of the way.

It was a nightmare and slowed down the process considerably. Everyone was frustrated, and if this project didn't quicken, there was no way all the bunkers would be completed in time for the following golf season.

As we were fretting, one of our Mexican greenkeepers approached us. He suggested we bail on the excavator, give him a few greenkeepers, and they would dig the trenches using a pickaxe and shovels. There was hesitation because the club had invested some coin in the excavator and we were inclined to keep using it. But the piece really wasn't doing an ideal job, so it was decided to let the Mexican team rip.

Things started flowing once the decision was made to dig the trenches by hand. We fell into a major groove and began moving at a reasonable pace. Watching this team bust out those trenches using only hand tools was amazing. Their precision and problem solving were remarkable, and it seemed unfathomable that they were digging trenches at a way faster clip than the mini excavator.

This was my first experience working with a majority Mexican crew, and I couldn't help but gain a deep respect for who they were as a group. I learned about their troubles back in Mexico, where corruption reigned, education was a joke and you were more likely to end up dead before the age of 30 than to find a decent job.

They made a conscious decision to leave the homes where they grew up, their wives and children, all for the hope of finding a better opportunity in America. Being able to understand the sacrifices our Mexican crew made — while also working in a pretty tough job — had a deeply profound effect on me.

If you ask superintendents about what has affected our industry for the better over the past 20 years, I'm sure some answers would have something to do with the advances in equipment or improvements made to irrigation. Others might allude to breakthroughs in turf breeding, while some would say social media has been highly influential.

These are pretty decent answers, but for the life of me, I never understand why we don't give the countless Latinos making up the backbone of our labor force their due. Latinos have had the biggest impact on our industry in the past 20 years, so you can go ahead and use that robotic mower, program irrigation on your smartphone, seed all your greens with improved varieties of turf, then tweet like mad about it. Just give me a crew of Latinos and you can have the rest.

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

The Golfdom FILES

FROM THE ARCHIVE

Benjamin Franklin once said, "An ounce of prevention is worth a pound of cure." Noted turfgrass scientist (and three-time GCSAA Distinguished Service Award winner) O.J. Noer likely would have agreed with him. Noer frequently offered his recommendations for developing quality turf through a solid fertilization program and planning ahead for turf pests and diseases. The following article was printed in the May 1949 issue, the second in a series on fairway turf. In it, Noer discussed topics that included proper fertilization techniques, white grubs, leaf spot disease, aerification and lime usage. To read the full article, visit **golfdom.com/exclusive.**

Developing fine turf with aid of fertilizers and chemicals

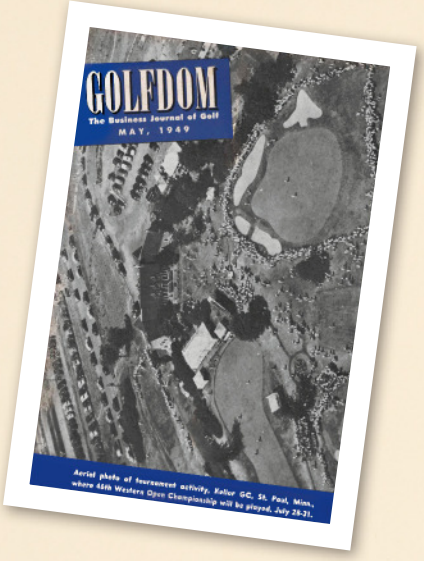
BY O.J. NOER

Fertilization of established fairways: Fertilization is the clue to increased turf density, provided other unfavorable factors have been corrected.

Phosphate and potash are needed by every plant but play a secondary role on established fairways because clippings are not removed. Nevertheless, the first step in formulating a fertilizer program is to decide whether the soil supply of these elements is adequate. If not, they should be applied so nitrogen can do its work and produce a dense, uniform coverage of turf.

Potash rarely needed: Fairways seldom need potash fertilizer because most soils contain an abundance of it. The soil supply is replenished when the clippings decay. The use of potash without adequate amounts of nitrogen encourages clover. Poor sandy soil and the peats are the only ones that may need potash occasionally. An application of 60-percent grade muriate of potash at 100 to 200 pounds per acre is ample.

Phosphate overemphasized: The need for phosphate on established fairways has been overemphasized by some. It should be used liberally only on soils known to be deficient, or where reseeding is necessary. The initial application should furnish 80 to 100 pounds per acre of actual phosphoric acid. This amount is contained in 400 to 500 pounds superphosphate, 20 percent grade. After that, a fertilizer containing one-third to one-half as much phosphoric acid as nitrogen will supply all the phosphorus fairway grass requires. Phosphate alone, or without enough nitrogen, encourages clover also.



Nitrogen is the key to good fairway turf: On established fairways, nitrogen fertilization is the thing that causes grass to spread and form a dense turf. When used in adequate amount, it helps discourage clover and weeds. There were good fairways before the days of sodium arsenite and 2, 4-D, both in the North and in the South. The problem of crowding out clover and weeds was simpler with Bermuda, but it was not too difficult on northern bent fairways.

Nitrogen imparts deep green color and is responsible for active growth more than any other element. It is the sales promoter among plant food elements. When phosphate and potash are applied alone or in combination, the effect is seldom noticeable to the eye. But put nitrogen with them, or apply a little ammonium sulphate, nitrate of soda, etc., and the effect is startling and like magic. The grass becomes a beautiful dark green and starts to grow at an accelerated rate. Because of this marked effect on top growth, many conclude that nitrogen is the cause of shallow roots. This is not true. Nitrogen is an essential constituent of protein, which is in turn a vital part of every plant cell. Roots are made up of cells and need nitrogen just as much as leaves and stems. The root system will be restricted when nitrogen is deficient. Only when the use of nitrogen is grossly overdone does it tend to produce shallow roots.

On starved grass, heavy rates of nitrogen are justified spring and fall until turf of desired density is obtained. After that, the rate can be reduced to bare maintenance requirements and possibly to only one application a year. In crabgrass regions, major nitrogen fertilization should be in the fall, with smaller doses in the spring in order not to encourage crabgrass. Farther north, heavy spring feeding is feasible and desirable.

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TO INTRODUCE SUPERINTENDENTS TO ITS BROAD PORTFOLIO, QUALI-PRO IS OFFERING A UNIQUE, WEB-BASED TRAINING COURSE.

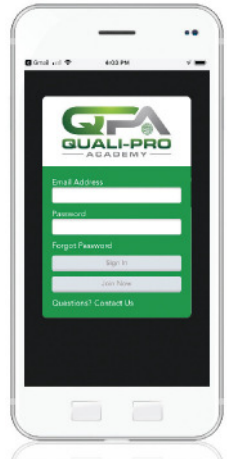
By **CHRIS LEWIS**

Without question, Quali-Pro has the broadest portfolio in the turf industry. There's simply no comparison to the company's wide range of innovative combination chemistry.

In fact, Quali-Pro's portfolio is so diverse that superintendents often aren't aware of all the formulation options that are available. But that's no longer an issue now.

Thanks to the Quali-Pro Training Academy, which was first introduced in the spring of 2018, superintendents' knowledge of — and, in turn, comfort and confidence with — Quali-Pro's formulation solutions is more apparent than ever before.

Through an easy to complete, 45-minute online course, superintendents learn about several Quali-Pro formulation products, along with their key features, benefits, application use and use sites.



"When superintendents are more educated about a certain product, they're more comfortable and confident talking about it," says Ty Ferraro, marketing director of Control Solutions Inc., a specialty chemical manufacturer that owns and develops Quali-Pro formulation solutions. "And, most importantly, they'll then try it and use it more often as they look to improve their turf health."


Ty Ferraro

A newfound knowledge of Quali-Pro

Jamie Borowski, a golf course superintendent based in Ohio, participated in Quali-Pro Academy last winter.

Though already a frequent user of Quali-Pro products, Borowski appreciated the training's overview of the differences in the formulations' use rates. This newfound knowledge led him to use more Quali-Pro herbicides in 2018 than he ever had before. In addition, he intends to use the Strobe Product Line this summer, as needed.

"I like the way that Strobe is packaged and combined with other sensible products," he adds. "The granular Strobe Pro is great for tees that can be hard to spray. I see it replacing other granular fungicides I've used in the past."


Jamie Borowski

No need for online research

Much like Borowski, Matt Miller, golf course superintendent at Hutchinson, Kan.'s Carey Park Golf Course, had a very positive experience as he participated in Quali-Pro Academy's online training.


Matt Miller

Prior to the training, Miller was not familiar with Enclave, Fahrenheit, Negate 37WG or the Strobe Product Line, but he is considering using each of them now.

"Carey Park is a mixed grass course in the transition zone, so I'm looking for weed control in warm season fairways during their growing season," he says. "One bottle of Fahrenheit and Negate per acre will make for easy measuring."

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Make it simple.

"The following suggestions are in areas that have been overlooked by the turfgrass academic establishment. I think you'll agree that to be successful in this business, exposure to these areas is crucial."

MATT NEFF, *assistant superintendent, Wedgewood G&CC, Powell, Ohio*

It's academic

I've often said that getting a turfgrass science degree is one of the best decisions I've ever made. The science is fascinating, the job is awesome (usually) and our "offices" are pretty hard to beat. I'm grateful for the solid academic foundation provided by the degree on which I'm building a career.

We've likely all read career-oriented articles about what the author "didn't learn in college" and had to figure out once they got into the workforce. These articles don't contain anything terribly profound, as I'm sure very few people are surprised to learn that their college courses didn't cover every aspect of their future job.

So, instead of beating a dead horse and speaking in generalities most people are already aware of, I would like to offer several academic programming suggestions to the fine turfgrass science institutions in this country in order to provide an even stronger educational foundation for generations to come.

The following suggestions are in areas that have been overlooked by the turfgrass academic establishment. I think you'll agree that to be successful in this business, exposure to these areas is crucial.

- **The Law of Averages in Greenkeeping: Why bad things happen at even worse times.** This class explores vexing questions of this industry, such as why major irrigation leaks always happen on Friday afternoons and why half the crew decides to be late on the weekend of the member/guest.
- **Transportation Logistics for Course Management.** This course analyzes the phenomenon of there being one more utility cart than there are people working on a project. Strategies for avoiding this situation will be developed as part of a group project.
- **Theory and Practice of Clubhouse Christmas Lighting.** No one has yet been able to fully explain the vagaries of exterior holiday illumination. Questions such as "How can dozens of light strands that were working perfectly when they were taken down not work, even though they've been sitting unused and safely stored since the previous year?" will be explored in depth, though only on a philosophical level because there is no real answer to this question.
- **Psychopathology of the Chronic Call-Off Guy.** This class takes a deep dive into what makes this guy tick and why he thinks anyone would believe that so many insane circumstances could befall one person within the short span of his employment.
- **Animal Scatology: Who Did No. 2 on No. 2?** As anyone who grew up watching "Schoolhouse Rock!" knows, knowledge is power. Being able to identify what animal made a mess of the No. 2 (or any other) green will make an unpleasant job more tolerable, and potentially even fascinating.
- **Public Relations for the Turf Professional.** The student will develop a thorough summary of the profession to share with those unfamiliar with the industry, and a 25-word boilerplate explanation of the job for use at parties and family get-togethers when people learn your occupation and respond with, "Oh, so you just mow all the grass?"
- **Snow Removal Technology: The snow plow Jedi mind trick.** This class discusses how the student can subliminally force drivers into parking their cars in the part of the lot that's already cleared as opposed to right in the middle of the pass the student is currently making. It also explores what occurs in people's minds that allows them to ignore a big truck with flashing lights and a large metal blade attached to the front.

In an occupation with a wide scope of responsibilities, exposure to the duties and expectations outside the turf realm will lead to more prepared and well-rounded students. If we're lucky, it may also lead to fewer "What I Didn't Learn in College" articles.

Matt Neff (mneff4@yahoo.com) is assistant superintendent at Wedgewood G&CC in Powell, Ohio.

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WHERE TURF MASTERS MEET

The largest-ever *Golfdom* Summit brought superintendents from around the country to meet with 20 of the industry's most cutting-edge companies

BY THE *GOLFDOM* STAFF

We just might be getting the hang of this.

The eighth annual *Golfdom* Summit was the largest yet, combining 20 industry vendors with 40 top-level superintendents from around the country for three days of meetings, networking and troubleshooting.

Yes, there were speakers (Thom Nikolai, Ph.D., and *Golfdom's* Clark Throssell, Ph.D.), and yes, there was golf (18 on Reunion Resort's Arnold Palmer course). But the focus of every *Golfdom* Summit is making connections within the industry ... so now a superintendent in Texas knows a plant protection company in Canada, or a marketing manager at a Philly chemical company can dial up a couple Washington state supers on his or her speed dial.

"The *Golfdom* Summit means relationship building," said Chris Benevides, growth development manager for FairwayiQ. "It's one of the few opportunities I've seen in golf that generates quality time among people. It provides a chance to shake hands and learn about people and what they care about."

To learn more about the *Golfdom* Summit and to apply to attend (only qualified superintendents are accepted, and we must limit the field to 40 each year), visit **GolfdomSummit.com**. As a service to our readers and our 20 partners, we offer this recap of what those 20 cutting-edge companies were discussing with the superintendent attendees.

Bluebird Turf Products

2018 marked Bluebird Turf Products' first appearance at the *Golfdom* Summit, and it made sure it had plenty of equipment to show off to superintendents gathered in Orlando.

Bluebird has been in the turf renovation business since 1960. It changed ownership in 2014, and the new owners are former engineers and executives from the automotive industry. The new leadership intends to bring automotive design and manufacturing to turf care products, said Chris Durig, vice president of sales and marketing for Bluebird.

The company offers a wide range of commercial turf equipment, and Bluebird arrived in Orlando with a lineup of equipment specially selected for golf course superintendents, including hover mowers, bed edgers, sod cutters and chippers.

Bluebird's service experience was one of the major factors the company emphasized during the Summit. "Customer service has been our No. 1 focus; we've really brought in what we feel is a quality service team," Durig said.

Continued on page 22

PHOTO BY: LOU FERRARO, PARK SOUTH PHOTOGRAPHY

Smiles all around at the *Golfdom* Summit. Forty of the country's top superintendents and representatives from 20 turf industry companies assemble before hitting the links at Orlando's Reunion Resort.

Bluebird Turf Products' demo area was humming all day long, with superintendents testing out the company's hover mowers, edger, chipper and wheeled mower.

Continued from page 20

The service experience encompasses the equipment itself, with features such as Bluebird Assist.

"Bluebird Assist is tech support that travels with the machine," Durig explained. When operators use their smartphones to scan the QR codes included on each piece of equipment, Bluebird sends them how-to videos on how to use the product and information such as short checklists of maintenance tasks for that piece of equipment.

Scanning the QR code also allows superintendents to look up parts from their phone, and any parts ordered by 2 p.m. will be shipped the same day.

"That fast parts shipment, as well as our highly trained customer service and technical support staff, has quickly gained us a lot of loyalty in the industry," Durig said.

FairwayiQ

FairwayiQ is a system designed to help superintendents manage labor and equipment by tracking equipment usage and labor efficiency in real time.

"We're a technology company, but don't let that scare you," said Dave Vanslette, CEO of FairwayiQ. "The value we bring with this information will augment how you work and tell you some smart stuff during the day that helps you be better without hiring more people."

To take advantage of the technology, superintendents can place FairwayiQ sensors into their maintenance equipment, then track when and where equipment moves, how long it takes to complete a task and the amount of downtime between tasks.

The FMC team met superintendents from all over the country, including Kyle Johnson (Carolina CC) and Steve Wilson (Pinehurst).

Vanslette also clued Summit attendees into an interesting partnership at FairwayiQ — the company is working with Toro to create a sensor that generates even more information: engine temperature, torque, speed, fuel levels and more. All of this information is then sent to the cloud and entered into taskTracker, a digital job board.

"During the day, you're tracking everything happening on the golf course. You've got an air-traffic-control view," Vanslette said. "You can get all the data you want if you're a data junkie. You get a better idea of where you're spending your dollars and you can adjust the effort and equipment levels."

FMC Professional Solutions

FMC Professional Solutions, based in Philadelphia, sees a major opportunity within the golf course industry.

"That's why we're here today," said FMC Marketing Manager Kevin Laycock to Summit attendees. "We participated (in the Summit) in 2014, and we're excited to be back ... FMC is here to stay in the golf course industry."

The company started in the pest control space, expanding into the turf and ornamental sector about 15 years ago.

The jump into the golf course market has, in part, been fueled by the company's new research facility, which has played a crucial role in bringing new formulation technologies to the market, particularly for herbicide and fungicide products.

Continued on page 24

PHOTOS BY: KELLY LIMPERT (TOP); ABBY HART (BOTTOM)

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Continued from page 22

"It's changed the game for FMC," Laycock said. "This'll give us a library of more than 1.8 billion molecules that will potentially be new products to the market and new modes of action."

FMC soon will introduce three new fungicides to the market: a stand-alone fungicide and two combination fungicides.

In the meantime, Laycock urged attendees to focus on FMC's foundational fungicide, its Fame portfolio. The Fame SC fungicide includes the active ingredient of fluoxastrobin, which helps provide increased leaf systemicity and uniform leaf distribution.

Sipcam Agro

"We've been your source of chlorothalonil and you just don't know it," said Sam Wineinger, Sipcam Agro's Turf & Ornamental marketing and formulator business manager.

With brands like Echo 720, Echo Ultimate, Manicure 6FL, Manicure Ultra and Armor Tech, many attendees in the room had used a Sipcam product at some point during their careers.

Enhanced Turf Quality (ETQ), one of the products Sipcam spoke with supers about during the Summit, is the company's branded version of a value-added fungicide. Downforce ETQ, a new addition to the ETQ family in 2018-19, is fluazinam plus ETQ. The new product is a multisite contact fungicide that can control multiple turf diseases, including dollar spot.

Another new product, Coastal Herbicide, is a pre- and post-emergent southern herbicide. It is a three-way combination herbicide that uses sizamine, prodiamine and imazaquin. And the new products just kept coming. Two other herbicide concepts from Sipcam currently are in the works.

"We are continuing to find new things and bring up new solutions," Wineinger said. "We value your opinions and thoughts on where your struggles are, what you need to do to tackle the next hurdle. If we can come up with a product that fits that niche, that's what we're looking to do."

Smithco

Smithco President Don Smith told the group that his company was one of the first to sign on to be a partner for the inaugural *Golfdom* Summit eight years ago, and he is proud to have participated in every Summit since.

"We really like this event and the format. We get to spend a lot of time one-on-one (with superintendents) in a relaxed atmosphere," Marketing Manager Emil Miller said.

He adds, "One of the things we think we do best is interact with superintendents and end users of our products."

Since its inception in 1967 as a "one-man, one-product" company, Smithco has diversified its portfolio to include bunker rakes, greens and fairway rollers and spikers, sweepers and dedicated sprayers.

Of that array of products, it showcased five during the Summit's boardroom presentation: the XXL 70 Greens Roller, the 15-foot fairway roller, the 10-foot fairway spiker, the 5200 Spray Star and the Star Command 2.0.

Smith was especially excited about the Star Command 2.0, a GPS sprayer created through a partnership with TeeJet. The sprayer can control the droplet size on the fly for greater efficacy, independent of rate or speed. Smith added that on a $50,000 budget, the machine offers a return on investment of about $16,250.

"Not only does the system pay for the technology, but it starts to pay for the sprayer," Smith said.

Textron

Many of the Textron products attendees saw at the *Golfdom* Summit were recently redesigned to remove redundancies.

Superintendents took a look at the new product initiatives for Jacobsen, which included the updated TR and AR series

Continued on page 26

Smithco has been a *Golfdom* Summit partner since the first event. Here, the team takes the time to show off what's under the hood (or seat) of its greens rollers.

PHOTO BY: KELLY LIMPERT

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Textron demoed its UTV lineup, including the Cushman Hauler 800 and the 4x4. The Hauler 800 features a lithium battery.

Continued from page 24

mowers. The new TR series features increased visibility and maneuverability, with three or four wheels depending on psi necessity. The new AR series has an enlarged deck size and improved contouring capabilities.

Both the TR and the AR series have 24.8 hp and have adapt-a-shift, which allows users to offset both cutting heads — whether wheel or rotary — by 12 to 18 inches, according to Neil Perez, national turf and utility sales manager for Textron.

Attendees got the chance to test out the new Cushman Hauler 4x4 series on the Reunion Resort driving range. The model has up to 50 hp and comes in diesel or gas models. The company also showed off the Hauler 800, which is the first Cushman on the utility side to be powered by a lithium battery.

To help manage all of the equipment, Textron Fleet Management demonstrated its new Shield Plus, which can lock onto any 12-volt battery and give utilization data. It also allows for geofencing and customized orientation. Superintendents can see where people are and what they've completed, Perez noted.

Turfco

It was all about the Es for Turfco this year at the *Golfdom* Summit: efficiency, effectiveness and ease, that is.

With those goals in mind, the company demonstrated equipment — the fourth "E" in their arsenal — that would help attendees and their crews perform topdressing, seeding and debris-blowing tasks easily, effectively and efficiently.

"No. 1, our products need to be focused on helping you all with the labor challenge," said Scott Kinkead, Turfco executive vice president.

Attendees learned how the 1550 topdresser, with an 80-inch hopper and straight-line edge-to-edge spreading, reduces the number of passes on the green, saving time and resources. The equipment also saves preferred settings and allows employees to switch between heavy, medium and light application at the push of a button.

"Whatever you want, you can dial that in and get exactly what you want; but most importantly it's done, sorted and you don't have to think about it," Kinkead said.

Turfco's CR 15 fairway topdresser has the same guiding principles. The machine is designed to make fairway topdressing quick, effective and easy on supers and their staffs.

Attendees also got to take a look at the Triwave seeders, which supers can use for tees, driving ranges and fairways and have a 30 percent higher germination rate than traditional seeders. The nice thing about them, Kinkead added, is that you don't need a tractor or a PTO. You can just hook it up the back of a cart and go.

Continued on page 28

Turfco's Scott Kinkead adjusts the angle on the Turfco Torrent debris blower for maximum efficiency.

PHOTOS BY: KELLY LIMPERT

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Continued from page 26

Another efficiency hacker attendees got to peek at was the Turfco Torrent, a blower with an optimized angle and three times the rotation speed on the nozzle. It also has an idle down and resume button, which reduces fuel consumption.

"What we're focused on is taking some of these items and making them, and you, as effective as possible," Kinkead concluded.

Nufarm

When Cam Copley, Nufarm's golf national accounts manager, started with the company seven years ago, the company had seven sales reps throughout the United States. Now Nufarm has 12 territory managers, a manufacturing plant in Greenville, Miss., in the works and has expanded its Chicago plant, where most of its products are made.

Nufarm has growth on its mind, as did superintendents at the Summit: growth regulators, that is.

Anuew, the plant growth regulator that Nufarm launched three years ago, came up in most of the one-on-one meetings. "There was a lot of interest," Copley said. "People were trying to grasp how to use it, and it commanded probably 70 percent of our conversations."

Copley estimated that about 30 to 40 percent of the superintendents at the Summit used Anuew and 40 percent were extremely interested in trying it.

The product's active ingredient is prohexadione calcium, and Copley noted that it's yielded promising results on ultradwarf bermudagrass greens. "We're also seeing a lot of good results as far as *Poa* seedhead suppression, *Poa* regulation, bentgrass regulation, ryegrass regulation," he added.

Growth regulators require a bit of hand holding, said Copley. "You have to work with them to figure out what works best for what (the superintendent) wants to do," he explained.

Because growth regulators can slow down the rate at which a plant grows, there are other implications as well. "It can save time on mowing and save cleanup from mowing," Copley said. "They do a lot of regulation for plant health and aesthetics and playability, but also, it can save time mowing fairways, rough or greens. It can save a lot of time, money, effort — and labor."

COMING SOON

Conversations with more of the *Golfdom* Summit partners and their key messages to superintendents, including:

- **The Andersons**
- **Capillary Concrete**
- **Cub Cadet**
- **Frost Inc.**
- **Healthy Grow**
- **Intelligro**
- **PBI-Gordon**
- **Pogo Turf Pro**
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Golfdom Summit

CLASS OF 2018

Tyler Andersen, University of Texas Golf Club, Austin
Nick Bisanz, TPC Southwind, Memphis
Scott Bordner, Chicago Golf Club
Alan Brown, Timuquana CC, Jacksonville, Fla.
Cory Brown, Overlake G&CC, Medina, Wash.
Mickey Brown, Pro Turf International, Henderson, Nev.
Kyle Callahan, Victoria National GC, Newburgh, Ind.
Mike Chrzanowski, Madison (Conn.) CC
Ian Daniels, Teugega CC, Rome, N.Y.
Alan Davis, Willow Creek CC, Sandy, Utah
Davis S. Downing II, CGCS, Golf Maintenance Solutions, Aynor, S.C.
Parker Ferren, St. Andrews Club, Delray Beach, Fla.
Kevin Frost, CGCS, Ballen Isles CC, Palm Beach Gardens, Fla.
Edward Gasper, Whiskey Creek GC, Ijamsville, Md.
Jeff Girard, StoneRidge GC, Stillwater, Minn.
Dan Grogan, The Sagamore Club, Noblesville, Ind.
John Gurke, CGCS, Aurora (Ill.) CC
Bill Irving, Wolf Creek Golf Links, Olathe, Kan.
Aaron Johnson, CGCS, Dacotah Ridge GC, Redwood Falls, Minn.
Kyle Johnson, Carolina CC, Raleigh, N.C.
Tony Kalina, Kalina Turf Consulting, Winfield, Ill.
Ben LaBarre, The Legend at Bristlecone Pines, Hartland, Wis.
Ben Larsen, Green Bay (Wis.) CC
Joel Larsen, North Shore CC, Mequon, Wis.
Bill Lewis, Shaker Heights (Ohio) CC
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Want to see your name on the list in 2019? Apply at **GolfdomSummit.com**.

The BIG IDEA of the mini course

BY SARAH WEBB

With the goal of increasing revenue and growing the game, a Colorado golf course thinks small

Imagine a standard golf outing experience: 18 holes spread across sprawling fairways, a small white ball, a wide selection of clubs from which to choose.

Now, subtract a couple hundred yards from each hole, increase the fuzziness and size of the ball, expand the cup to 6 inches, add in a roller (putter) and a launcher (wedge) — this is the basic idea of a mini course.

Continued on page 30

PHOTO BY: KELLY SMITH

To resemble the topography of a traditional course, ponds dot the mini course's perimeter.

PHOTO BY: KEVIN ATKINSON

"WE NEED TO GROW THE GAME OF GOLF, PLAIN AND SIMPLE. IN DESIGNING THIS COURSE, WE THOUGHT ABOUT THE 91 PERCENT OF THE POPULATION THAT DOESN'T PLAY GOLF."

— Kevin Atkinson

Continued from page 29

While it may bring up thoughts of mini golf, the mini course concept resembles that of traditional golf rather than putt-putt.

The idea of a mini course was inspired by Starting New at Golf (SNAG) equipment, which is similar to traditional golf clubs, save for the shorter club lengths and oversized club heads. More than 8,000 schools worldwide use SNAG equipment.

"The product is great," says Kevin Atkinson, a golf course architect at Phelps-Atkinson Golf Design in Littleton, Colo. "It's great for teaching people how to play golf, and we felt like there was an opportunity to use that type of equipment in the real setting of a golf course."

That's where Dennis Kling and the Cattail Creek Golf Course come in. The superintendent of The Olde Course and Cattail Creek Golf Course in Loveland, Colo., received his first lesson about SNAG equipment in early 2012 from his town's elementary school.

Around that same time, he was trying to figure out what to do with a several-acre gravel parking lot and coming up with ways to make extra revenue, as the facility was barely breaking even and still trying to dig its way out of recession-era lows. Originally, Kling and his team had planned to build a four- or five-hole pitch-n-putt area. However, free to the public, a pitch-n-putt space would have resulted in no additional revenue.

Kling enlisted the help of Atkinson, who says he was excited about the prospect of building the unique mini course. By July 2012, the Cattail Creek Mini Course was born.

"We thought, 'We need to make ourselves relevant and fresh,' which is why we rolled the dice," Kling says.

Atkinson agrees. "We need to grow the game of golf, plain and simple," he says. "In designing this course, we thought about the 91 percent of the population that doesn't play golf. We thought about what barriers are preventing them from wanting to learn how to play."

Golf's "bunny slopes"

Because the mini course introduces the basic concept of golf, Kling says the course is designed for almost all ages, beginning with children as young as 5 years old.

"It's like the building blocks," Kling comments. "If you start them at a mini course from ages 5 to 8, we're hoping they go from the mini course to Cattail Creek (a nine-hole par-3 course), and then they'll gain the confidence and want to play the 18-hole course. We're hoping we can grow a golfer."

Atkinson likens the mini course to the "bunny slopes" of the nearby ski resorts. "You can learn and have good success without having to go down the double diamond," he says.

In addition to promoting the game of golf, Kling says he's also seen the mini course bolster social interactions among participants.

The Cattail Creek Mini Course, for instance, plays host to a range of visitors, including sugared-up youngsters celebrating birthday parties, high school kids out on dates, working-age folks participating in corporate team-building activities and grandparents enjoying a day outside with their grandkids.

Kling says that during the summer months, the mini course can get pretty busy, with anywhere from 100 to 150 golfers per day on the weekends, for a total of about 6,000 rounds per season.

"Sometimes we'll even have to do a tee time for the mini course, or we'll have a line four deep waiting to get on the course," he says.

Early on, however, many of Loveland's 75,000 residents didn't even know what a mini course entailed. To educate the public, Kling and his team have worked tirelessly getting the word out, using flyers, word of mouth and multimedia platforms, such as the course website and YouTube.

Creating the course

Construction for the mini course began in February 2012 and was completed in just five months. "It was pretty fast and furious to get it done, but we had a dry winter, so we were able to get a lot of work

in," Kling says.

The labor for the mini course was done in-house, after the design was created by Atkinson. Kling adds that not hiring outside labor helped keep construction costs down. The mini course cost between $350,000 and $400,000 to build and generates about $40,000 per year in revenue, according to Kling.

"We're not quite yet at the break-even point with construction costs, but it won't be too much longer," he says, optimistic of the mini course's continued success.

The mini course is situated on 2.25 acres and consists of nine holes, each ranging in length from 20 to 50 yards, although Atkinson is quick to add that it's not required to have nine holes on every mini course.

A round takes between 30 minutes to an hour to play and costs $6 for children and $7 for adults. The mini course stays open about as long as the regular

Continued on page 32

PHOTO BY: KEVIN ATKINSON

The Mini Course at Cattail Creek provides a multigenerational activity for families in the area.

Continued from page 31

courses do, as long as there's no snow on the ground, Kling adds with a wry chuckle.

Ryegrass makes up the course's rough, and bentgrass comprises the greens. The course features rolling terrain, some native grass areas, a few rock outcroppings that get moved around from time to time and several ponds around the perimeter. There are no bunkers or water features embedded in the course.

In terms of maintenance, Kling says his team initially walk-mowed the greens six times per week but has since cut down to two to three times per week. The rough gets mowed between one and two times a week using a Toro Sidewinder.

There's no fairway, and since the tee box is a concrete slab, the mini course makes use of artificial turf driving range mats.

Sparking interest

When Kling attended the Rocky Mountain Turfgrass Association conference in December 2018, he was pleased to learn of several other mini courses under consideration (and designed by Atkinson) in Provo, Utah, and other parts of Colorado. Atkinson says an additional course is being considered in Fargo, N.D. (*Editor's note: The November 2018 issue of* Golfdom *reported on a similar mini course, the Red Bridge Wee Links in Eudora, Kan.*)

The larger club head and ball serve as the building blocks for youngsters who want to learn how to golf.

For those superintendents who may want to implement a mini course, Kling advises them to consider the impact of increased water pressure on their area.

Atkinson says it's also important to ensure there's enough space available and suggests that the mini course is positioned as its own entity rather than intermixed with a traditional golf course.

"The beauty of it is that you only need a couple of acres, and with a separate facility, it takes the pressure away and people can just go play," he says.

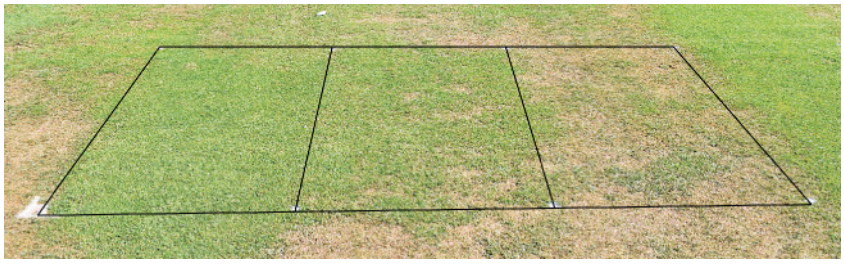
Whatever the ultimate design of a proposed mini course, Kling remains hopeful that fellow superintendents will take interest in the idea.

"What we've got going here in the city of Loveland is pretty cool and unique," he says. "We're just trying to share what we're doing, and hopefully other courses can see the benefit, too."

PHOTO BY: CATTAIL CREEK MINI COURSE

Hosted by Clark Throssell, Ph.D. | *clarkthrossell@bresnan.net*

Super Science



ABW damage on preventative (left), threshold (middle) and no-insecticide (right) treatments (not treated with paclobutrazol) on June 5, 2018, six days after threshold damage was met.

PHOTO BY: KATHERINE DIEHL

// ABW CONTROL OF ANNUAL BLUEGRASS

A LESSER OF TWO WEEVILS?

By Katherine H. Diehl, Matthew T. Elmore, Ph.D., Albrecht M. Koppenhöfer, Ph.D., and James A. Murphy, Ph.D.

The annual bluegrass weevil (ABW) can inflict severe damage on annual bluegrass (*Poa annua*) fairways, greens and collars. Because the ABW showcases a strong preference for annual bluegrass over creeping bentgrass (*Agrostis stolonifera*), we hypothesized that manipulating traditional insecticide programs to allow some ABW damage might help superintendents control annual bluegrass in creeping bentgrass fairways.

In 2017 research, we observed that ABW damage to annual bluegrass was more severe in PGR-treated plots. To further explore the relationship between ABW damage and paclobutrazol, we initiated a separate experiment in 2018.

We conducted this research on a simulated fairway with a history of ABWs at Rutgers University. Treatments consisted of three insecticide programs combined with four rates of paclobutrazol. We applied paclobutrazol monthly and included rates 4, 6 and 12 fl. oz./A and a nontreated control. The first insecticide program was "preventative" and controlled the ABW at all larval stages to prevent turfgrass injury, as is standard on many golf courses where the ABW is endemic. Second was the "threshold" insecticide program, which did not offer any early larval control; we applied insecticides only after we observed threshold damage (unacceptable fairway turfgrass quality May 30, 2018). We also included a "no-insecticide" program as a scientific control. We assessed annual bluegrass cover and turfgrass quality monthly.

Preliminary results indicate that the paclobutrazol program had a greater impact on season-long annual bluegrass control than an insecticide program. Initial results also suggest that in the absence of paclobutrazol, the turfgrass quality of the "threshold" treatments was quick to recover from initial ABW damage after rescue insecticide applications were made. This experiment will be repeated in 2019.

Katherine H. Diehl, Matthew T. Elmore, Ph.D., Albrecht M. Koppenhöfer, Ph.D., and James A. Murphy, Ph.D., are turfgrass scientists at Rutgers University.

NEWS UPDATES

GOWAN CO. CREATES NEW BUSINESS UNIT

Gowan Co. is creating a new business unit dedicated to biological development and innovation.

As part of this initiative, Gowan has purchased the remaining shares of Colombia-based EcoFlora Agro SAS through its U.K. subsidiary, and the global biological business will be built around the EcoFlora brand.

EcoFlora Agro SAS was founded in 1998 and develops plant (botanical) extracts for effective and sustainable crop protection, such as EcoSwing biofungicide. This acquisition combines EcoFlora's biorational product development capabilities with Gowan's more than 50 years of experience in the coordination of registration, development, marketing and sales to provide solutions for integrated pest and disease management around the world.

The newly formed unit reinforces Gowan's global commitment to deliver more integrated crop solutions to organic and conventional growers, according to the company.

"We have developed and registered organic products since the 1960s," said Gowan Group CEO Juli Jessen. "Our circumstances today, such as rapid adoption in our Latin American business and opportunity in Europe, led us to this focused venture."

> **"... A MORE INTEGRATED CONTROL APPROACH IS NEEDED TO MANAGE THE ABW IN THE FUTURE."**
>
> **Ben McGraw, Ph.D.**
> *(see story on page 34)*

//THE ABCS OF ABW

Mowing down weevils

By Ben McGraw, Ph.D.

Many turfgrass managers in northeastern North America would rather forget the 2018 growing season. Record-breaking rainfall throughout the region affected most aspects of turfgrass management, including insect pest control. The annual bluegrass weevil (ABW), *Listronotus maculicollis,* is one insect pest that flourished in the wet weather and was particularly difficult to control with our standard arsenal of insecticides.

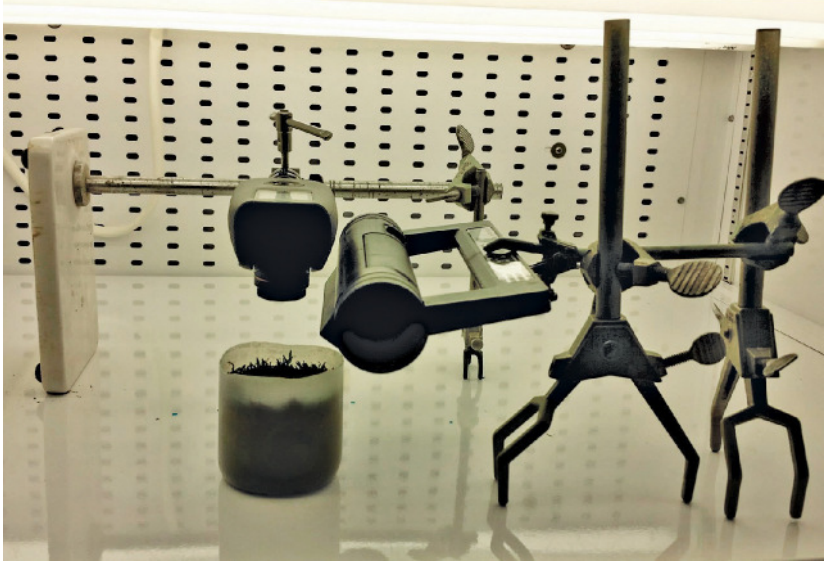
The weevil is challenging to manage even in a "normal" year, given that early larval instars are hidden within the plant. These "cryptic" stages are difficult to detect and nearly impossible to control with most — if not all — insecticides. This creates a need to manage the pest either preventively (targeting adults prior to egg laying) or curatively, as larvae emerge from the plant to feed externally on the crown. Both chemical management strategies have their advantages and disadvantages, with each requiring precision timing.

USGA
Research provided and funded by USGA.

Though many superintendents find it desirable to reduce populations preventively, only two chemical classes provide even moderate control of adults. The fear of creating a pyrethroid-resistant or possibly a multiple-insecticide-resistant population (one that is less sensitive to nonpyrethroid compounds as well) has many choosing to solely target larvae. Curative controls are more selective than broad-spectrum adulticides yet are relatively more expensive and require a detailed monitoring program to determine population structure.

Even with this information, spring 2018 curative applications required dodging heavy rainfall and saturated soils. We observed numerous product failures (including time-tested standards) in this year's field trials, where applications were made in advance of heavy (greater than 1 inch) or prolonged rainfall. Clearly, relying solely on chemical insecticides to reduce ABW populations is a weak strategy, and a more integrated control approach is needed to manage the ABW in the future.

FIGURE 1



Time-lapse photography was used to capture annual bluegrass weevil (ABW) surface movement in growth chamber studies. Weevils were marked with a UV pen and placed in groups of five on a *Poa annua* plug. The black light illuminated the mark during dark periods.

PHOTO BY: BEN MCGRAW

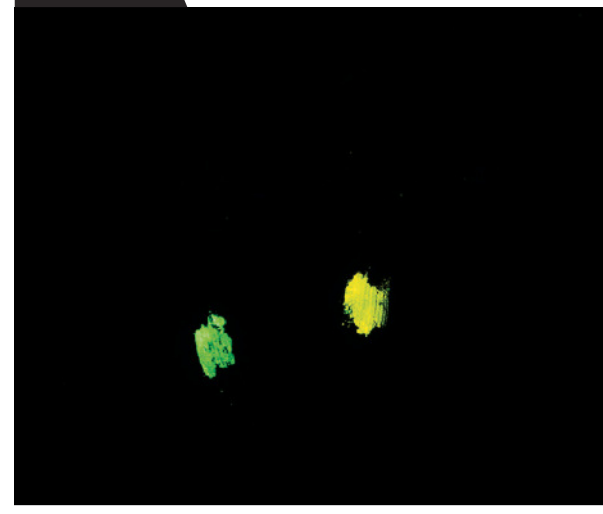
MECHANICAL REMOVAL OF ADULTS

Over the last four years, members of the Turfgrass Entomology Laboratory at The Pennsylvania State University have been investigating the impact that cultural controls, specifically mowing, nitrogen fertilization and irrigation, have on reducing ABW populations or damage severity. The project was initiated after reviewing superintendent responses to a 2016 ABW management survey.

It is uncommon to observe damage to putting surfaces maintained at or below 0.125 inch, though adjacent collars (0.25 inch and higher) may be severely affected. Superintendents reported much greater ABW incidence in collars than greens. Additionally, the percentage of greens experiencing turf loss increased linearly with increases in height of cut, suggesting that mowing

FIGURE 2A

FIGURE 2B



Two ABWs marked with a Sharpie Neon (bottom) and two unmarked weevils photographed without the filter system (A). The same weevils were photographed with the NIGHTSEA system (B). The black light illuminated the mark during dark periods.

may inhibit either ABW adult or larval persistence in these areas.

Greenhouse and field plot trials confirmed our suspicions, as 26 percent to 38 percent of adults were removed from the turfgrass canopy in a single mowing. Mowing height had a significant impact on adult removal, as the percent removed decreased at increasing mowing heights, with practically no removal at collar height of cut. The percentage of adults removed was encouraging given that the true impact is likely to be additive as greens are mowed five to seven days per week throughout the growing season.

However, superintendents most likely can't rely on mowing alone as a stand-alone tactic, as we detected eggs in our lowest mowing height treatments (0.100 inch) that were capable of surviving to damaging stages. We need a better understanding of adult behavior and movement within the turfgrass canopy to identify conditions or periods when mowing can have an even greater impact on adult populations on putting surfaces and higher-mown areas (fairways, tees).

Therefore, to optimize adult removal, we initiated a second study to understand when weevils were on top of the turfgrass canopy and to identify periods when mowing would be most effective.

LABORATORY STUDIES

Most animals exhibit diel patterns — an increase in activity with regard to time of day or photoperiod — that allow them to move, feed, escape predation or mate. Our efforts to improve ABW mechanical removal through mowing required a better understanding of ABW surface activity and the factors that influence movement. Our investigations sought to assess the effects of photoperiod (light/dark periods) and temperature on adult activity.

It had been anecdotally reported by researchers that ABWs are nocturnal, which was not surprising because many weevils become most active near dusk or in the middle of the night. However, making direct observations of ABW behavior is difficult because the weevil is relatively small (0.14 to 0.18 inch in length) and requires tracking movement in darkness. We initially observed weevil surface activity in growth chambers using time-lapse photography.

To overcome the challenge of observing movement through both light and dark phases, we marked weevils with a UV pen, which caused the weevil to fluoresce under a black light (Figure 1). This system allowed for near-continuous observations under precise light and temperature conditions. We found surface activity to be greatest between 59 degrees to 68 degrees F and equal light/dark phases, with few weevils active on the surface when temperatures were less than 50 degrees F. We detected no differences in surface movement with regard to time of day.

In a second experiment, we programmed incubators to exhibit different daytime and nighttime conditions (14 hours of light at 64 degrees F, 10 hours of darkness at 50 degrees F) such as those encountered in spring during the overwintering adult migration period. These conditions resulted in diurnal activity, with greatest activity around midday and little to no activity during the dark phase. However, when we reversed temperatures for light and dark phases (10 hours of light at 50 degrees F, 14 hours of darkness at 64 degrees F), we observed the opposite, with the greatest activity in the middle of the night and little to no activity during the light phase, suggesting that temperature, not photoperiod, had a greater impact on surface activity.

Continued on page 36

PHOTOS BY: CHARLES MAZEL

FIGURE 3

The custom-made camera box photographed marked ABWs on top of the turfgrass canopy. The box housed the external flash (left) and camera (right) and provided consistency in light level and photo height throughout the experiment.

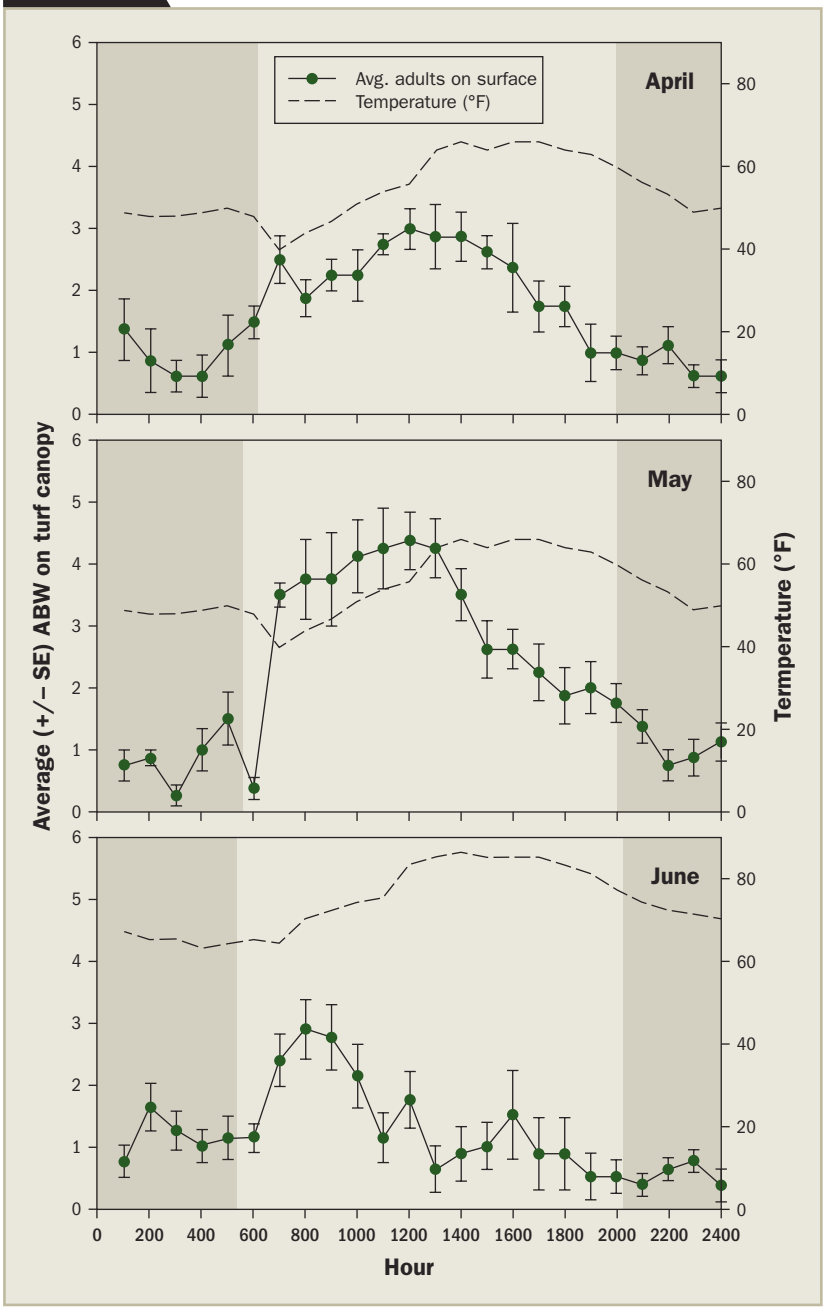
Continued from page 35

IN-FIELD STUDIES

We attempted to observe adult activity in the field using the same system described for laboratory studies — marking insects with a UV mark, placing ABWs in cages with a UV light and capturing movement on a time-lapse camera. No matter how hard we tried to exclude outside insects (e.g., moths, flies) — including surrounding the study area with mesh cages — nocturnal insects somehow got in, attracted to the UV light and blocking the time-lapse images.

We solved our problem through a random encounter on the 2015 tradeshow floor of the Entomological Society of America's annual meeting. We met Charlie Mazel, Ph.D., of NIGHTSEA, a developer of fluorescent camera systems. Mazel's background is in underwater exploration and photography of corals, and his company develops solutions for viewing and photographing fluorescent images (**https://www.nightsea.com/about-us/**).

FIGURE 4



Effect of temperature and daylight on ABW canopy activity in three 24-hour observation periods. The shaded bars indicate periods of darkness. (Source: Ben McGraw).

His solution involved marking weevils with a Sharpie Neon pen, then capturing an image with a digital single-lens reflex (DSLR) camera (Nikon D90), off-camera flash and light filters. The photographer places one filter on the camera's external flash to produce a blue light flash. A yellow blocking filter is placed over the camera to exclude reflected blue light and transmit only

PHOTO & FIGURE SOURCE: BEN MCGRAW

the fluorescence, resulting in super-excitation of the marked weevil (Figure 2a-b). We used a custom-made photo box (12-inch width by 12-inch depth by 18-inch height) to hold the camera and flash over each observational arena and to block out sunlight (Figure 3). The camera and flash were threaded through holes in the lid of the box to ensure consistency of height between photos.

With the NIGHTSEA filter system, we could take a still image of the turfgrass canopy at regular intervals, and any insect on top of the canopy would fluoresce. The downside was that we could not continuously or remotely monitor movement, but instead we had to have someone physically move the camera box from observational arena to observational arena, taking photos every hour on the hour. This was done for 24-hour periods in April, May and June.

This novel mark-recapture system confirmed laboratory findings that adult activity was affected by temperature and not light. Adult weevil activity on top of the turfgrass canopy was greatest during the day and strongly correlated with temperature early in the season (April, May) (Figure 4). However, adult presence on the surface in early summer was greatest briefly after sunrise, then declined during the midmorning when temperatures exceeded 70 degrees F. The effect of temperature on surface activity in all months was best described by a model that predicts maximum adult surface activity between 57 degrees and 63 degrees F.

STRONG TEMPERATURE ASSOCIATION

Our findings suggest that ABW adult surface activity is strongly associated with temperature. Therefore, scheduled mowing with the intent to remove adults may need alterations throughout the season. Although most operations must mow the putting surfaces first thing in the morning to prepare the course for the day and to stay ahead of golfers, performing a second "dry cut" to improve ball roll or possibly vacuuming surfaces when temperatures are between 57 degrees and 63 degrees F may provide improved adult control. Altering daily mowing routines to increase mechanical removal may not be necessary in the summer if early morning temperatures are in the optimal surface activity range we observed in the June field studies.

This study has other benefits to turfgrass managers than just mechanical control. Successful pest management depends on monitoring pest activity. We have observed that several of our monitoring techniques (e.g., vacuum sampling, soap flushing) are more successful when the insects are active. Timing regular scouting activities when temperatures are in the optimal temperature range minimizes the likelihood of missing an infestation.

This research also has implications for chemical management. The adulticides used to control ABW adults are short-residual contacts. We may improve contact insecticide efficacy by using our temperature model if less plant material will be between the insect and the toxin at application or if the insect moves through the residue. We will investigate this in the upcoming field season as a possible new cultural control method. It is my hope that these studies lead to simple, efficacious and cost-effective solutions that superintendents can implement along with or in lieu of current management plans.

Acknowledgements

This work was partially funded with a grant from the United States Golf Association (USGA), regional golf course superintendent groups (Central Pennsylvania Golf Course Superintendents Association, Connecticut Association of Golf Course Superintendents, Finger Lakes Association of Golf Course Superintendents, Greater Pittsburgh Golf Course Superintendents Association, Long Island Golf Course Superintendents Association, Mid-Atlantic Association of Golf Course Superintendents, Mountain and Valley Golf Course Superintendents Association, Northeastern Golf Course Superintendents Association, Northwest Pennsylvania Golf Course Superintendents Association, Old Dominion Golf Course Superintendents Association, Western New York Golf Course Superintendents Association) and support from the USDA National Institute of Food and Agriculture, Hatch project 1006804.

Ben McGraw, Ph.D., is associate professor of turfgrass science at The Pennsylvania State University.

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Based on the article:

Czyzewski, B. D., and B. A. McGraw. In press. Detection of *Listronotus maculicollis* (Coleoptera: Curculionidae) turfgrass canopy activity with the use of a novel fluorescent marking system suggests opportunities for improved mechanical control. *Environmental Entomology*, **https://doi.org/10.1093/ee/nvy156**

Ad Index

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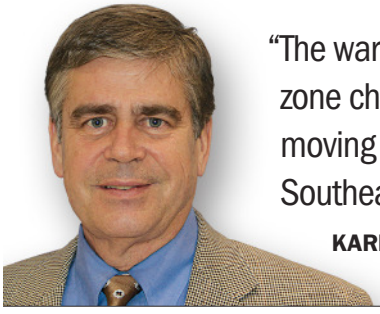

"The warming trend reflected in zone changes appears to be moving northwest from the Southeast."

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

This year and from now on: *change*

My campus colleagues tell me that if it's been dry, it's going to get drier, if it's been wet, it's going to get wetter. Facing us in the new year and in coming years is how the climate is changing and how we will need to account for the changes to manage golf courses.

The federal government's report on climate change released on Nov. 23, 2018, predicts climate changes that will increase temperatures and create changes in moisture patterns across the United States. The picture is especially dim for the Midwest, where temperatures are expected to rise more than in any other U.S. region, and the moisture pattern is expected to become wetter and more humid.

Although USDA plant hardiness maps are not a sign of climate change (because changes in the hardiness zones are based on 30-year weather averages and climate change is based on 50- to 100-year averages), we have seen zone changes of one-half to one full zone since 1990, which affects plants directly and tells us temperatures are warming. For example, since 1990, Ohio has gone from having about two-thirds of the state in zone 5 to now being almost completely in zone 6.

The warming trend reflected in zone changes appears to be moving northwest from the Southeast. The zonal changes, in part, help explain not only the warmer temperatures but the longer, warmer growing season.

Increasing temperatures in combination with wetter growing seasons in the Midwest will have a huge impact on agriculture and will lead to increased pest pressure and a drop in the quality of stored grains. Golf course managers will see wetter conditions that favor greater pest pressure, especially diseases, and a loss of golf rounds or powered golf car use because of wet conditions.

Continuing warmer temperatures — and importantly more wet and humid weather — will have an impact on how we manage turf. A short-term or pragmatic approach will not suffice. Long-term strategies and planning will need to match the impact of continually warmer, wetter weather in the Midwest.

Long-term disease control will change golf courses through management and structural practices to minimize and enhance the use of fungicides. Warmer, wetter weather means prolonged periods of major golf course diseases. Fungicides are effective against many of our summer diseases, but the cost of disease control will rise to a point that will be prohibitive for many. Structural changes to golf courses that promote air movement and drainage will have a positive impact on reducing disease severity. Tree-removal programs will be a long-term strategy for reducing disease and managing associated costs.

Most tree removal focuses on providing more light to shaded turf areas and enhancing golf shot strategies, but increasingly, tree removal influences the environment under which diseases develop. Air movement reduces leaf wetting by promoting evaporation and transpiration. Shortening the period of leaf wetness helps reduce conditions favorable for pathogen infection. Greens or fairways sitting in low or wet areas need to be considered for future renovation.

Technology — both current and future — will be needed. In areas where disease control is pervasive, we'll need to incorporate technology like GPS for more accurate applications and for fungicide cost savings.

In addressing disease management, improved drainage must be a long-term feature for golf courses in general, but especially in the Midwest, not just for disease and pest control but to provide access and acceptable playing conditions. Wet conditions lead to course closures, or more likely, restrictions on golf car use. Improvement of drainage over the long term will be the most important improvement in golf course conditioning in a changing weather environment.

The coming years will see continuing environmental changes. This is the time to plan for long-term mitigation of these changes to your golf course.

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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IN THE FIGHT AGAINST SPRING DEAD SPOT AND DOLLAR SPOT…

Spring dead spot — it returns

Superintendents managing bermudagrass in the Transition Zone and in the northern part of the warm-season turfgrass zone are awaiting an unfortunate annual event. How much of their bermudagrass will be affected by spring dead spot? Spring 2018 brought bad news for many superintendents in the form of considerable damage from spring dead spot. What 2019 brings in the form of spring dead spot damage is anyone's guess. There is no good way to predict how much spring dead spot damage will occur over the winter, although experience has shown that golf courses with bermudagrass located in the most northern locations often have the most spring dead spot damage.

The most common fungal species that cause spring dead spot are *Ophiosphaerella korrae* and *O. herpotricha*. Both are active in fall and infect roots, rhizomes and stolons when soil temperature is 50 degrees to 70 degrees F. The fungi do not cause the bermudagrass to die but rather weaken it. Cold winter temperatures cause the turf to die. The extent of spring dead spot damage is due to a combination of the extent of fungal infection in fall and the duration and magnitude of cold temperatures in winter.

Complicating our understanding of control and management of spring dead spot is the fact that *O. korrae* and *O. herpotricha* respond differently to nitrogen source and soil pH, have different geographic ranges — but may overlap in some locations — and cause different degrees of spring dead spot damage.

The only way to know the extent of spring dead spot damage is to wait until the bermudagrass greens up in spring. Areas damaged by spring dead spot will remain brown, and the roots, rhizomes and stolons of damaged plants will be dark brown to black. Spring dead spot is most common on intensely managed bermudagrass stands. Once spring dead spot occurs, it will be found on the same locations

"The most common fungal species that cause spring dead spot are *Ophiosphaerella korrae* and *O. herpotricha*. Both are active in fall and infect roots, rhizomes and stolons when soil temperature is 50 degrees to 70 degrees F."

year after year, becoming more severe if superintendents don't attempt control measures.

If you observe spring dead spot damage, make a concerted effort to photograph and map the damaged areas at spring green-up. Spring dead spot often is more severe where an additional stressor is present. Try to link spring dead spot-damaged areas with suspected stresses at that location and take steps during the 2019 growing season to alleviate the suspected stresses.

Spring dead spot will be back in 2020 at the same locations it damaged in 2019. Therefore, treat only the areas damaged in spring 2019 when making a fungicide application in fall 2019. Careful observation and mapping of spring dead spot damage in spring can save time and money in fall.

Controlling spring dead spot with fungicides can be inconsistent. If fungicides are going to be applied, preventive applications in fall when soil temperature is 60 degrees to 80 degrees F have been shown to be the most effective strategy to control spring dead spot. In situations where spring dead spot has been severe, two fungicide applications in fall may be worth a try. The fungicide applications should be several weeks apart, but both applications need to be made when soil temperatures are 60 degrees to 80 degrees F.

Concentrate on growing healthy bermudagrass yearround. Proper aeration, verticutting, topdressing and a sound fertility program are essential for managing spring dead spot. Avoid fertilizing with nitrogen 45 days prior to expected dormancy to give the bermudagrass plenty of time to harden off prior to winter. G

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

The Shop

// MUST-HAVE NEW EQUIPMENT

1

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

2

1 | 6000A fairway mower models

JOHN DEERE's 6080A and 6500A E-Cut models feature high-performance electric-reel drive, reducing potential hydraulic leak points. In addition to their economical price point, the mowers can be operated at lower engine speeds, reducing operating costs by decreasing fuel consumption, the company said. The password-protected TechControl display enables turf managers or technicians to input commands such as mow speed, turf speed, transport speed and service timers, while also capturing on-board service diagnostics.

Deere.com/golf

2 | Indemnify nematicide

Indemnify by **BAYER** controls nematodes on contact in as little as one application and continues to work throughout the root zone to offer visible, long-lasting improvement in turfgrass quality for up to six months, Bayer said. Offering control of key plant parasitic nematodes — such as sting, root-knot, stunt, ring, *Anguina pacificae* and others — Indemnify improves root growth and overall turfgrass health, translating to better playability with improved wear tolerance. Built as a stand-alone nematicide, Indemnify contains a soil surfactant, eliminating the need for additional adjuvants.

Es.Bayer.us

3 | Flex-Guard fungicide

QUALI-PRO's Flex-Guard is a preventive contact fungicide for golf course use that provides control of multiple diseases, including dollar spot, brown patch and leaf spot. The active ingredient, fluazinam, is classified by the Fungicide Resistance Action Committee in Group 29. Flex-Guard contains 4.17 pounds of fluazinam per gallon. When partnered with chlorothalonil-based fungicides, it provides season-long contact protection. Additionally, the product's label allows for 12 applications per year.

Controlsolutionsinc.com

3

4

5

6

4 | Greensmaster 1000 Series of fixed-head walk greens mowers

TORO's new greens mower is powered by a Honda GX120 engine and available in 18-, 21- and 26-inch cutting widths. The telescoping loop handle can be adjusted; handle isolation mounts give the cutting units consistent contact with the ground; and new operator controls and a shorter distance between the roller and drum deliver more precise handling in turns and more consistent performance on greens with modest undulations. It features the Edge Series reels for a precise cut and the flexibility to choose between eight, 11 and 14 blade cutting units.

Toro.com

5 | Star Command 2.0 spray system

The system, created by Smithco and TeeJet, can be fitted on **SMITHCO**'s Spray Star 3180 and 2000 sprayers. It allows superintendents to control droplet size based on wind, speed and height of cut, independent of rate or speed, and spray from 2 to 10 mph. The Spray Star 3180 and 2000 are factory-fitted with a DynaJet Nozzle Control System and Aeros Field Computer from TeeJet. The Aeros Computer amplifies precision with tip-flow monitoring, pinpoint guidance, optional auto steering, application rate control, mapping, automatic boom control and USB data transfer.

Smithco.com

6 | Posterity fungicide

Posterity fungicide, an active SDHI, is now available to control dollar spot and spring dead spot. It delivers power that lasts, holding stronger for up to 28 days of dollar spot control, according to **SYNGENTA**. Ideal for use in an agronomic program, Posterity works best when rotated with Secure Action and Daconil Action fungicides to prevent dollar spot and other diseases in cool- and warm-season turf.

Greencastonline.com

Dan Grogan

SUPERINTENDENT // The Sagamore Club, Noblesville, Ind.

Dan, what are you having? I'll go with an All Day IPA.

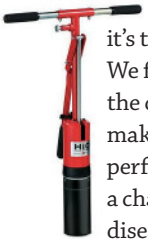
Tell me about your family. I've been married to Andrea for three years. My oldest, Grayson, turned 2 in November. Kennedy was born in July, the Monday after the member/guest ... I appreciated her waiting.

What do I need to know about the Sagamore Club? It's a Signature Jack Nicklaus Design that opened in 2003. It's in a suburb of Indianapolis. They like to play golf out here, we usually push about 20,000 rounds of golf through the course. It's a great place to work.

And you come from a superintendent family, right? My dad (Duke) has been a superintendent since before I was born. He's been at the same club for 25 years; he's pushing 40 years in the industry. And my Uncle Paul retired from TPC Deere Run about five years ago. He and my dad started taking care of golf courses in Michigan together way back when.

What's one thing I should do if I'm ever in Noblesville? We have an amphitheatre — Ruoff Home Mortgage Music Center — that's a big staple of our community. It's only about 2 miles from the course. On a calm day, you can hear the show, depending on the wind and where you are on the course.

What's the best show you've seen there? Darius Rucker, because of what happened. We have an agreement with the venue so that their performers can come play here at the course. Darius Rucker was playing golf the day of the show and I ran into him so I said hi. I was at the concert that night and I thought to myself, 'it'd be cool if we got a shoutout.' Then, only about three songs in, he says, 'Shoutout to the Sagamore Club, those were some of the best greens I've ever putted!' That's hard to beat.

What's your favorite tool in the shop?  I love cutting cups, so it's the (Par Aide) HiO hole cutter. We freehand paint the edges of the cup every morning. I like to make sure every single cup is as perfect as possible. And it gives me a chance to see the course, look for disease and run the dog.

What teams do you root for? The Colts, the Boilermakers and the Pacers. But I also root for the Saints because of Drew Brees — his senior year at Purdue was my freshman year.

Fill in the blank: I know it's going to be a long day when _____. ... probably when I wake up in the morning, check my phone and I've got text messages from my employees. 'What's it going to be today?' 'Hey Dan, my car broke down ...' The second I open that text, I know I'm going to be a few bodies light at work that day.

As interviewed by Seth Jones, Jan. 18, 2019.

MAIN PHOTO BY: LOU FERRARO, PARK SOUTH PHOTOGRAPHY (DAN GROGAN)
U.S. AIR FORCE PHOTO BY: MASTER SGT. VAL GEMPIS (DARIUS RUCKER)

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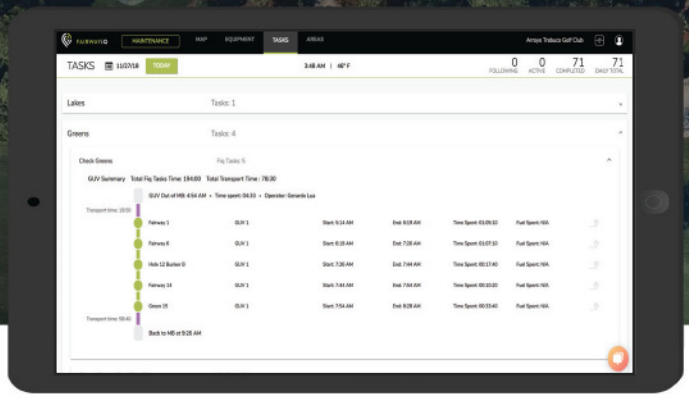

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Mow Collars / Approaches								
	Terry Alford	1	4	6.99	2.99	$ 40.00	$ 69.90	$ 29.90
			4	**6.99**	**2.99**	**$ 40.00**	**$ 69.90**	**$ 29.90**
Mow Fairways								
	Jason Fischer	1	4	6.95	2.95	$ 44.00	$ 76.45	$ 32.45
	Daryl Odom	1	4	3.14	-0.86	$ 40.00	$ 31.40	$ (8.60)
	Stacy Doherty	1	5.5	2.9	-2.6	$ 71.78	$ 37.85	$ (33.93)
	Leroy Woodward	1	4	3.46	-0.54	$ 55.12	$ 47.68	$ (29.76)
			4.38	**4.11**	**-0.26**	**$ 210.90**	**$ 193.37**	**$ (39.84)**
Mow Greens (Triplex)								
	Ty Matthams	1	4	3.71	-0.29	$ 40.00	$ 37.10	$ (2.90)
			4	**3.71**	**-0.29**	**$ 40.00**	**$ 37.10**	**$ (2.90)**
Mow Rough (4500)								
	Isaak Hopkins	1	8	7.62	-0.38	$ 80.00	$ 76.20	$ (3.80)
			8	**7.62**	**-0.38**	**$ 80.00**	**$ 76.20**	**$ (3.80)**
Mow Tees								
	Michael Ratliff	1	5.5	4.99	-0.51	$ 60.50	$ 54.89	$ (5.61)
	Justine Laing	1	4	3.46	-0.54	$ 40.00	$ 34.60	$ (5.40)
			4.75	**4.23**	**-0.53**	**$ 100.50**	**$ 89.49**	**$ (11.01)**
Set Up (Detail)								
	Steve Vasquez	1	4	1.07	-2.93			$ -
	Cillian Davis	1	4	0.05	-3.95	$ 40.00	$ 0.50	$ (39.50)
			4	**0.56**	**-3.44**	**$ 40.00**	**$ 0.50**	**$ (39.50)**
Spray								
	Tyler Partridge	1	4	2.33	-1.67	$ 52.84	$ 30.78	$ (22.06)
			4	**2.33**	**-1.67**	**$ 52.84**	**$ 30.78**	**$ (22.06)**
					Grand Totals	**$ 564.24**	**$ 497.34**	**$ (89.22)**

taskTracker

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