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HOT START

In honor of the busy summer season, we offer these scintillating stories and more —

- Three USGA studies on PGRs
- Josh Saunders awarded the E.J. Marshall Platter
- Two Tallahassee twisters terrorize Capital City CC

Lancaster (Pa.) CC, host of the 2024 U.S. Women's Open

A NORTH COAST MEDIA PUBLICATION VOL. 80 // NO. 8

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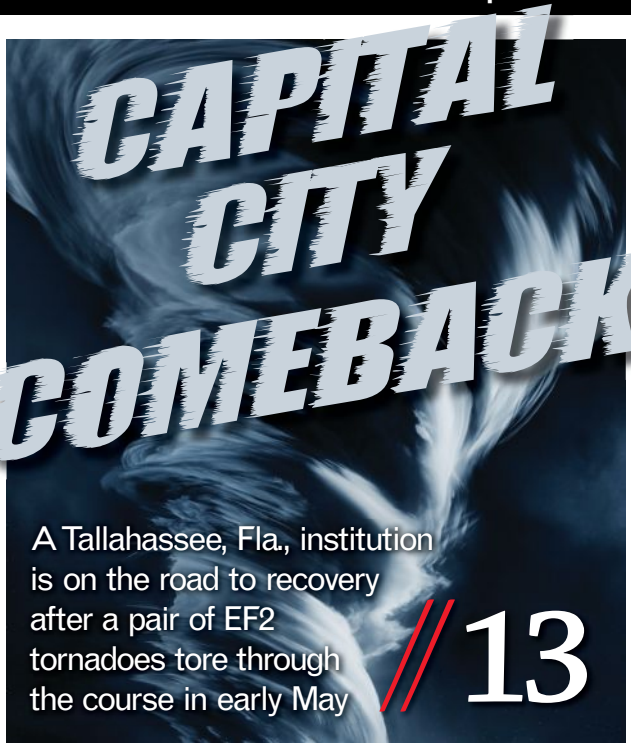

CAPITAL CITY COMEBACK

A Tallahassee, Fla., institution is on the road to recovery after a pair of EF2 tornadoes tore through the course in early May

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National Alliance for Accessible Golf

Inside the vision for a more accessible game

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SUPER SCIENCE

DEPARTMENTS

COVER PHOTO BY: JOSH SAUNDERS

Golfdom

Seven-time winner of the national **Folio: Award** for editorial excellence

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"I won't be able to go on for multiple pages like Graffis used to do, but here's my version of 'Swinging around golf' — Tuesday of the 2024 U.S. Open edition."

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

One day in North Carolina

If you look back in the archives of *Golfdom* in the 1940s and 1950s, a regular feature Herb Graffis would write was called "Swinging around golf." Graffis would write for a few pages about where he'd been, who he talked to and what he learned.

I'm going to steal a page from his book and report on one day in North Carolina, the Tuesday of U.S. Open week. I was joined by my colleagues Bill Roddy, group publisher, and Craig MacGregor, publisher. I won't be able to go on for multiple pages like Graffis used to do, but here's my version of "Swinging around golf" — Tuesday of the 2024 U.S. Open edition.

10:00 a.m. — We arrive at Envu headquarters in Cary, N.C. The team we meet with — Julie Groce, Mark Ford and Chad Noyes — have several things cooking, top-of-mind is their sponsorship of the crew and volunteers for the upcoming U.S. Senior Open at Newport (R.I.) CC.

"As Envu, we don't have any restrictions," Ford told me. Previously, when the company was a part of Bayer Environmental Science, it was harder for them to dedicate time and money to the industry. "Our mindset now is, (golf and lawn care) are our reasons for being."

Look for James Hempfling, Ph.D., and Lindsey Hoffman Chappell, Ph.D., among the volunteer force for that tournament, in support of superintendent Chris Coen and his crew.

12:00 p.m. — We pull into Sipcam Agro's American headquarters in Durham, N.C., to meet with Todd Mason and Elizabeth Taras. Mason's energy is sky high as he tells us about two major plant purchases the company recently made in Mississippi, bringing the global company a manufacturing facility in the U.S. for the first time. He also hints about a product the company is developing for *Poa annua* control that will be available in the near future.

"I've seen the trials, and it is good … it is very, very good," Mason told me. "Our researcher looked at me and said, 'I think you've got something here.'" He says it'll be especially helpful for superintendents in the southwest during overseeding season.

2:30 p.m. — Nufarm's headquarters near the Raleigh airport is next, a meeting with Tracy Rich and Reuel Heyden. The company's Anuew EZ liquid formulation has been selling like gangbusters, they tell me. They've also got two major product launches they're anxiously awaiting the EPA to approve. At the end of the meeting, Heyden gave us a tour of the company's on-site laboratories, which are massive and include labs dedicated to seed treatment, insecticides, herbicides and one lab labeled collaboration.

"Where great minds come together … to address today's most complex challenges." There are plans in the works to purchase land behind the facility to add test plots.

6:30 p.m. — We arrive in Chapel Hill, N.C., for a dinner with Mark LaFleur of Syngenta. LaFleur reports there's been a major investment in upgrading the company's Vero Beach, Fla., research laboratory, including doubling the area dedicated to turf test plots. LaFleur also hints at two new active ingredients coming from the company soon — a press release should be in my email inbox next month, he says.

On the drive home, curiosity got the best of me, and I looked at the Syngenta Global site to see if there was any news from the mothership in Basel, Switzerland. In May the company announced Tymirium, a nematicide and fungicide; and Plinazolin, a new active ingredient for pest control, especially useful to replace older chemistries that are showing resistance. I'll keep an eye on this for further news.

It was a productive day in North Carolina. It will be interesting to see what the above companies will do for you, the superintendents, in the upcoming months and years. From just this one day alone, it's clear to see there's a lot in the pipeline.

And now, on to the U.S. Open at Pinehurst No. 2!

Email Jones at:
sjones@northcoastmedia.net.

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NEWS, NOTES AND QUOTES

//PLATTER PLAUDITS

After leading preparations for the 2024 U.S. Women's Open, Lancaster (Pa.) CC director of grounds Josh Saunders was presented with the E.J. Marshall Platter.

LANCASTER CC SUPER RECEIVES USGA'S E.J. MARSHALL PLATTER AT U.S. WOMEN'S OPEN

BY *GOLFDOM* STAFF

The USGA presented a 2024 E.J. Marshall Platter to Josh Saunders, CGCS, director of grounds at Lancaster (Pa.) Country Club, at the 79th U.S. Women's Open, which was contested at the club May 30-June 2.

Established in 2022, the E.J. Marshall Platter celebrates excellence in golf course management. It acknowledges superintendents who demonstrate dedication, expertise and seamless collaboration with the USGA in preparing a course that meets the demanding standards of a national championship, fit for the world's elite golfers. Presented on the 18th green at the conclusion of the event, the ceremony also extends recognition to the entire course maintenance team and volunteers for their vital contributions.

Saunders, a 20-year member of the Golf Course Superintendents Association of America, is serving his sixth year at Lancaster CC. Alongside his team, Saunders partnered with Darin Bevard, USGA senior director of championship agronomy, to prepare the 6,583-yard, par-70 course for the championship. A Virginia native, Saunders served as an assistant superintendent at Southern Hills during both the 2001 U.S. Open and 2007 PGA Championship before joining the Lancaster CC team.

The course, designed by renowned architect William Flynn in 1920, features Penn Trio creeping bentgrass fairways and A1-A4 creeping bentgrass greens. Jim Nagle renovated the course in both 2011 and 2022. The most recent work added nine new bunkers, including the restoration of five from the original Flynn design. Extensive tree work opened views and improved airflow to improve turf health.

//SUNSHINE STATE STANDOUT

FLORIDA GCSA HONORS RESEARCHER AND EDUCATOR UNRUH

Researcher and educator J. Bryan Unruh, Ph.D., was awarded the Marie Roberts Lifetime Service Award by the Florida Golf Couse Superintendents Association.

Unruh is a professor at the University of Florida and the associate director of the West Florida Research and Education Center. The award recognizes non-superintendent individuals whose participation, support and achievements have made significant contributions to the Florida GCSA and the state's golf industry.

"I've been fortunate to be recognized by my peers in the past but to be recognized by my stakeholders, the people I serve day in and day out, is just special," Unruh said.

Unruh's award nomination emphasized his crucial role in enhancing environmental sustainability on Florida golf courses after establishing the landmark Best Management Practices program in Florida. He has helped create similar programs for the Golf Course Superintendents Association of America.

//BRIGHT LIGHTS, BIG SUPPORT

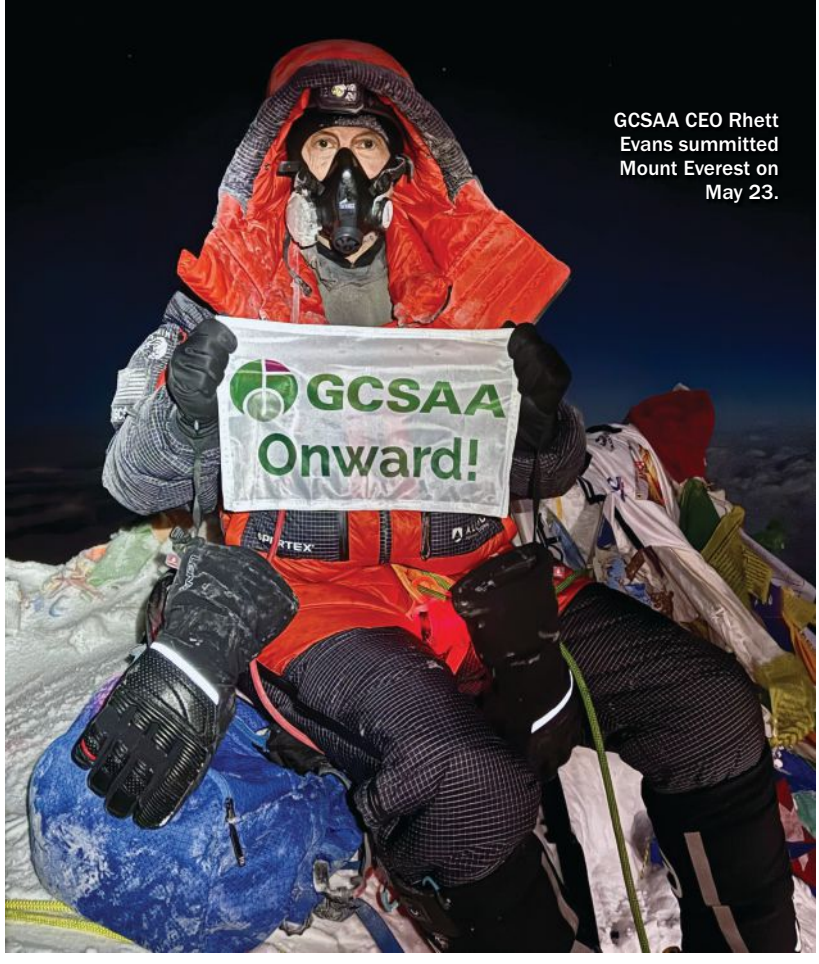
GRASS CLIPPINGS TO HELP FUND GCSAA LEGACY AWARDS

Grass Clippings at Rolling Hills in Phoenix, Ariz., the state's first fully lit 18-hole golf course, has partnered with the Golf Course Superintendents Association of America (GCSAA) to provide educational aid to children and grandchildren of GCSAA members. The GCSAA Legacy Awards, funded by Grass Clippings, will provide $1,500 scholarships to up to 20 students annually.

"Grass Clippings is profoundly honored to express our commitment to nurturing the future of golf by supporting its very foundation: the grass beneath our feet and the dedicated individuals who keep it green," said Jake Hoselton, co-founder of Grass Clippings.

"Through our partnership with the GCSAA Foundation and the Legacy Awards, we celebrate the heroes of the game and invest in the education of their families, ensuring the spirit and sustainability of golf for generations to come."

PHOTO BY: WELLGLAD / ISTOCK–GETTY IMAGES PLUS / GETTY IMAGES (GOLFBALL); PHOTO COURTESY: USGA



GCSAA CEO Rhett Evans summitted Mount Everest on May 23.

PHOTOS COURTESY: RHETT EVANS, GCSAA; JEFF SEXTON (TURF POST)

//ON TOP OF THE WORLD

GCSAA CEO Evans conquers Mount Everest

Golf Course Superintendents Association of America (GCSAA) CEO Rhett Evans was on top of the world — literally — as he successfully summitted Mount Everest on May 23.

Now safely back home, Evans scaled the mountain with a GCSAA patch on his outerwear and unraveled a flag with GCSAA's logo and his favorite motto, "Onward," while standing on the peak at 29,035 feet.

Evans was joined by a large online following over the course of his 45-day journey as he documented it on social media.

"To all those who offered prayers, provided support, positive thoughts and encouragement, you were instrumental in keeping me moving forward. Thank you," Evans says.

Evans' summit attempt was riddled with several setbacks, however, such as injuries that required him to be airlifted from Everest's base camp to Katmandu, Nepal, for medical treatment. Afterwards, he returned to the mountain to complete his journey.

After a long flight back home, Evans reunited with his wife, Colleen, started gaining back some of the 26 pounds he lost and reflected on his journey to the top of the world.

"I learned so much about life and who I am and what the human spirit is capable of," Evans says. "Our minds are the most powerful tool that we can harness for all levels of success in life. Our thoughts shape who we are and who we will become. The capability we each possess is far greater than most of us can even begin to imagine."

#TurfPost of the Month

Follow us @Golfdom

Jeff Sexton, CGCS
@ECCSuper77
Golf Course Superintendent
at Evansville (Ind.) CC

Good Sunday morning from ECC. This 1991 green is kicking butt. Better grass, mat layer removal with a sod cutter during construction has me convinced that we all need to be working much higher in our profiles. 1/2 in is where we seal off folks! Good day.

Friends in High Places

#THANKASUPERINTENDENT

Jason Scheff, Lead singer and bassist, Chicago

IT WAS THE BAND CHICAGO that asked the now classic question, "25 or 6 to 4?"

Formed in 1967, Chicago has sold more than 100 million records and boasts 21 top-10 singles. Of their 34 albums, 25 have been certified platinum. Just a few of their hits include "Hard Habit to Break," "If You Leave Me Now" and "Saturday in the Park."

Jason Scheff joined the band in 1986 after frontman Peter Cetera's departure. Both a vocalist and bassist, Scheff sang lead vocals on "Will You Still Love Me," which reached No. 3 on the U.S. Billboard Hot 100 in 1987.

Scheff was a member of Chicago for more than 30 years, eventually leaving the group in 2016 — the same year the band was inducted into the Rock and Roll Hall of Fame.

— Seth Jones // *Editor-in-Chief*

"Let me count the ways I love golf …

I love competition. Golf slows me down. Fifteen years ago, I got out on the celebrity player's tour, and I was a 3.6 index. It was great mixing it up with all those world-class athletes that win, they're used to winning. I love that it settles me down.

My course back home — I play out of Woodland Hills CC in (Los Angeles) — and it's in great shape. It's Kikuyu; boy, you have to hit the ball solid or else it'll just stick. A course that is really well maintained, there's nothing like it. There's an art to it."

//TROPHY TIME

GOLFDOM RAKES IN 11 TOCA AWARDS

In any field, it's nice to see great work rewarded.

The team at *Golfdom* felt that reward, and then some, at the recent Turf and Ornamental Communicators Association (TOCA) annual meeting, where the best in the industry was rewarded with TOCA awards. *Golfdom* walked away with a whopping 11 awards in writing, columns, design and photography.

"2023 was a stand-out year for *Golfdom* and I'm happy to see that hard work recognized," said Seth Jones, editor-in-chief of the magazine. "I was especially happy to see our cover with Justin DePippo, director of golf course and grounds at Bel-Air CC, with his dog Penny, recognized with a Gardner Award — that was certainly the best cover in the industry last year."

"TOCA awards are our industry's version of gold medals," said Craig MacGregor, publisher, *Golfdom*. "With such hard work and dedication, it makes me proud to be a part of this magazine."

Gardner (best in show) Awards:

Personality photography: Power to DePippo, Ed Carreon, Pete Seltzer
Two-plus page design: The Wild West, Pete Seltzer

First place:

Two-plus page design: The Wild West, Pete Seltzer
Personality photography: Power to DePippo, Ed Carreon, Pete Seltzer
Best print magazine cover: Power to DePippo, Ed Carreon, Pete Seltzer
Best single photo, stock: Bunker business, Pete Seltzer, ImagineGolf
Ornamental feature article: Young, wild and bee(s), Rob DiFranco
Series of columns: Keeping up with the Jones, Seth Jones

Merit:

Turf feature article: How one superintendent is blazing the trail with bermudagrass mite management, Christina Herrick
Column: You might be a superintendent if…, Alan FitzGerald
Special projects, best single issue: Tour Guide, *Golfdom* staff

PHOTOS BY: *GOLFDOM* STAFF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"When the GCSAA took over running the First Green, I was asked to become a liaison. ... My biggest hurdle was worrying about what to teach. But I found that having a broad plan was enough, and it flowed organically from there."

ALAN FITZGERALD, *CGCS, MG*

Why First Green is a big-time win for golf

This year I participated in the National Golf Day in Washington D.C., as First Green was hosting a field trip as part of the program.

I indirectly became involved with the First Green at LedgeRock GC, where the nationally recognized kids' golf instructor, Andy Miller, taught course etiquette and maintenance as part of his golf camps. He wanted the kids to learn at a young age about what goes into course maintenance and why etiquette is so important.

We visited the barn — the shiny equipment was always a big hit with the younger ones — or we spent time on the practice green showing them how the soil is made up, how short the grass actually is, etc.

The club had some indirect relationships with the local school district and had fundraisers for the school from time to time. For one of the events, they had the students design and build a mini golf course and invited Andy and me to talk to the students about golf, how a golf hole should play and how to make each of their holes fun and challenging.

We were both really impressed with the holes that the kids built on 4-by-8 sheets of plywood. Some were pretty basic, but sensible, while others were very intricate, with conveyors, rails and baffles to move the balls around.

When the GCSAA took over running the First Green, I was asked to become a liaison and help superintendents set events up as needed. My biggest hurdle was worrying about what to teach. But I found that having a broad plan was enough, and it flowed organically from there.

It works well as we can get the information across, but by being interactive, the kids can get the specific answers that they want too. I was also very lucky in that not only did I have a passionate school district and teachers, but also the support from the Philadelphia Association of Golf Course Superintendents and local turf vendors, who, along with people like Mike Fidanza, Ph.D., from Penn State, have been amazing in assisting with presenting stations on subjects such as irrigation, soils, IPM and more.

At one point I jokingly mentioned we needed bird boxes only to get a call a couple of months later that the wood shop had used it as a lesson and had made them for us! We then invited the elementary kids who were studying ornithology to come out throughout the year and check the boxes and study the birds that lived in them.

One of the teachers moved on to a new position at a local college which introduced a whole new angle to us. The college ran summer school for teenagers, and each week they visited the club to learn different aspects of the business, from turf to the golf department, to the food and beverage ops and running a business in general, proving there really are no boundaries on what can be done.

The First Green is extremely rewarding for both the superintendent and the school. Having passionate teachers helps immensely to get started so they just need to be sold on the possibilities. They will come away from events wanting to do more. The media loves it also, which only helps get us another avenue to promote what we do.

I can't wait to host one at Rehoboth Beach CC this fall, and I hope this encourages you to host one too!

Editor's note: *For more on the First Green program, see last month's issue of* Golfdom, *or visit firstgreen.org.*

Alan FitzGerald, CGCS, MG (superintendent@rehobothbeachcc.com) is superintendent at Rehoboth Beach (Del.) Country Club.

The Golfdom FILES

FROM THE ARCHIVE

The *Golfdom* staff tackled the basics of tractor maintenance in this September 1964 issue of the magazine. In the first of a two-part series, read about what we knew about tractor engine care in the '60s. To read the full article — and see part two — visit **Golfdom.com**.

Tractor maintenance


Tractor Maintenance

"ONE IT'S VALVES, TWO IT'S RINGS, THREE IT'S VALVES, FOUR IT'S RINGS..."

An understanding of how the parts of an engine react to heat, carbon, lubrication, etc. gives mechanic more confidence in diagnosing trouble and making repairs

In its manual, "Tractor Maintenance and Tune Up," International Harvester Co. observes that it takes only a fairly competent mechanic to make repairs or adjustments on almost any piece of machinery when the need or the trouble spot is pointed out to him. But a man who can detect what and where the trouble is, and then correct it, is doubly valuable. The manual has been prepared with the purpose of helping the course mechanic or serviceman to make any diagnosis with confidence and then proceed to handle the necessary adjustments or overhaul. It also emphasizes that if proper adjustments are made periodically, the tractor always will be available for eight hours of work.

As a matter of general information, it should be kept in mind that when an engine is started, especially in cold weather, some fuel enters the combustion chamber in liquid form. During the first few minutes of operation, the liquid fuel mixes with the oil on the cylinder walls and is forced past the piston rings into the crankcase, thus diluting the crank case oil.

Combustion is liable to be erratic during this initial period. Cold cylinder walls condense some of the fuel out of the fuel-air mixture, thus adding more liquid fuel to the crankcase.

For every gallon of fuel burned in an engine, about one gallon of water is produced. Contamination from water and other combustion products is exaggerated during low-temperature operations because of the cold cylinder walls and incomplete combustion. These contaminating products remain in the crankcase until the oil temperature becomes high enough to evaporate them. (Oil temperature must reach approximately 140 degrees F to keep water vapor from condensing.)

CAN BLOCK SCREEN, PASSAGES

Sludge formed by the mixture of water, oil and contaminants tends to settle to the bottom of the oil pan, and if it collects in sufficient quantity, it can block the oil pump screen or plug the oil passages. Crankcase and valve compartments are ventilated to aid in removing the water vapor. The crankcase breather must be clean to allow the vapor and other blowby products to escape and to reduce the sludge accumulation.

Engine Corrosion — The rusting of metal parts may result from the presence of water in the crankcase. Water alone causes rusting and, in combination with blowby products, may form acids which attack other metals such as copper or cadmium alloy. Water forms as the result of condensation of water vapor in the blowby products and in the air entering the crankcase, from low crankcase temperatures caused by worn-out thermostats, and from long periods of engine idling.

Engine Varnish — Unburned fuel that enters the crankcase in blowby gases contributes to the formation of varnish on engine parts. Deposits may then form on pistons and cause rings to stick. Similar deposits on valve stems result in sluggish valve action and "sticking" valves.

High speeds and temperatures and increased compression ratios with more power put new demands on engine valves.

"Since I was a risk-taker, I seemed to always see things on the horizon before they became big problems. I got to them when it was earlier and easier, from my perspective."

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

The rewards of risk

A lot of people like to think that they are risk-takers, but the truth of the matter isn't quite as cut-and-dried as whether you're a risk-taker or you aren't. I think if you have been in your profession for 20-plus years then, yes, it can be that cut-and-dried because risk-taking goes hand in hand with confidence or the lack thereof.

There are people that just are risk-takers, and that would be me. It's why when I was old enough to get in the big Minneapolis-Moline tractor — maybe 12 or 13 — I would never use the steps to dismount. Instead, I would jump, tuck and roll. I used to swing from one hay loft to the other on a rope; if I fell, it would have been a 30-foot drop. My dad always said, "Wait until you are old. That crazy stuff you think is funny now won't be so funny!" As always, he was right and I am now an achey mess, but, oh boy … the adventures I had. I wouldn't trade these broken bones or torn muscles for anything (well, maybe a few!).

Business is changing rapidly, and golf course operations aren't any different. Lack of labor, a shortage of assistants, the high cost of goods and/or the inability to attain goods in an optimal timeframe are legitimate challenges. And when other areas of your facility are facing the same issues, that means more competition for the same money. What does this have to do with whether you are or aren't a risk-taker? In my opinion, it comes down to how you approach and solve all your challenges.

Since I was a risk-taker, I seemed to always see things on the horizon before they became big problems. I got to them when it was earlier and easier, from my perspective. So, how would that translate if I was still a working superintendent and not sitting in my cozy den in the mountains of Pennsylvania?

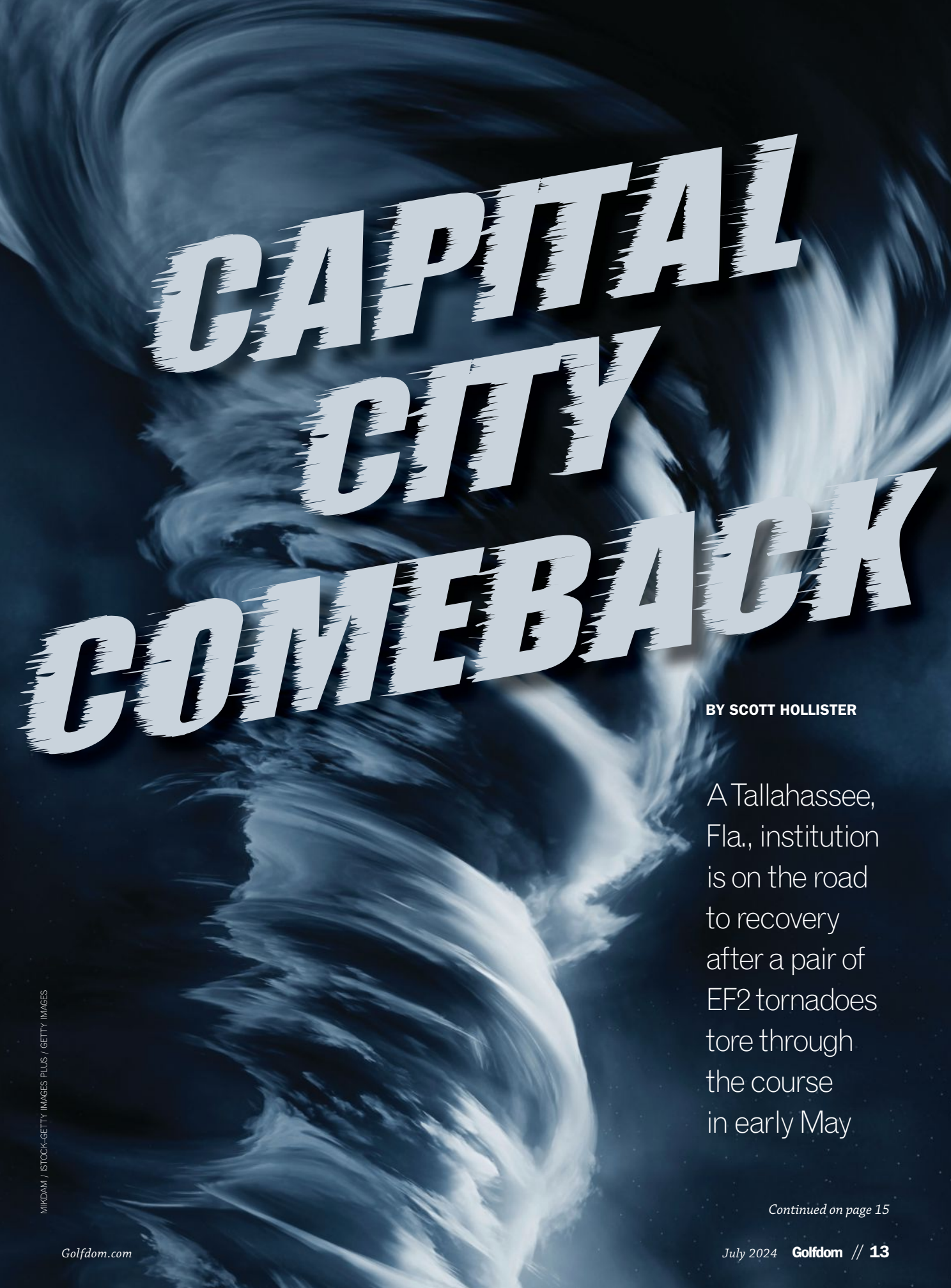
When it comes to hiring, I would like to think if I couldn't get a turf student as an assistant, I would write an ad that would attract a person that might be looking for new challenges. Maybe their current career that is unfulfilling, or they're stuck inside, or paid less regardless of their prior training. A good person can take online classes to get that degree.

If I was having trouble getting new equipment and the price tag was through the roof, I would favor buying versus leasing my equipment. My second highest paid employee would be my equipment manager. I wouldn't care if he made as much as I did; without a good EM you are literally dead in the water. Equipment that in the past would be traded in after four years might very well be in my fleet for eight years. I would spend a tremendous amount of time training my operators on how to run equipment to help ensure its longevity.

I would always be looking for a better way to manage turf. A lot of the best ideas in turf come from proactive supers that don't wait to see what happens but make it happen. Take, for example, my old mentor, Paul Latshaw, who utilized fans to move air across greens and added misters behind the fans to cool the air. He first put a tractor blower on a green, then he and his incredibly talented equipment manager built bigger and bigger fans. The difficult greens at Augusta — on holes 5, 10, 12, 13 and 16 — responded immediately and he knew he was on to something.

Can you change and become a risk-taker? Of course you can. All you need to do is change how you think and react. I've always said that it's easy to change grass, but it is hard to change minds. For a risk-taker, pivoting and changing is part of their personality.

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



CAPITAL CITY COMEBACK

BY SCOTT HOLLISTER

A Tallahassee, Fla., institution is on the road to recovery after a pair of EF2 tornadoes tore through the course in early May

Continued on page 15

MIKDAM / ISTOCK-GETTY IMAGES PLUS / GETTY IMAGES

Continued from page 13

Chase Brown is no stranger to severe weather and the impact it can have on a golf course.

The golf course superintendent at Capital City Country Club in Tallahassee, Fla., is a native of the city and has spent much of his career in golf course management at facilities in Florida.

"I've been through hurricanes before, but those basically missed us," Brown says. "We've lost trees, had branches, leaves and other debris that had to be cleaned up. No fun, but nothing that kept us closed for very long. This wasn't that, though. This was something else entirely."

The "this" Brown is referring to is a series of tornadoes that tore through Tallahassee on May 10, killing two people and causing an estimated $50 million in damage, a figure that is expected to rise. Capital City CC was the epicenter for much of that damage, with two of the confirmed five tornadoes spawned by the storm system converging on the golf course, bringing down thousands of trees and damaging nearly every structure on the property.

As of the first of June, the club had yet to reopen for play.

"It was an all-timer, it really was," Brown says. "The National Weather Service guys who were here said one of the tornadoes was 1,400 yards wide and the other was 900 yards wide. That's pretty much the footprint of our property, wall to wall, so everything was affected."

In the weeks leading up to the storm, Brown says the course was rounding into peak condition, the results of long-term course improvement efforts and more short-term work to prepare the facility for a busy slate of upcoming tournaments. In fact, on the day of the storm, the club was set to host a tournament that's a local favorite among the green industry set, sponsored by, ironically enough, Miller's Tree Service, with a host of local superintendents taking part.

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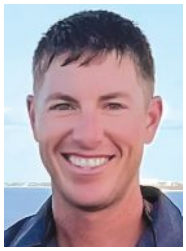
PHOTO BY: CHASE BROWN

Some of the damage to Capital City CC in Tallahassee, Fla., after a pair of EF2 tornadoes ripped through the golf course on May 10, causing significant structural damage and uprooting or damaging thousands of trees.



Chase Brown

"THIS IS A REALLY GOOD GOLF COURSE, AN INSTITUTION IN THE COMMUNITY. WE'LL GET IT BACK TO WHAT IT WAS BEFORE THE STORMS, I GUARANTEE IT."

Continued from page 15

And while light rain was falling as Brown drove to the club that morning, there were few signs that anything more sinister was ahead.

"We had crews on the course finishing up our prep, and I was getting ready to pull onto a side road that leads to the course," Brown says. "It was raining just enough to get the windshield wet, and radar wasn't showing what was coming yet because I was watching."

Just a few minutes later, that changed.

"All of a sudden, we get a torrential downpour," he says. "And as I'm sending out a mass text for everyone to get off the golf course, the tornado sirens went off. It happened so stinking fast. Everything unraveled in just a minute or two."

As the pair of EF2-rated tornadoes with estimated peak winds of 115 mph began to roar through the property, crew members and golfers alike found themselves scrambling for safety. Some of Brown's crew made it to the clubhouse. Others made it back to the maintenance facility, with some riding it out in parked vehicles and others taking shelter in a bathroom. A single crew member was stranded on the far side of the course and dove into the only cover he could find in time — an open-sided rain shelter. Miraculously, none of the crew were injured.

As for Brown, he quickly pulled off the road and parked along the side of an oil change shop for protection. While he too came out unscathed, his truck was another matter; most of his crew's vehicles suffered some kind of damage, and a fundraising effort

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In addition to the thousands of trees that were lost to the tornadoes' wrath, many others had their tops sheared off as the twisters rose and fell while making their way through the course.

PHOTO BY: CHASE BROWN

Removing downed trees and ensuring the ones that remained are safe has been an arduous task for the crew at Capital City CC. "You get one set of busted trees cleaned up," says superintendent Chase Brown, "and there is another set right behind it."

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to help defer some of those repair costs is underway.

Once the storms had passed and club officials were able to assess the overall scope of the damage, the arduous task of cleaning up Capital City CC began. Clearing greens was job one, and that was finished in just a day or two.

"My assistant, my mechanic and I did most of that ourselves," Brown says. "The crew had been through a lot, obviously, so we gave them a few days off. They're back now and have really gone above and beyond for us."

The rest of the playable areas — mainly tees and fairways — were next, and as of late May, Brown says those areas were in decent shape, aided by plant growth regulator treatments that they made throughout the spring. He's also had access to water, even though the pump house lost its roof and most of the satellite irrigation boxes on the property were damaged.

"Down the middle, we look pretty good," Brown says. "If you hit 'em straight, you could play right now."

It's the edges of the once tree-lined property where the going has been slower.

"The sheer quantity of trees that were mangled or have sketchy, dangerous limbs is just through the roof," Brown says. "You get one set of busted trees cleaned up and there is another set right behind it. It's a very slow process."

And even though it could be several more months before most signs of the tornadoes' wrath are no longer visible, Brown and his team are committed to seeing it out.

"This is where I was born and raised, and I take a lot of pride in this place," Brown says. "It's a reflection on me and everybody on my team, so we'll do what we need to. This is a really good golf course, an institution in the community (Capital City CC opened in 1908). We'll get it back to what it was before the storms, I guarantee it."

PHOTOS BY: CHASE BROWN

Inside the vision for a more accessible game

BY ROB DIFRANCO

Dave Barton of the National Alliance for Accessible Golf discusses how superintendents can make the course more accessible to everyone

In 2022 when the USGA hosted its first U.S. Adaptive Open, it chose Pinehurst Resort as its location. Perhaps the most iconic golf resort in the country, Pinehurst has played home to 13 USGA championships — including this year's U.S. Open — so playing the first Adaptive Open on Course No. 6 at Pinehurst made perfect sense.

Fast forward two years and after two successful tournaments at Pinehurst, the USGA is taking the U.S. Adaptive Open on the road.

Sand Creek Station, a 7,200-yard Jeff Brauer design in Newton ,Kan., will host the 2024 tournament, a sign of how much the commitment to accessible golf has grown since that first event.

Although it's not associated with the Adaptive Open, the National Alliance for Accessible Golf (NAAG) is another organization dedicated to expanding not only golf's player base, but those who can secure jobs on the course as well.

At the helm of the organization is Dave Barton, executive director. *Golfdom* sat down with Barton to get an inside look at what it offers golf course superintendents looking to make their courses as accessible as possible.

Golfdom: Dave, thanks for taking the time to sit down with us today. What can you tell us about yourself and how you ended up leading the NAAG?

Dave Barton: I'm a retired Navy pilot. I got into the golf business in 2005 because I'm a glutton for punishment (*laughs*). I managed properties with (Raspberry Golf Management) up in Northern Virginia and I had an ownership interest for about eight years.

Then, I moved down here about five years ago to work for the National Golf Course Owners Association where I ran their education department and *Golf Business* magazine. I was the editor of that, which is saying a lot because I had no magazine or editorial experience whatsoever. Thankfully they had some amazing people, so I just had to kind of say, "Hey, here's what we want to talk about. Let's make it happen."

I started (at the NAAG) about two years ago, and we've had, not unlike a lot of 501(c)(3)s, a day-to-day battle sometimes for survival. But we've reinvested in ourselves over the last 18 to 24 months on a very, very small scale, re-launching our education platform as opposed to just having resources.

Dave Barton

We're really proud of GAIN (Golf Access and Inclusion Network) and the education hub. It's really the secret sauce for us. PGAs and superintendents can get education credits, and it allows us to deliver this education to golf course facilities, staff and leadership so they can be knowledgeable. And, as we grow our numbers, it'll help folks decide that we're somebody to associate with and then we can reopen our grant program.

Golfdom: NAAG has been around for more than 20 years. For our readers who have never heard of the organization, what can you tell us about what you offer?

Barton: (The NAAG) was formed out of some working groups in the mid-1990s when leading golf associations, and even some academia, realized that when the ADA (Americans with Disabilities Act) came out, it really only addressed

buildings. It didn't address the recreational aspect of a facility such as a golf course. It worked on the clubhouse, but not the golf course. If there's a big building at a club, it applies to the building, but nobody talked about the course accessibility.

So, they had six working groups, and in 2001, the alliance was created. For most of our existence, we've worked to increase the participation of people with disabilities in the game of golf through education, whether it's through programs or creating employee resources to help the golf industry.

And so that's where we've got some grant money that we want to earmark … for golfers or maybe employees, getting someone into the golf business as an individual with a disability that wants to work in golf. Maybe it's a scholarship or two for an up-and-coming high school senior who's looking to go to college that's interested in sports and golf. So, there are options there for us. That's really what we do.

In the grand scheme of things, we target, in a positive way, the places where people can play golf or learn to play and to help them understand what they've got to do be compliant with the ADA.

We're not the Department of Justice, we're not an enforcing agency. And with our golf background and the folks on our board of directors, we have a lot of credibility when we start talking to golf course owners, operators or leaders. We're not entry-level staff as far as how things work on the golf course.

Golfdom: How can superintendents get involved with the NAAG?

Barton: The superintendent has such a sphere of influence over the course and every integral part of the course, whether it's paths, benches, barriers or curves … the superintendent kind of owns that space. So, I think they just have to work with the pros and understand and make sure the course is accessible.

Some of this stuff is not free, but we do think most golf courses are much better off than they think they are. But there are other things that we want to educate them about.

So again, we just aspire to make this education easy to find and uncomplicated to understand because the ADA is a big document and it's just not that complicated.

That doesn't mean it's free if you've got some things you've got to do, but we can educate you on that. I think a lot of what we do is dispelling myths. We're in the business saying, "Look, here's what the deal is. Here are some solutions, here's how you can do it ideally and cost-effectively."

Golfdom: What's a good starting point for superintendents looking to get involved?

Barton: It starts with a self-assessment.

So, if I were to talk to a superintendent who asked, "Hey, how do we do this?" I would say, before you go too far down the road with some of these things, have you done a self-assessment of your golf facility? There's a checklist that does that. The ADA puts it out, and it's easy to find all over our website.

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As part of the National Alliance for Accessible Golf's self assessment, superintendents will need to evaluate if their greens are accessible for adaptive golf cars.

PHOTO COURTESY: USGA

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It's a seven-phase checklist and it's got big pictures. It asks things like, does your course have curves? How far apart are they? How far spaced out do you have access routes? Access routes don't have to be paved, but if they are, are they wide enough (for golf cars)? Can people get to and from the golf course? Can a golfer get on every green and at least one or a couple of the tee boxes depending on how many tee boxes you have?

That's what the access part of the game is. We would refer them to that to start with because I'm a believer that if you're going to have a course that's going to have adaptive golf programming and even host an adaptive golf tournament, your course ought to meet those standards established by the ADA. I mean, it is a law, right? And that's what we tell the operators, too.

Then, does your website indicate that you welcome golfers of all abilities, right? Is it accessible for someone who might have a vision problem or some other impairment where they have to do different things from the website to understand what you offer?

And then really the third question is how educated is your leadership? Because culture feeds from leadership. So, if your leadership understands what the requirements are, you can build that culture of inclusivity for the golfers, which in the end benefits the staff that's working outside, the staff that's working inside, and they're having positive customer service experiences both ways.

That is the secret sauce. You don't know what you don't know. But if you can get pretty smart in about three hours, it's not a bad thing to do. The self-assessment is just that. It's not a certification, but it's just showing you your facility has a level of commitment. I would encourage (superintendents) to speak with the operations side of the facility and work together and find out where they all stand on this and what needs to be done. What's going on with all the inside stuff with disability etiquette and communications? Are we training on that? What are we doing as a property as a whole working towards the same objective?

Golfdom: How do you encourage superintendents or golf professionals — aside from being a feel-good thing and something that looks good on paper for the club — to invest their time and resources into this?

Barton: That's a good question because folks might not necessarily see the demand. So why put all this effort into it?

To answer that, I would ask someone why they would not want someone to play golf at their facility? It's a game for everyone. And the reality is that friends of mine I play with that are over 40 — way over 40 — they drag their feet on the greens around holes, and they do as much damage, more damage than these carts that the superintendents can be concerned about.

So, we're educating about that.

But I think in the end, it's just reminding them why they should do it. It's because they are people, they're no different than you and I. They have different abilities. And do you not want to welcome people to play golf at your golf course?

A chance encounter, a new partner

Kafka Granite partners with NAAG after making a new friend

Most golf fans are familiar with the inspiring story of Amy Bockerstette, a golfer with Down Syndrome who famously parred the 16th hole at the 2019 Waste Management Phoenix Open. Paired with Gary Woodland, who would go on to win the U.S. Open later that season, she told him, "I got this!" before hitting out of a greenside bunker to an adoring crowd. The video has been watched more than 55 million times.

Turns out, Bockerstette is still motivating people. Kafka and the NAAG's partnership had unique beginnings at the 2024 GCSAA Conference and Trade Show in Phoenix.

"(Dave) had been running around looking for a putter for Amy Bockerstette to do a putt at the sustainability pavilion," says Tiffany Koss. "He had met with one of my reps first and said nobody had a putter to use. He came off the PGA where every aisle you can go find a putter, but apparently, at the GCSAA, no one's trying to sell that, but we happened to have one in our booth. He ran with our crappy old putter, and it did the job."

Koss adds that Bockerstette stopped by the Kafka booth later in the day to thank the crew for their help. That's when she and Barton got to talking about the NAAG and its mission.

"I felt a lot of synergy. This something that I want to be a part of and not just from his story and passion and messaging around making golf more inclusive, it comes from experiencing things firsthand. I have friends, family and employees who have disabilities and am inspired by what they're able to do in their personal life," Koss says.

Koss adds that Kafka's wax polymer pathway product has a role to play in the continued push toward accessibility, making a partnership between the two organizations a perfect fit.

"In those instances where they need an option to make a pathway or walkway more accessible for an individual, it is an option that we can help provide," she says. "I felt like there was a lot of good we can do there. I'm excited to help Dave with their mission."

— R.D.

Hosted by Mike Kenna, Ph.D. | *mpkenna@gmail.com*

Super Science

// **LUCKY NO. 7**

HOW DO NITROGEN AND PGR COMBINATIONS AFFECT BENTGRASS

By Mike Kenna

Ashton Franks, an M.S. student at Oklahoma State University, evaluated a 777 creeping bentgrass research putting green for the effects of nitrogen (N) rate and a mixture of three plant growth regulators (PGRs) on playability, turfgrass quality and dollar spot severity.

Nitrogen application treatments included 0, 0.1, 0.2, 0.3 and 0.4 lbs. N/1000 ft. sq. (0, 4.9, 9.8, 14.7 and 19.5 kg N/ha^{-1}) per application arranged in factorial with three rates (0.28, 0.41 and 0.5 oz./1000 ft. sq. or 0.9, 1.3, 1.6 L/ha^{-1} per application) of a mixture of trinexapac-ethyl (1.4 percent), paclobutrazol (5.6 percent), and flurprimidol (5.6 percent). Applications were made every 14 days for 20 weeks, starting May 1 in 2021 and 2022.

Franks measured ball roll distance (BRD) using a Stimpmeter seven and 14 days after each N and PGR application. Visual turfgrass quality (TQ) ratings and normalized difference vegetation index (NDVI) were measured weekly to quantify aesthetic quality. He visually assessed dollar spot disease severity.

For TQ and NDVI, the N-treated plots had higher ratings than the 0 N treatment. Plots receiving PGR had significantly lower NDVI than the non-regulated plots. In both years, the 0 and 0.1 lbs. N/1000 ft. sq. (0 and 4.9 kg N/ha^{-1}) plots resulted in greater BRD than the other three N rates.

The use of PGRs did not influence BRD in 2021, but the highest rate increased BRD in 2022. In 2021, the high N rate (0.4 lbs N/1000 ft. sq. or 19.5 kg N/ha^{-1}) reduced disease incidence, while in 2022, plots receiving N had reduced disease compared to the non-fertilized treatment.

The high N rate decreased the average dollar spot size and diameter. Plots treated with PGR had less dollar spot disease than the non-regulated plots. Increasing N resulted in lower BRD but improved turfgrass quality. Both increasing N rates and using PGRs decreased dollar spot severity and increased turfgrass quality.

Reference

Adapted from Franks, Ashton G. 2023. Effects of Nitrogen and the Combination of Trinexapac-Ethyl, Paclobutrazol, and Flurprimidol on Creeping Bentgrass Putting Greens. Oklahoma State University ProQuest Dissertation & Theses, 2023.30574435.

USGA

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NEWS UPDATES

ADVANCED TURF SOLUTIONS ADDS FORMER SUPERINTENDENT

Advanced Turf Solutions recently welcomed Kent Turner to its team as a sales representative. Turner is based in the Cincinnati, Ohio, area and will foster and manage relationships with golf course professionals in the region, providing them with the advice and products they need to succeed.

Kent Turner

Turner brings more than 35 years of green industry experience to his new role, including 25 years as a golf course superintendent. He is a GCSAA member, has served as president of the GCGCSA, and currently serves as president of the Ohio Turfgrass Foundation.

Turner enjoys building relationships with customers and looks forward to seeing them succeed with the help of his expertise and the products offered by ATS.

"Kent is an incredibly knowledgeable and all-around great person, and ATS is happy to have him on board," said Brad Nevitt, vice president of sales at Advanced Turf Solutions. "Kent's commitment to customers, love of the game and vast experience make him a valuable addition to the team."

"TRINEXAPAC-ETHYL (PRIMO MAXX) EFFECTIVELY SUPPRESSED THE GROWTH OF TIFEAGLE BERMUDAGRASS WHEN MIXED WITH VARIOUS DIVALENT CATIONS."

Mike Kenna, Ph.D.

(see story on page 32)

//HARD KNOX LIFE

Imazapic growth suppression of hybrid bermudagrass

By Benjamin Pritchard, Devon Carroll, Tyler Carr, Gregory Breeden and James Brosnan

Turfgrass managers use plant growth regulators (PGRs) to reduce mowing requirements, suppress inflorescence production and improve overall turfgrass quality (8, 16, 20 and 21). Recent surveys indicate that 45 percent of all golf courses in the U.S. apply PGRs (22).

The five primary types of PGRs used in turfgrass management are:

- **Class A compounds:** Suppress gibberellic acid (GA) biosynthesis late in the pathway.
- **Class B compounds:** Suppress GA biosynthesis early in the pathway.
- **Class C compounds:** Inhibit cell division by reducing total nonstructural carbohydrates in leaves.
- **Class D compounds:** Herbicides with growth-regulating properties.
- **Class E compounds:** Considered phytohormones (6, 16, 24 and 25).

Imazapic is a herbicide used for pre and postemergence control of grassy and broadleaf weeds in various systems, including maize, rangeland, pasture and roadsides (1, 2 and 15). Past research explored imazapic efficacy for seedhead suppression in managed and utility turfgrass (3, 4, 9, 10 and 26). For example, tall fescue growth suppression following imazapic application on roadsides reduced mowing events required to create clear sightlines for motorists (7, 9, 10 and 13).

Reductions in labor availability have challenged many turfgrass managers to meet the mowing requirements of bermudagrass on golf courses (12). More than 159,284 ha of maintained bermudagrass on golf courses across the United States in 2021 required regular mowing (23).

FIGURE 1

Researchers at the University of Tennessee evaluated the growth suppression of imazapic on hybrid bermudagrass cultivars.

Applications of imazapic as a PGR could assuage this issue. For example, imazapic at > 0.5 oz./acre (> 35 g/ha^{-1}) reduced bahiagrass plant height by ≥ 30 percent; however, these applications resulted in 30 to 50 percent injury through 119 days after treatment (DAT) (18).

Comparatively, imazapic at 0.5 oz./acre (35 g/ha^{-1}) only injured bahiagrass 23 percent 14 DAT which reduced to 4 percent by 56 DAT (18). Other research found inflorescence suppression with imazapic applications to bahiagrass and zoysiagrass in the U.S. transition zone (4 and 26). On Riviera bermudagrass, imazapic at 0.75 oz./acre (52 g/ha^{-1}) resulted in ≤ 15 percent injury, reduced inflorescence production and suppressed growth (3).

Although tolerance of common bermudagrass to imazapic for use as a PGR has been explored in the transition zone of the U.S. (3), information about the response of hybrid bermudagrass is lacking, considering the species constitutes 32 percent of all maintained turfgrass hectarage on golf courses (23). Limited research demonstrated imazapic applications at 0.5 to 1.5 oz./acre (35 to 105 g/ha^{-1}) reduced hybrid bermudagrass plant height by ≥ 28 percent, suggesting that it could be a tool to aid turfgrass managers in reducing mowing requirements on golf courses (19).

Our research objective in this study was to evaluate hybrid bermudagrass tolerance and growth suppression following applications of imazapic.

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TABLE 1

Injury of hybrid bermudagrass cultivars in 2020 and 2021 in Knoxville, Tenn., following application of imazapic.

			Hybrid Bermudagrass Injury[iii]									
	Rate[ii]		2020					2021				
Cultivar[i]	oz./acre	g ha^{-1}	3 DAT[iv]	10 DAT	14 DAT	21 DAT	28 DAT	3 DAT	10 DAT	14 DAT	21 DAT	28 DAT
Latitude 36	0.5	35	10	10 a[v]	35 a	0 a	0	60	45 a	30 a	0 a	0
	0.75	52	10	13 a	50 b	3 a	0	63	50 ab	46 b	0 a	0
	1.0	70	11	20 b	53 b	10 b	0	58	63 bc	63 c	14 b	0
	1.5	105	11	20 b	53 b	18 c	0	65	68 c	71 c	28 c	0
Tahoma 31	0.5	35	15	38 a	5 a	0	0	63	48 a	35 a	3	0
	0.75	52	13	45 b	15 b	0	0	53	50 ab	45 a	0	0
	1.0	70	14	50 b	25 c	0	0	45	68 c	68 c	9	0
	1.5	105	16	45 b	50 d	3	0	65	65 bc	65 bc	5	0
TifTuf	0.5	35	14	33	23 a	0 a	0 a	0	45 a	40	26 a	0
	0.75	52	15	35	33 b	5 a	3 ab	0	63 bc	45	38 a	0
	1.0	70	11	33	40 c	15 b	9 b	0	60 b	50	64 b	0
	1.5	105	13	33	40 c	25 c	9 b	0	73 c	58	61 b	0
Tifway	0.5	35	43 b	33 a	3 a	3	0	55	45 a	33 a	8 a	0
	0.75	52	30 a	43 a	6 a	0	0	55	53 ab	36 a	6 a	3
	1.0	70	40 b	58 b	20 b	0	0	50	68 c	68 b	25 b	5
	1.5	105	38 ab	60 b	33 c	0	0	60	63 bc	69 b	49 c	13

[i] Hybrid bermudagrass cultivars Latitude 36, Tahoma 31, TifTuf and Tifway are presented by each treatment and experimental year.
[ii] Treatments were applied on Aug. 14 2020 or Aug. 6 2021. All treatments were mixed with methylated seed oil at 316 mL ha^{-1}.
[iii] Hybrid bermudagrass injury was assessed visually on a 0 (i.e., no injury) to 100 percent (i.e., complete kill) scale relative to untreated check plots in each replication.
[iv] Days after treatment (DAT) represents the time between experiment initiation and rating date.
[v] Within each column and for each cultivar, means with the same letter are not significantly different according to Fisher's least significant difference ($P \leq 0.05$).

Continued from page 25

MATERIALS AND METHODS

We conducted field experiments on Aug. 14, 2020, and repeated them on Aug. 6, 2021, at the East Tennessee AgResearch and Education Center, Plant Sciences Unit in Knoxville, Tenn., to evaluate injury and growth suppression of hybrid bermudagrass cultivars following application of imazapic. Separate experiments were conducted each year on four hybrid bermudagrass cultivars: Latitude 36, Tahoma 31, TifTuf and Tifway.

Experimental areas were maintained with a reel mower three times per week at a 1.6- or 1.3-cm height of cut in 2020 and 2021, respectively. The soil at all experimental sites was a Sequatchie silt loam, and we irrigated to supplement rainfall on all plots.

We arranged each experiment as a randomized complete block design with four replications of 1.5 m^2 plots. Treatments included single applications of imazapic (Plateau, BASF) at 0.5, 0.75, 1.0 and 1.5 oz./acre (0, 35, 52, 70 or 105 g/ha^{-1}) mixed with methylated seed oil (0.2 gal/acre or 1.75 L ha^{-1}). Treatments were applied using a CO2-pressurized backpack sprayer calibrated to deliver 40 gallons/acre (374 L/ha^{-1}) via 8002 TeeJet nozzles.

We assessed hybrid bermudagrass injury 3, 10, 14, 21 and 28 DAT using visual measurements of the normalized difference vegetation index (NDVI). We visually rated turfgrass injury on a 0 to 100 percent scale, where 0 = no turfgrass injury and 100 = complete kill relative to untreated check plots in each replication. We used a FieldScout TCM 500 hand-held NDVI meter (Spectrum Technologies Inc.) on each date the visual injury was rated to collect three measurements per plot.

We evaluated growth suppression by collecting clippings from a single pass with a reel mower (22 inches [55.5 cm]) wide in the center of each plot on each rating date. We avoided mowing the plots for 48 hours before a clipping collection event and mowed the entire plot after collecting the samples. Clippings collected were dried in a forced-air oven at 54 degrees C for at least two days and weighed. Clipping weight data were expressed as a percentage of the untreated check to quantify the degree of growth suppression following imazapic treatment.

We analyzed hybrid bermudagrass injury and growth suppression data from all plots (N = 160) using a repeated-measures analysis of variance and a means separation technique (least squares means). Treatment means for significant effects were separated using Fisher's protected least significant

difference test (P = 0.05). Pearson's correlation coefficients were calculated for turfgrass injury and NDVI data.

RESULTS AND DISCUSSION

We found a treatment-by-cultivar-by-year-by-rating date (DAT) interaction in hybrid bermudagrass injury data; therefore, data were presented separately by cultivar and year. Turfgrass visual injury data correlated significantly with NDVI assessments ($r = -0.53$; $P \leq 0.001$), similar to previous reports outlining the relationship between qualitative and quantitative measures of herbicide performance (5 and 11). Therefore, we only present the visually rated injury data.

Hybrid bermudagrass injury means are presented based on treatment, cultivar, year, and DAT (Table 1). Hybrid bermudagrass injury increased with imazapic rate for all cultivars in both years; however, injury was less pronounced in 2020 compared with 2021. For example, 10 DAT in 2020, no cultivar was injured > 38 percent with imazapic at 35 g/ha^{-1}, whereas in 2021, this treatment resulted in upward of 48 percent hybrid bermudagrass injury (Table 1).

Peak hybrid bermudagrass injury following imazapic treatment (regardless of rate) occurred within 14 DAT for all cultivars each year; however, the degree of injury varied by year, which may be related to environmental conditions, particularly increased precipitation during the data collection period in 2021 compared with 2020.

The activity of imidazolinone herbicides (such as imazapic) in the soil is greater when moisture is nonlimiting (14) and can lead to crop injury. For example, increased rainfall leading to greater imazapic availability in soil solution has been identified as a cause of exacerbated imazapic injury in rice (17).

In our study, peak injury of Latitude 36 was 35 percent following treatment with imazapic at 35 g/ha^{-1} in 2020 compared with 60 percent in 2021 when precipitation nearly doubled (Table 1). Similar responses were also observed for Tahoma 31, TifTuf and Tifway in 2020 and 2021. However, all cultivars recovered (0 percent injury) by 28 DAT each year following treatment with imazapic at 35 g/ha^{-1}.

These findings suggest hybrid bermudagrass is less tolerant to imazapic applications for growth suppression than common bermudagrass. We reported 15 and 17 percent common bermudagrass peak injury year over year with imazapic at 52 g/ha^{-1} at the same research location (3). Comparatively, hybrid bermudagrass peak injury was ≥ 35 percent between 10 and 14 DAT (across cultivars and years) with imazapic injury reported herein greater than that observed for other warm-season grass species (18 and 19), which may be a function of mowing height. Turfgrass was maintained at ≤ 0.63 inches (1.6 cm) in our study compared with a 3- to 5-cm range in work conducted on bahiagrass and St. Augustinegrass (18).

We observed a significant year-by-cultivar-by-DAT interaction; therefore, growth suppression data were presented separately for each cultivar and year (Table 2). A significant imazapic rate-by-DAT interaction was present for growth suppression data collected for Tahoma 31, TifTuf and Tifway in 2020.

Differences in growth suppression were detected among cultivars each year (Table 2). In 2020, imazapic reduced dry clipping weight by 37 to 56 percent across all cultivars compared with the untreated check. In 2021, dry clipping weight was reduced by 39 to 78 percent across all cultivars by 21 DAT; however, rebound growth occurred, with dry clipping weight measuring 64 to 122 percent of the untreated check by 28 DAT.

Dry clipping weight for all cultivars other than Tifway was ≥ 100 percent of the untreated check by 28 DAT in 2021. Similar to our turfgrass injury

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TABLE 2

Growth suppression of hybrid bermudagrass cultivars in 2020 and 2021 in Knoxville, TN, USA.

		Growth suppression[ii]				
Cultivar[i]	Year	3 DAT[iii]	10 DAT[iv]	14 DAT	21 DAT	28 DAT
Latitude 36	2020	52 a[v]	26 b	13 c	42 a	50 a
	2021	62 b	ND	15 c	75 b	109 a
Tahoma 31	2020	66 a	5 d	34 c	78 a	50 b
	2021	57 b	ND	19 c	76 b	122 a
TifTuf	2020	56 a	17 c	18 c	20 c	37 b
	2021	90 ab	ND	68 b	78 b	107 a
Tifway	2020	43 c	4 e	22 d	77 a	56 b
	2021	74 a	ND	ND	39 b	64 a

[i] Hybrid bermudagrass cultivars Latitude 36, Tahoma 31, TifTuf and Tifway are presented by each treatment and experimental year.

[ii] Growth suppression was determined by collecting and weighing clippings in each experimental unit. Data were used to calculate growth suppression as a percentage relative to the untreated control.

[iii] DAT = days after treatment.

[iv] No data (ND) for 10 DAT in 2021 are presented because extreme weather prevented clipping yield collections.

[v] Means with the same letter within each row are not significantly different according to Fisher's protected least significant difference (P < 0.05).

"Reductions in labor availability have challenged many turfgrass manager to meet the mowing requirements of bermudagrass on golf courses."

Continued from page 27

assessments, greater growth suppression in 2021 could be related to increased precipitation. Peak growth suppression following imazapic treatment occurred 10 to 14 DAT for all cultivars in both years, with the exception of Tifway in 2021.

Imazapic reduced hybrid bermudagrass dry clipping weight effectively for all cultivars each year. For example, at 10 DAT in 2020, dry clipping weights were 4 to 26 percent of the untreated check regardless of cultivar. In 2021, we saw similar reductions at 14 DAT for Latitude 36 and Tahoma 31. Growth suppression with imazapic in our study was comparable to that reported for other warm-season turfgrass species (18 and 19).

Imazapic (35 g/ha^{-1}) could be used to suppress hybrid bermudagrass growth on golf courses if commercially unacceptable (albeit transient) injury (> 30 percent) is tolerable for up to 28 days after the application. This is particularly important given that the species constitutes 32 percent of all maintained turfgrass hectares on golf courses.

Research Takeaways

- In 2020 and 2021, researchers at the University of Tennessee evaluated imazapic, a herbicide labeled for weed control in pastures, rangeland and non-crop areas for growth suppression of four hybrid bermudagrasses.
- Separate experiments on TifTuf, Tifway, Tahoma 31 and Latitude 36 hybrid bermudagrass.
- Normalized differential vegetation index (NDVI) data were collected, and growth suppression was quantified via reductions in dry clipping weight.
- Hybrid bermudagrass injury increased with imazapic rate for all cultivars, and peak injury (> 30 percent) following all imazapic treatments occurred within 14 days.
- At the lowest imazapic rate of 0.5 oz./acre (35 g/ha^{-1}), the injury was transient, with all hybrid bermudagrass cultivars fully recovered by 28 days.
- All rates of imazapic reduced hybrid bermudagrass dry clipping weight for 21 days on all cultivars.

Our study was limited because imazapic was applied singly to cultivars maintained at mowing heights less than 0.63 inches (≤ 1.6 cm) on a single soil type. Moreover, we did not directly compare the effects of imazapic to other PGRs used commercially in turfgrass, including trinexapac-ethyl, paclobutrazol, and flurprimidol. Future research to understand these limiting factors is warranted, given that turfgrass tolerance to imadazolinone herbicides can be affected by climatic zones (4).

Benjamin D. Pritchard, Gregory K. Breeden, and James T. Brosnan, Ph.D., University of Tennessee; Devon E. Carroll, Ph.D., Envu Turf & Ornamentals; and Tyler Q. Carr, Ph.D., Ohio State University.

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"Today, we have products ... that provide turf benefits not just from the targeted effect, but also plant health benefits."

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

Uncovering the true power of PGRs

A plant growth regulator (PGR) is an organic compound — natural or synthetic — that, when present or applied in small amounts results in a change in plant growth and development. These compounds, when produced by plants, regulate plant growth, reproduction, life expectancy and death and are known as phytohormones.

The five "classical" phytohormones are known as auxin, gibberellin (GA), ethylene, cytokinin and abscisic acid (ABA). The actual amounts needed to induce a change in growth, either to improve or restrict growth, require incredibly small amounts.

Charles Darwin and his son discovered the first phytohormone, auxin (known as indole-3-acetic acid [IAA]), in the 1880s. In a series of experiments with oat seedlings grown in the dark, the Darwins discovered that light could induce differential elongation in the plant to reorient shoot growth to optimize photosynthesis (phototropism). It wasn't for another 40 years that IAA was chemically isolated.

The phytohormone that I find of special interest is cytokinin. It influences plant growth and cell division but also leaf senescence. The common natural cytokinin found in plants is zeatin. I often see zeatin levels reported in turf studies as a measure of plant stress. Personally, my first exposure to cytokinin in turf came when I was working with the turfgrass disease anthracnose.

At the time, golf course fairways were predominantly annual bluegrass and often died in the summer. It was often quite devastating. The turf industry was embroiled in a controversy over whether the turf was dying due to the summer heat or whether something new and biological such as anthracnose was the culprit.

At turfgrass conferences around the country, golf course sessions saw turfgrass pathologists and agronomists with different views squaring off against each other.

For those special occasions when a preeminent matchup occurred between plant pathologists, the conference room would be packed, and nobody dared to sleep. What I learned from that time was to trust your data and develop a thick skin.

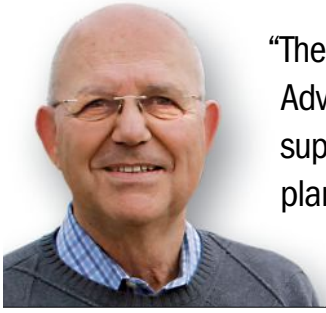
During this time, some field research studies observed that certain fungicide treatments resulted in healthy annual bluegrass through the summer. An impactful speaker presentation might show a slide with a healthy and green annual bluegrass plot where fungicide treatments had been made surrounded by untreated plots of dead annual bluegrass.

One of the first fungicides to show this effect was benomyl (Tersan, 1991). Benomyl was the first in the class of benzimidazole fungicides released in the late 1960s. It was a revolutionary fungicide, systemic in nature which was novel and broad spectrum. Some felt this was such an amazing product that the end of plant pathology as we knew it was near. Then within a few years, fungicidal resistance occurred with benomyl, which allowed plant pathologists to keep their jobs and triggered a new area of research.

Additionally, benomyl and benzimidazole fungicides were shown to have anti-senescence characteristics on various crops, like soybeans. In other words, benomyl had cytokinin-like properties that delayed the senescence of leaves. The theory at the time was that the applications of benomyl were slowing the leaves' senescence, causing them to remain green for a period. In actuality, benomyl controlled anthracnose and gave the additional benefit to the plant as an anti-aging agent.

Today, we have products including plant growth regulators, fungicides and supplements that provide turf benefits not just from the targeted effect, but also plant health benefits through cytokinin-like properties. As you attend conferences and read articles that address turfgrass health or summer stress tolerance, pay attention to what is measured — plant hormones — in these studies.

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



"The USGA Mike Davis Program for Advancing Golf Course Management supports various projects that evaluate plant growth regulators (PGRs)."

MIKE KENNA, PH.D., *Research Editor*

Diving deeper into the USGA's PGR research

The USGA Mike Davis Program for Advancing Golf Course Management supports various projects that evaluate plant growth regulators (PGRs). The following is a summary of the results from three projects nearing completion.

SHADE AND WATER

Mike Richardson, Ph.D., University of Arkansas, James Brosnan, Ph.D., University of Tennessee, and Aaron Patton, Ph.D., Purdue University, are evaluating growth-degree-day-(GDD)-based applications on shade tolerance and daily light requirements of an ultradwarf bermudagrass putting green. They are also determining the effects of divalent cations in the spray solution on the efficacy of trinexapac-ethyl when applied to ultradwarf bermudagrass.

PGRs are commonly used on putting green turf to enhance performance and reduce the turf's overall growth. In recent years, the application timing strategy has moved towards a GDD-based model compared to calendar-based applications.

The two-year field study was conducted at two locations in 2021 and repeated in 2022 to compare different PGR application timings (calendar versus GDD) under four differing shade levels. At both locations, calendar-based applications of Primo Maxx consistently produced higher quality under shaded conditions compared to a GDD application timing.

In 2023, the researchers looked at the effects of water quality on PGR efficacy. Trinexapac-ethyl (Primo Maxx) effectively suppressed the growth of Tifeagle bermudagrass when mixed with various divalent cations.

None of the divalent cations caused a reduction in Primo Maxx efficacy.

TIMINGS AND RATES

Alec Kowalewski, Ph.D., and his staff at Oregon State University have been evaluating the addition of Proxy applied from October through February, along with traditional spring timing, to improve annual bluegrass seedhead suppression. They have also evaluated lower rates of Proxy applied with Primo during the summer to improve annual bluegrass seedhead suppression.

Results from 2022 and 2023 show that sequential applications of Proxy in January, February, March, April and May, totaling 25 fl. oz. per year (less than the annual max of 30 fl. oz. per year), provided the greatest suppression.

In all years, the timing of the first application of Proxy was later and was then followed by March, April and May applications, providing better seedhead suppression than treatments applied earlier combined with March, April and May applications.

Their research suggests that late winter Proxy applications combined with spring applications will provide the greatest seedhead suppression in the Pacific Northwest.

CORE CULTIVATION RECOVERY TIME

Chas Schmid, Ph.D., in collaboration with Emily Braithwaite, Brian McDonald and Alec Kowalewski, Ph.D., at Oregon State, evaluated the effect of PGRs on recovery from core cultivation.

The study began in March 2021, looking at the effect of trinexapac-ethyl and ethephon application timing on core cultivation recovery. They also evaluated the effect of gibberellic acid (GA3) on core cultivation recovery. In the three-year project, they found that ethephon (Proxy) applications reduced core cultivation recovery time in two out of three years.

The timing of trinexapac-ethyl (TE; Primo Maxx) had an inconsistent effect on cultivation recovery in the spring, but withholding TE applications within 200 GDD before cultivation generally decreased recovery time.

Trinexapac-ethyl and ethephon application in the fall had little effect on cultivation recovery. Gibberellic acid treatments cause excessive growth/scalping and should be avoided on annual bluegrass putting greens.

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

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"The stress to perform under pressure was evident — this was not the time for mistakes."

BENTON HODGES, *Owner, Mountain West Turf Technologies*

When tech goes wrong

In my previous columns, I've introduced the idea of turf tech and how it can maximize the efficiency of agronomy operations and improve the lives of superintendents. While both of these things are true, there is a caveat — tech will go wrong — and it will likely be at the worst time possible. Here's a personal story about when technology threw a wrench in the final plans of the season.

While the Mountain West region doesn't apply a ton of fungicides, the last spray on every superintendent's schedule is a preventative snow mold application. With snow coverage lasting for well over 100 days at times and a shortened growing season, this application is critical to prevent damaged grass that can last well into the summer.

I always felt like an athlete getting ready for a big game when it was time to spray snow mold. Our director and superintendent would check in on me like I was the QB for a playoff game. The spray operation had been my baby since we made the switch to GPS-guided spraying in my first few years at the course. I was the only one who had the entire playbook memorized.

It was Oct. 20th in Wyoming, and the forecast was shifting — winter weather was on the way … fast. My bosses mulled over the decision to spray or hold off. Would this snowstorm be the "one," or would it melt off by next week? There's a saying in mountaineering: "It's hard to be too early, but very easy to be too late."

I showed up with my mind right, prepared for two or three marathon spray days. We mixed up the initial tanks, and our two sprayers headed out to the practice facility. Everything was moving smoothly. I checked in with my co-sprayer, Mark, and confirmed his machine was working. However, as I finished my first fairway, I noticed my signal started dropping from RTK to GPS. *Sh*t.*

When picking up an RTK signal, our accuracy was sub-inch, but under a normal GPS signal, we were only able to achieve accuracy to multiple feet. That difference is a big deal in the world of fine turfgrass management. Thankfully, my sprayer picked up the superior RTK signal within minutes. No harm, no foul — until the signal dropped in the middle of a pass on the third fairway.

For the next eight hours, my eyes were glued to the signal indicator on my screen, and I made calls to my dealer as I sprayed.

Even with a new modem overnighted to our shop, the problem wasn't solved. Like most agronomy departments, we figured it out, and the snow mold spray was completed with only one reliable GPS sprayer while my machine did it the old-fashioned manual way. The root of the issue ended up causing months of trouble-shooting in the dealer shop. It was ultimately tied to cell phone carriers phasing out 3G towers across the nation. Once updated to a modem with a new carrier, the issue was solved.

This was nearly five years ago, and the technology was not completely understood by our dealer. Dealers are now dedicating staff to learning this new technology so they can better service this equipment.

This is not to dissuade anyone from trying turf tech, but rather paint an honest picture of the growing pains that come with it. By setting realistic expectations when incorporating technology, you will have a less frustrating time when things inevitably go wrong.

Remember, if all else fails, just unplug it for a few minutes and plug it back in.

Hodges started his career in the turfgrass industry as a researcher at Mississippi State University followed by nearly a decade at high-end golf clubs as an assistant superintendent in the Mountain West. He now focuses his efforts on helping golf courses leverage technology-driven solutions while maintaining a people-first mindset. Find him on X at @BPHTurf or LinkedIn.

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1

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2

1 G3 robotic mower

The G3 robotic mower from **GRAZE ROBOTICS** features a wide 60-inch mowing deck with three metal mulching blades that operate at 3,000 RPM. The mower also boasts an eight-hour runtime and is capable of mowing 1.6 acres per hour. Safety features include a 360-degree optical suite, computer vision technology to detect and avoid obstacles and advanced sensors that allow for mowing on varying terrains. Additionally, the mower comes with an app for real-time monitoring, adjustments and software updates.

GrazeMowing.com

2 Castlon fungicide

Castlon fungicide is a new fluoxastrobin from **ENVU** that can help golf course superintendents mitigate 26 turf and 22 landscape/ornamental diseases. According to the company, Castlon fungicide delivers superior performance on several of the most problematic diseases of turf including fairy ring, summer patch, brown patch, leaf spot and *Pythium*. Castlon's fungicide fluoxastrobin is a natural partner to the tebuconazole in Mirage Stressgard fungicide — meaning the two products can be tank-mixed for improved plant health benefits.

US.Envu.com

3 NutriRoot Granular

ARBORJET | ECOLOGEL launched NutriRoot Granular, a new iteration of its NutriRoot 2-2-3 liquid formulation. NutriRoot Granular 3-3-3 features a blend of nutrients, seaweed extract, humic acid, surfactants and humectants designed to increase root development and reduce moisture stress. It is ideal for new tree plantings and to fertilize new and existing shrubs, vegetables, annuals and perennials.

Arborjet.com

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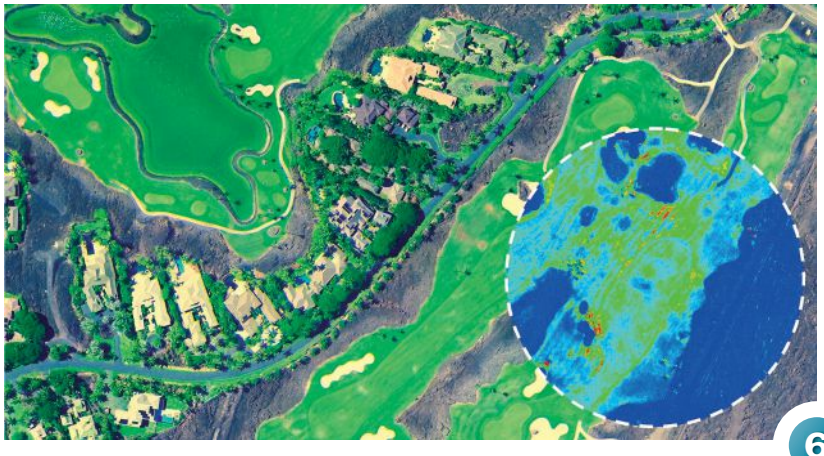

6

4 Aramaz Intrinsic brand fungicide

Aramax Intrinsic brand fungicide from **BASF** is a dual-active fungicide that delivers broad-spectrum control of 26 cool- and warm-season turf diseases, such as snow mold, large patch, brown patch and dollar spot on golf course fairways. According to the company, Aramax Intrinsic brand fungicide combines the strength of two powerful active ingredients, pyraclostrobin and triticonazole, for long-lasting residual disease control up to 28 days.

BASF.com

5 FM9380-F75 flow meter

The FM9380-F75 from **TEEJET TECHNOLOGIES** is a brand-new flow meter design. According to the company, the design contains no moving parts which means no service or maintenance requirements and has no risk of clogging. It works with any conducting fluid. The flow meter balances low-flow performance with the ability to handle high flow rates without pressure loss. It is unaffected by changes in fluid temperature, density, viscosity, concentration and electrical conductivity.

TeeJet.com

6 Mapware

With its aerial imaging technology, **MAPWARE** allows golf course superintendents to monitor turfgrass health, plan renovations, diagnose irrigation issues, and more, all without setting foot on the green. Mapware captures images of the course with high-resolution aerial imagery and 10-band multispectral that help superintendents catch problems early with plant health indices like NDVI and GNDVI. Aerial data capture can take as little as half an hour, minimizing disruption to players.

Mapware.com

The 19th Hole

Jeff White

CGCS // Indian Hills CC, Mission Hills, Kan.

Jeff, what can I get you? Titos, with a *psshht* of soda … and two limes.

Tell us about your course. Indian Hills CC is near downtown Kansas City. I've been there 13 years. It's an A.W. Tillinghast course. It turned 100 years old two years ago. It's a traditional parkland-style golf course with tree-lined fairways. Lots of trees and lots of bunkers. The membership is gracious; it's a great place to work.

Tell me about your family. My wife of 13 years, LeAnn, and I have two beautiful daughters, Maddie and Elle. Maddie just got married. Two dogs, Cyrus and Brodie. Cyrus used to be a golf course dog but then we got Brodie and they're inseparable. Family is a big deal for me. I can't do what I do without them.

You're the current president of GCSAA. You've had some great mentors … how did they motivate you to give back to the industry and run for the GCSAA board of directors? They all had a part. It wasn't until I lived near the headquarters that I made that connection. I was too busy working, playing golf and hanging out at West Coast Saloon. I had a lot of choices along the way, and they showed me that there's a way to be involved in something bigger than "I" — there's a lot of "we" in this industry.

West Coast Saloon is legendary in the golf world locally. It is. A lot of our joint friends in this world and in the publication world are frequent fliers. We should have done this interview at West Coast, with Bob watching with the towel over his shoulder!

Aside from three Super Bowl wins in the last five years, what's the best thing about being a Chiefs fan? It's awesome being a Chiefs fan. There's Arrowhead and the tailgating and the camaraderie — the city as a whole is a welcoming community. But there were a lot of rough years. I remember my first playoff game, row 48. I bought a Miller Lite and a hot chocolate, and both were frozen by the time I got to my seats. I remember all the missed kicks.

Who would be in your dream foursome? Me, my dad and my brothers. And it never got to happen, and it can't happen now because Dad isn't with us anymore. I have one brother in Atlanta, another in Ames. And we'd play someplace cool.

Give me a recommendation — it could be anything. I'm going to go old school on a TV show sitcom, and it goes back to family … *MASH*. I remember watching it with my folks. It was funny, but it also had a dark political side. If I'm going to goof off and watch TV, I'm going to watch something from back in the day.

As interviewed by Seth Jones, May 23, 2024.

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