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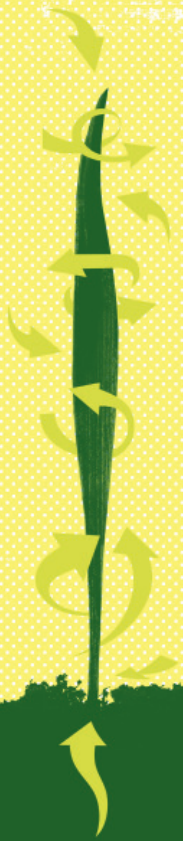

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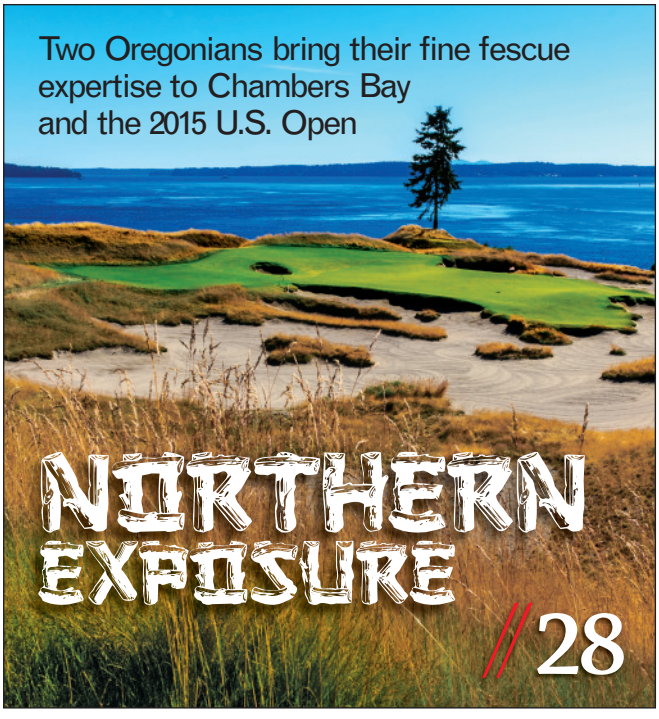

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"I've pushed, pulled, skulled and chunked a few more shots when Jeff comes out again: 'Seth, what would you think if, after meeting with the superintendent… you guys grabbed lunch with Tom Watson?'"

SETH JONES, *Editor-in-Chief*

Lunch with a legend

So there I am, having lunch with Tom Watson the Friday before the Masters. ¶ Wait, wait… let me back up. To quote Ron Burgundy, "that escalated quickly." ¶ I'm at my local driving range chatting with the owner, Jeff Burey. I told him I'm due for new clubs and I wanted to know where he wanted me to go to buy them. Because Jeff is the man, and he never leads me astray.

He told me I should go see his old friends at Kansas City-area golf course Wolf Creek, where he was the head pro for 20-plus years. He then did me one better and called and made me an appointment for the next day.

I walked out to the range and started hitting balls with my now on-borrowed-time clubs. I'm out there for a few minutes when Jeff reappears and says, "Seth, you know what would be neat? If you met the superintendent while you were there. He's a great guy, and they just did a really nice renovation on a few holes…"

Jeff is a fan of *Golfdom,* and like I said: he never leads me astray. Of course I'd like to meet the superintendent at Wolf Creek, I say. Jeff heads back in again and makes another phone call.

I've pushed, pulled, skulled and chunked a few more shots with these lousy, obsolete clubs when Jeff comes out again: "Seth, what would you think if, after meeting with the superintendent… you guys grabbed lunch with Tom Watson?"

"Jeff, you tell Mr. Watson that anytime he is available for lunch, I'm available."

I went back to hitting balls, why I don't know, because now my imagination is running wild about sharing a plate of cheesy fries with Kansas City's biggest golf hero. But there's no way this is going to work out, right?

I was driving home from lunch just two hours later when Todd Bohn, the superintendent at Wolf Creek, called to introduce himself and share the good news that, yes… after a tour of the course, Watson would be joining us for lunch.

Talk about 'escalating quickly.' Now I go into full-on panic mode and speed home. I disregard that afternoon's emails and phone calls and instead start brushing up on my Watson history. I grabbed my copy of "Caddy for Life: The Bruce Edwards Story" and started reading, as if I was going to reread the whole book over night.

Eventually I gave up on the book and decided sleep would be good. After all, it was going to be a big day: tour a golf course, fitting for clubs and lunch with a legend.

The details of the course tour are stashed away for now, but look for a story on what they did at Wolf Creek in a future issue (spoiler alert: Tom Watson will be quoted.)

The lunch with Watson and Bohn? A thrill and an honor. Watson was a normal guy, and it didn't take long for him to tell a few fun stories. There were no cheesy fries ordered, but he didn't seem rushed, and also took me to the new practice putting green to talk a little more business before heading on his way.

After I left Wolf Creek I called my friend Matt Neff, a regular columnist for the magazine, to give him the full story. Neff asked me what the experience was like. "Well, imagine grabbing lunch with a 65-year-old World Golf Hall of Famer a few days before he heads off to play in the Masters," I said. Neff shot back, "Yeah, because that's something anyone can just imagine!"

So, another fun story for my book.

Well, OK, the magazine. Because right now, the stories are coming so fast, the book is going to have to wait.

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NEWS, NOTES AND QUOTES

//SUPERS HELPING SUPERS

Dean Kerns, CGCS (center) sits on his Solo Rider with (L to R) Troy Martin, president of MVGCSA, Terrie Kerns, Dean's wife, and Mark Jordan, CGCS.

WEE ONE DONATES SOLO RIDER

BY GRANT B. GANNON // *Associate Editor*

Dean Kerns, CGCS, has spent 33 years at Arrowhead Golf Club in Minster, Ohio. When he was diagnosed recently with Amyotrophic Lateral Sclerosis (ALS), a progressive neurodegenerative disease, it was inevitable that he would have to retire from two things he loves.

However, a recent surprise gift from the Wee One Foundation will allow him to extend his career as a superintendent and a golfer.

Debbie Ahrns, the Minister High School girl's golf coach, made the Wee One Foundation aware of Kerns' condition. Ahrns and her team were trying to raise the money for a Solo Rider golf cart themselves but, as she says, how many car washes or bake sales would that take?

Ahrns contacted the Wee One Foundation, a group whose purpose is to help superintendents with overwhelming expenses because of medical hardship. Upon learning about Kerns, the foundation volunteered to pay nearly $10,000 for the specialized golf cart.

"I received Debbie's online application and it was logical that we needed to look further into Dean's situation," said Wee One Foundation President Rod Johnson, CGCS at Pine Hills CC in Sheboygan, Wis. "Usually our gifts to

Continued on page 9

//HIGH QUALITY H2O NEEDED

DROUGHT EMERGENCY EXTENDS INTO OREGON

The record low snowpack on the West Coast is affecting more states than just California. Gov. Kate Brown of Oregon has declared a drought emergency for five counties in the state.

"Oregon's unusually warm and dry winter has potentially dire consequences," Brown said in a release. "By enlisting the support of our state and federal partners, we will be best able to ensure the safety of the residents... as well as their livelihoods and property."

The affected areas are confined to the southeastern part of the state and include Baker, Malheur, Harney, Klamath and Lake counties. Although a majority of the state has avoided emergency status, 80 percent of Oregon is experiencing some degree of drought.

//TIP OF THE CAP

TWO TIE FOR MUSSER AWARD

The Musser International Turfgrass Foundation has selected Joseph Roberts, Ph.D., and Matthew Elmore, Ph.D., as its 2015 Award of Excellence winners.

The prestigious award is given to outstanding Ph.D. candidates who, in the final phase of their graduate studies, demonstrate overall excellence throughout their doctoral program in turfgrass research.

"We strive to select the one candidate that we feel is the best of the best. This year, we had a virtual tie, so we issued two awards," said Frank Dobie, president of the Musser International Turfgrass Foundation.

Elmore, assistant professor and Extension turfgrass specialist at Texas A&M, earned his Ph.D. from the University of Tennessee in plant, soils and insects, specializing in turfgrass weed control. Roberts, assistant professor of turfgrass pathology at the University of Maryland, received his Ph.D. from North Carolina State University in plant pathology, specializing in turfgrass pathology.

PHOTOS BY: GRANT B. GANNON / ISTOCK.COM/WELLGLAD (GOLF BALL)

//NEW INNOVATIONS

Syngenta launches two fungicides

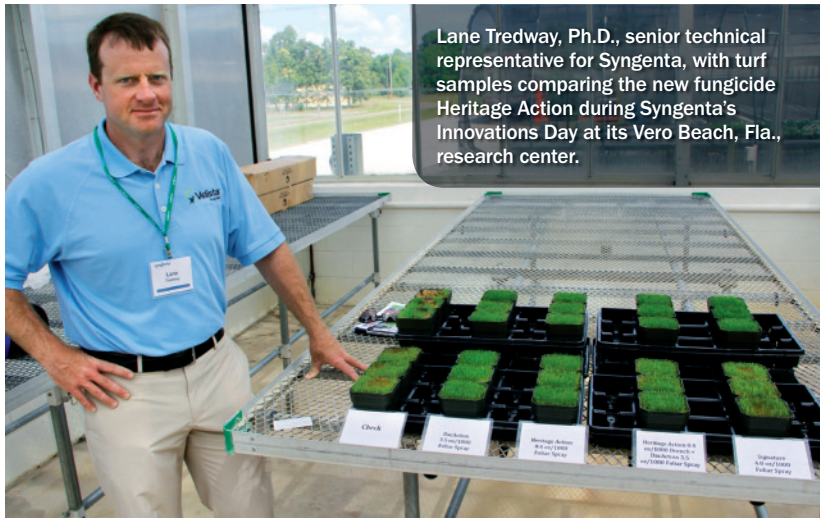
April 15th was a busy day. Taxes were due. It was National Golf Day. And at Syngenta's research center in Vero Beach, Fla., it was Innovations Day.

What that meant was the launch of two new fungicides, Appear and Heritage Action. Appear controls *Pythium* and anthracnose while improving turf quality. Heritage Action will enhance the control of abiotic and biotic stress. Results of the previously released Ference insecticide, for the control of Annual Bluegrass Weevil, were also discussed.

At the Vero Beach research facility, Appear was being tested on Celebration bermudagrass. Appear was showing a darker green color when compared to Signature, after just one application. Lane Tredway, Ph.D., senior technical representative for Syngenta, told the magazine that the improved color becomes even more pronounced after multiple applications.

"By the time you have made six or eight — and it's not unheard of for superintendents to make 10 applications of these types of products — you really see the improved color," Tredway said. "You really see the improved color by the time you get into the main stress in July and August."

For more information on Syngenta's Innovations Day, visit **Golfdom.com**.



Lane Tredway, Ph.D., senior technical representative for Syngenta, with turf samples comparing the new fungicide Heritage Action during Syngenta's Innovations Day at its Vero Beach, Fla., research center.

PHOTO BY: SETH JONES

Continued from page 8

families are used to pay medical bills, but we were excited that we could purchase equipment that will help extend Dean's career."

Kerns wasn't aware he would be receiving the Solo Rider until a surprise ceremony at Arrowhead GC's clubhouse on Masters' Sunday, surrounded by approximately 100 friends and club members.

When Kerns addressed the group gathered in his honor he thanked the members for allowing him to stay for so long and joked, "Now I'm going to have to learn to drive this thing so I don't rip up my own greens."

GO FIGURE

68.8

BILLIONS OF DOLLARS

The size of the direct economic impact of golf.

Source: We Are Golf coalition

//NEW GUY ALERT

BAYER ADDS NEW GREEN SOLUTIONS TEAM MEMBER

Environmental Science, a division of Bayer CropScience LP, added Zachary Reicher, Ph.D., to its Bayer Green Solutions Team.

Reicher brings more than 25 years of experience in the turfgrass industry to his new role. His focus as a part of the Green Solutions Team will be developing science-based solutions for customers managing cool-season turfgrass.

"It is an honor to join the Bayer Green Solutions Team," said Reicher. "I am eager to leverage my experience from many years in research and academia leading efforts to offer the best scientific solutions to support our business, customers and industry as a whole."

//THE CHILDREN ARE THE FUTURE

THE FIRST TEE INTRODUCES TEENS TO TURF

The next generation of superintendents is being inspired right now and The First Tee's 2015 Careers on Course, in partnership with John Deere, is helping the cause.

Teenage members of Greater Dallas, Des Moines, The Triangle (N.C.) and San Diego chapters of The First Tee will learn from superintendents at PGA Tour tournament courses about the work required to present a well-manicured, sustainable and playable course.

Two participants from each chapter will shadow a superintendent as their golf course is prepared for an official PGA Tour event, including the AT&T Byron Nelson Championship, the Principal Charity Classic, the SAS Championship and the Farmers Insurance Open.

Golfdom Gallery

1 Cheese, please (L to R) Brandon Haddock, E-Z-Go and Jeff Plotts, TPC Scottsdale, enjoy some wine and cheese — and say cheese — at the Landscapes Unlimited party in Augusta, Ga., during Masters week.

2 Old pals *Golfdom's* Seth Jones didn't wait to grab a photo with two of his favorite people in the game, Steve Mona, World Golf Foundation, and Rees Jones, ASGCA, at the GWAA annual dinner in Augusta.

3 How 'bout that Bulldog? These nifty bulldogs are used as the tee markers at the University of Georgia Golf Course in Athens, Ga.

4 Made in the shade (L to R) Andy Staples, ASGCA, Staples Golf; Bill Agler, Fayetteville (Ark.) CC; Jay Randolph, CGCS, Fianna Hills CC, Fort Smith, Ark.; and his brother Chris Randolph, CGCS, The Trails GC, Norman, Okla., enjoy a little shade from the big oak tree at Augusta National's clubhouse.

5 (Mostly) Jersey boys Enjoying a day at the Masters are (L to R) Lester Lombard, Grand Isle Club, Albany, Ga.; Lance Rogers, CGCS, Colonia (N.J.) CC; Mike Weber, Ash Brook GC, Scotch Plains, N.J.; "Mike the Pilot"; Jeremy Batz, Trump National GC, Colts Neck, N.J.; Jim Rattigan, Plant Food Co.; Rich Sweeney, CGCS, Plant Food Co.; and Anthony Ursino, Trump National GC, Colts Neck, N.J.

6 Bracket busters (L to R) Scott Griffith, University of Georgia GC, Athens, Ga.; Andrew Jorgensen, CGCS, On Top of the World Communities, Ocala, Fla.; Terry O'Leary, Southwind Golf Club, Fairburn, Ga.; and Corey Kimball, Nu Green by Corey, enjoy the 2015 NCAA Championship basketball game in Athens, Ga. Drinks were on Jorgensen — when Duke won it all, he won his NCAA bracket.

PHOTOS BY: BRANDON HADDOCK (2); SETH JONES (3-6)

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"If human resource management were a focus in turf school it would never fully prepare you for the complex issues that come up when you actually supervise people."

MARK WOODWARD, *Contributing Editor*

Turfgrass management is the easy part

As I read the March issue of *Golfdom* I noticed the interview with Assistant Superintendent Cameron Watt from British Columbia, Canada. Cameron was asked if there was anything that surprised him about the golf industry. He said that what surprised him most is the amount of people management.

This started me thinking about my biggest challenge in all the positons I've held over the 40-plus years I have been in the business. Interestingly enough, after a great deal of personal reflection I realized that Cameron and I have exactly the same answer.

I'm not sure of the current statistics, but at one point I think more than 92 percent of all superintendents had either a two-year or four-year degree in turfgrass management, and most of those also had some experience working on a golf course. So most people who progress from student to assistant to superintendent these days have fairly strong turfgrass management skills.

However, managing the different personalities a superintendent has to deal with poses many challenges that aren't fully addressed in turfgrass management school. Even if human resource management were more of a focus in school it would never fully prepare you for the complex issues that come up when you actually supervise and deal with people.

There's no question that at this point in my career, dealing with people issues is by far the most challenging aspect of my job. As we all know, there's a certain amount of talent and charisma one must possess in dealing with supervisors, boards of directors and golfers. But as we all learn fairly quickly in our supervisory/management positions, dealing with staff is a different animal.

I've had the opportunity to supervise many employees in the various positions I've held over the years. These have included professional positions, superintendents, golf professionals, clerical staff, administrative assistants, maintenance staff, golf starters, guest services staff, food/beverage staff, tennis staff, cemetery staff and professional baseball staff. I know Cameron Watt hasn't yet supervised this number of different positions in his young career. But I'm willing to bet that by the time he's my age the variety of positions he will have supervised will expand from what it is today as an assistant superintendent. Most superintendents I know who have been around the golf business for a while have continually taken on expanded roles at their golf facilities as they have progressed through their careers.

When you think about the variety of people you run into and the number of different personalities you have to manage, it's easy to see why this portion of our jobs is so challenging. Every one of these employees has a unique way of looking at their position. If you couple an employee's approach to their job with the vast number of issues they have with families, their attitudes, their different ages, different ethnic backgrounds, etc., it's easy to see why people management presents new and interesting issues to deal with every day.

None of these unique issues have anything to do with turfgrass management, but they are equally important because without a solid and talented staff, none of us would be successful in preparing our golf courses for our guests.

Take it a step further and factor in turnover, training of new and existing employees, progressively disciplining employees, the hiring process, terminating employees, human resource compliance requirements, and the list goes on and on. I can fully understand why Cameron names this aspect of the golf industry as the most surprising and challenging.

Like Cameron said, it almost makes managing turfgrass the easy part of our jobs.

Mark Woodward is a senior vice president for OB Sports, principal of Damarco Golf, president of Mark Woodward and Associates and a contributing editor for *Golfdom*. He can be reached at mwoodward@obsports.com.

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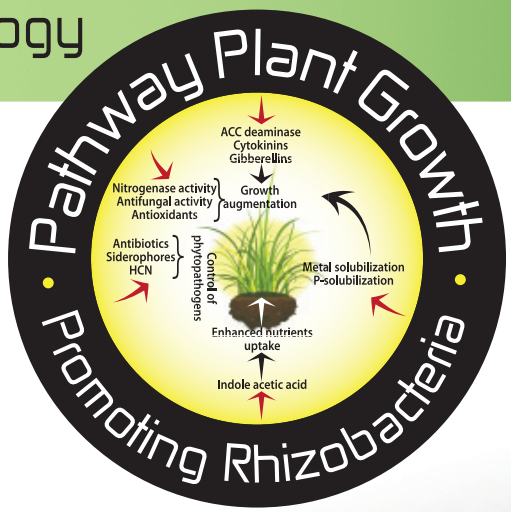

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"I was impressed with the club's vision, the members' support and Bentley's relentless attention to detail and his personal enthusiasm. The future of California is about water, and they are doing something."

JOEL JACKSON, *Senior Contributing Editor*

Back to the future

Last summer I wrote about the complex water regulatory system in California and since then Gov. Jerry Brown went to the mountaintop and discovered much to his surprise that he couldn't even build a snowman because of the skimpy snow pack! He came down from the mountains and ordered a 25-percent reduction in water use.

The governor may be surprised to learn that some water management districts had already surpassed that number and were at the 30-plus percentile level.

Since I was returning to California in April, I contacted Jeff Jensen, GCSAA's Southwest regional representative, to see if he could recommend a local superintendent I might visit to discuss the water issues facing golf courses. Jeff recommended that I contact J. Ryan Bentley, superintendent at the 27-hole, North Ranch Country Club in Thousand Oaks, Calif.

Bentley is engaged in a "turf reduction and landscape restoration" project that will remove around 40 acres of maintained turf from the 106 acres of rough, reducing water use 40-50 percent in those areas. Once the new plant material matures and the irrigation run times can be reduced, the club expects to see close to a 70-percent reduction of overall water use.

Bentley said, "The club realized that water conservation was the future of the club, and they began conservation planning for the past 10 years. They began with reducing potable water use by paying to hook up to a reclaimed water source. The only areas using potable water for irrigation are around the clubhouse and the practice tee."

But as the water crisis grew and more facilities were switching to reclaimed water, the cost has doubled in the past seven years. The club is now planning to install three wells to blend groundwater with the reclaimed water to moderate rising costs.

Every conservation action and project the club undertakes has to be reviewed and approved by three water authorities: the LA Water District, CAL Water — the club's primary purveyor — and MET Water, another regional authority. Bentley says they have been great partners in supporting their water use reduction plans. The club has applied for the MET Water District's Turf Rebate Program, which will help defray some of the up-front costs.

Bentley showed me "The Wall" in the clubhouse, where he posts the annual USGA Turf Advisory Service report, and schematics of each hole showing the color-coded areas that will be converted to naturalized areas. They are designated as "high, medium or low density," referring to the amount of plant material that will be installed. The low- to-medium-density areas are close to potential "in play" areas and the high-density plantings will be around tees and definite "out of play" areas. There are also photos and descriptions of all the plant material that will be used in the converted areas.

With the focus on water conservation, Bentley assigns one irrigation technician for each of the 9-hole courses. Each tech spends 40-50 hours per week monitoring moisture levels, scouting for hot spots, testing heads and controllers, hand watering, adjusting run times daily and watering newly installed landscape plants.

Beside the obvious turf-reduction areas, Bentley is also on a mission to restore the natural areas that neighbor the golf course by removing invasive trees and plants and replacing them with native plants.

Bentley said he is not alone in the effort to be part of the water conservation solution, "At the last Southern California GCSA chapter meeting, at least 10 other courses said they were also engaged in turf reduction projects. Several of them were not under demanding cut backs, but were doing the projects simply because 'it was the right thing to do.'"

I was impressed with the club's vision, the members' support and Bentley's relentless attention to detail and his personal enthusiasm for the projects. They get it! Bentley noted that work is under way in each region to develop BMPs for water use and conservation. The future of California is all about water, and they are doing something about it!

Joel Jackson, CGCS-Ret., is senior contributing editor for *Golfdom*. Email him at flrgn@aol.com.


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FROM THE ARCHIVE

Saving money. Everyone wants to do it on their course. ¶ In the July 1980 *Golf Business* (yes, we had a different name at that time and no, we don't like to talk about it), Jospeh Gambatese wrote about Billy Dillon and Charles Staples, former course pros turned course operators, and how they looked outside of golf for inspiration to save money. Dillon saw farmers using windmills to pump water from wells and Staples agreed to utilize this practice on the course. ¶ After a $3,000 investment on the windmill, Dillon and Staples were able to save on both the water and electric bills. The pair took the rundown course back to profit and then were asked to manage two more courses in the area because of their success. ¶ To read the rest of this article, including Dillon's "four essential elements in a successful course maintenance program," visit **golfdom.com/exclusive.**

Prince William windmill cuts electric, water bill

By Joseph Gambatese

Billy Dillon got the idea from farmers in Purcellville, Va., where he was golf professional at Loudon Golf & Country Club. Many of them irrigate their farm with water pumped from a well by a windmill.

Why not, Dillon thought, use the same method to water the public golf course he and Charles Staples had just leased in Nokesville, Va., some 40 miles from Washington? Staples' reaction: Why not?

That is why today, in its second year of operation, a 28-foot windmill over a well behind the 18th tee of Prince William Public Golf Course pumps as much as 15 gallons of water a minute through two four-inch pipes into two small storage lakes in front of the tee.

From these lakes, water is pumped 800 yards through another four-inch pipe to a larger lake, which comes to play as a hazard on the fourth, fifth and 13th holes.

A watering system from this lake is nearing completion. It now carries water to sprinkler heads on all 18 tees and 10 greens. The remaining eight greens will soon be tied into the system.

"The previous owners watered the course from the two small lakes," Staples recalled. "They barely provided enough water under normal weather conditions. During a recent drought, they went dry. The big lake had water but there was no way to use it. All the greens were lost. We don't want that to happen to us."

Staples was golf professional at the prestigious Aronimink Golf Club, near Philadelphia, site of the 1977 U.S. Amateur and 1962 PGA championships, when he and Dillon decided to go into business together. They had known each other when Staples was at International Town & C.C., Fairfax, Va., before going to Aronimink.

Leasing the golf course from Prince William County was their first venture. The previous owners, Greenwich C.C., were going through bankruptcy when the county bought the 150-acre property. The course was rundown, naturally, and needed a lot of work. Staples and Dillon have done such an impressive job of management that they have since been retained to manage two other northern Virginia courses, Evergreen, a private club 16 miles away, and Goose Creek, a public course another 16 miles beyond Evergreen.

Their first objective was to assure an adequate water supply needed to put and maintain the Prince William course in top condition. They got the 250-foot well dug for $1,500. They built concrete footings on which they mounted a 28-foot Dempster windmill with eight-foot wheel and tail, which cost another $1,500 and had to be assembled.

Besides providing adequate water, the windmill saves money in electrical as well as water bills.

"We don't have a program for watering," Staples says. "When and how much we water depends on the weather and the needs of the grass. If there is no rain, we might water every night, or every other night, or during the day to cool down the greens."

Once they had the water problem solved, their overall objective was one of keeping the golf course green and cut.

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PLANT HEALTH

PART 1 OF A 3-PART SERIES

Golfdom is proud to once again partner with BASF Professional Turf & Ornamentals to bring readers the 3-part Plant Health series. In part one of the series, award-winning writer Stacie Zinn Roberts talks to experts about what plant health means to them, and how they go about getting it in stressful climates like Tennessee, Florida and Indiana.

As we enter in the peak of golf season for much of the country, your friends at *Golfdom* and BASF wish you the best of plant health, and a successful 2015 season.

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Take the guesswork out of disease control

BY JEFF VANNOY

It's that time of year. Warmer temperatures arrive, kids head outdoors and families go on vacation. For superintendents, though, summer is rarely a vacation. You are getting the course ready for play, and you're worried about the effects of heat, humidity, mechanical stress and foot traffic on your turf. After all, the last thing you want to see is the first sign of disease.

So how do you get ahead of the problem? BASF has the answer. Our **Intrinsic brand fungicides** get to the very root of things, helping make turf healthier at the cellular level.

Here's how. Intrinsic brand fungicides inhibit mitochondrial respiration deep within the plant. In turf, this minor inhibition achieves two important goals: it kills fungi and strengthens every cell of the turf to help grass grow more efficiently. When mitochondrial respiration is inhibited, the resulting build-up of carbon in cells increases photosynthesis in turf. Higher carbon levels also result in more growth-producing nitrogen for larger, stronger roots. Your turf will have the power to control disease, withstand summer stress and grow more efficiently. And that's the meaning of true plant health.

This month, as you face the start of the summer season, we'll focus on disease control. Lexicon Intrinsic brand fungicide covers a very broad range of diseases — up to 27, in fact. That takes a lot of the guesswork out of protecting your greens from the array of diseases that can hit. **Lexicon Intrinsic** brand fungicide also helps with recovery from aeration, delivering playable greens faster.

To get started on protecting your turf, just follow the BASF Holiday Spray recommendation. Use Lexicon Intrinsic brand fungicide on greens and **Honor Intrinsic** or **Insignia SC Intrinsic** brand fungicides on fairways a week to two weeks before Memorial Day, July Fourth and Labor Day. And there are still more problem-solvers in our fungicide portfolio. For rapid curative and long-lasting protection from dollar spot, brown patch and other problem diseases, include **Xzemplar fungicide** in your spray schedule. It provides a solid 28 days of control of dollar spot.

In the year since its introduction, Lexicon Intrinsic brand fungicide has earned a reputation as the preeminent product for keeping greens healthy and resilient. Both Lexicon Intrinsic brand fungicide and Xzemplar fungicide are powered by **Xemium,** an innovative active ingredient that delivers the long-lasting, broad-spectrum control your turf needs.

John Jeffreys, superintendent of Pinehurst No. 2, understands the kind of pressure you face to keep your course in top condition. "Our goal is to deliver championship conditions for players, 365 days a year," he says.

"We know that any product that BASF comes out with has been thoroughly researched. Both (Lexicon and Honor) products have been foundation type products for us," he adds. In fact, all nine Pinehurst courses, bentgrass and Bermuda, are now protected by Lexicon Intrinsic brand fungicide.

John Jeffreys and his legendary course have lots of company. Superintendents around the country are reporting outstanding results from using the BASF line of fungicides. To defend your turf from disease this summer, follow the Holiday Spray Program with Intrinsic brand fungicides.

When it's summer conditions versus turf, we'll help your turf come out on top.

Jeff Vannoy is Senior Product Manager, BASF Professional Turf & Ornamentals.

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Always read and follow label directions.

A healthy plant wins the race

BY STACIE ZINN ROBERTS

When Joe Kennedy, CGCS, compares a healthy turf plant to a marathon runner, he knows what he's talking about. He's been the superintendent at Vanderbilt Legends Club in Franklin, Tenn., for 24 years, and he's run 13 marathons, including the New York City, Chicago and Boston Marathons.

"A marathon runner trains himself in more ways than just in the ability to run. You're able to withstand different stresses that are placed on you during that, and I can use that analogy with grass," Kennedy says. "If my grass is as healthy as I hope it can be than it's going to withstand a lot more stress than people give turf credit for. We've had that success over the years, and I don't attribute it to any one thing, but we've been able to withstand a lot hotter temperatures and a lot colder temperatures than you would have thought may be possible."

In that way, Kennedy defines plant health as more than just disease-free.

"It's the overall health of the plant, and I mean disease resistance, stress resistance, rooting depth, number of roots, things like that," he says. "Most of the time, if I do everything I should do, I would compare my turf to a marathon runner."

At Old Memorial Golf Club in Tampa, Fla., where Trent Inman, CGCS, has been superintendent for 12 years, the philosophy is similar.


Trent Inman

"Plant health to me is basically what I need to keep the plant alive and growing given the stresses that we apply," Inman says. "Most of the things that it takes to produce a good product on the course, i.e., low mowing heights, verticutting, aerification, judicious watering, etc., produce stress on turfgrass. Therefore, anything that will help keep the turf alive and healthy without being too succulent to me is extremely important, as playability is an underlying factor in most

PHOTO BY: ISTOCK.COM; NATALIE INMAN

No. 8 at Sycamore Hills GC

every decision that we make at our club.”

John Thompson, a superintendent for 19 years, the last three at Sycamore Hills Golf Club in Fort Wayne, Ind., agrees. “I think plant health is a combination of drought resistance, water management, how the plant looks and how it reacts to all of the stresses we put it under.”

Shuttling nutrients

To that end, the researchers at BASF developed a line of fungicide products that provide, “disease control that also offers optimum plant-growing efficiency and stress resilience,” says Brian Thompson, BASF’s strategic account manager.

It may seem counterintuitive to think of a line of fungicides as plant health products, but the new BASF Intrinsic franchise of products actually does just that. The line of fungicides includes products labeled for disease control and plant health under the brand names of Honor, Lexicon, Insignia, Pageant, Empress and Pillar.

Brian Thompson

These products not only fight disease, but help to make plants healthier by reducing the plant’s nighttime respiration rates, according to Thompson. “If you can reduce the respiration rate at night then it consumes fewer carbohydrates. What the plant does is experiences a net increase in carbohydrates and shuttles those nutrients into the roots, making the roots stronger.”

Stronger roots and reduced energy loss leads to a healthier plant.

Continued on page 24

PHOTO BY: JIM MANDEVILLE / NICKLAUS DESIGN

PLANT HEALTH
PART 1

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Tournament time

Kennedy has seen this work firsthand at his course (which is owned by Vanderbilt University and serves as the golf team's home course), during his preparation to host the NCAA Women's Golf Championships.

"I did rely on BASF products to help me through that entire week-to-10-day period when I really couldn't be out there making the applications that I normally would. The turf was put under stress because they required the greens to be faster than they normally would (be)," Kennedy says. "Leading up to the tournament, we made applications with products we knew would last and hopefully make the grass disease free and healthy enough to withstand what you were going to put it through."

What Kennedy put it through was tournament conditions for better than a week. The tournament didn't get delayed or run long, but the members want to play the same course that the ladies experienced. "You've got several days after that everyone wants to play the course just the way it was," he says. "Including the same hole locations."

At Sycamore Hills, John Thompson had a similar experience last year hosting the Web.com finals.

"You put the greens under so much stress during tournaments," he says. "You start double cutting a week before the tournament actually even starts."

Thompson says he sprayed Xzemplar, a BASF fungicide that is a key component of Lexicon, two weeks before the tournament and then sprayed it a week in advance of the tournament. When an 11-inch rain completely flushed all the nutrients out of the greens, Thompson was relieved he had good plant health serving as a backup.

"If I hadn't sprayed it, the greens would not have held up as well as they did. We were even thinking that maybe we needed to fertilize after that much rain flushing the green system the way it did," he says. "(The greens) looked awesome. The agronomist and I are going, 'This is unbelievable how great they look.' And I attest that to the Xzemplar. I'm really glad I made that application, because I think that if I had used a product that didn't have the plant health in it, I don't think they would have."

Sycamore Hills' Thompson says the greens were pushed to their absolute limits. But they saw success because they were healthy enough to withstand the tournament stress that they were put under.

"We had green speeds close to 13 every day," he says. "They maxed out, but the players loved it."

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PHOTO BY: JIM MANDEVILLE / NICKLAUS DESIGN

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PLANT HEALTH
PART 1

PHOTO BY: JIM MANDEVILLE / NICKLAUS DESIGN

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Renovation recovery

After the tournament, Thompson began a bunker renovation project, sodding bunker faces sprayed with Honor, and 15 acres of bluegrass sod for the roughs treated with Lexicon. "They just popped," Thompson says.

As he finishes the last few holes under renovation before this years' tournament in September, he's again included the BASF Intrinsic line in his arsenal of tools to achieve optimum plant health.

"I have an acre and a half of bentgrass sod that's going on a fairway this spring and I actually sent some Lexicon to the sod grower," Thompson says. "He's going to spray it before we harvest it, for the roots."

Thompson did this, he says, because of a Michigan State study that tested the turgidity of sod. The stronger the root mass, the harder it was to pull apart.

"I've seen it firsthand. It's amazing that it works," he says. "With the big renovations we've been going under at Sycamore, anything I can do in the time frame to get the turf healthier for the tournament — I will use every trick of the trade to try to get it there."

Thompson says that although these products are fundamentally fungicides, it makes sense to, "harness the ancillary benefit of plant health to help a plant become more robust, more resilient in the face of stress. It's more or less a holistic approach," he says.

Job security

A facility doesn't need to be hosting a major tournament or undergoing a renovation for the course to benefit from plant health. Plant health can make the golf course look better every day, and also improve the golfer's experience.

"There's fewer inputs so there's less disruption to play in terms of watering, hand watering or other applications," Kennedy says. "Less frequent applications mean we're out there less working among the players. I like to say that things like that add to the enjoyment golfers get, but they don't know why. It looks better, we're out there less, they're having more fun, but they really don't even know. So, if you have a healthier plant, you do less to it and you don't interrupt play."

And a better playing golf course means a happier membership, which directly impacts a superintendent's career prospects.

"Obviously, for any of us, if our turf is not healthy our job is at risk," Kennedy says. "So anything we can do to help the plant be healthier — completely healthy, not just disease-free — is going to impact our job security.

"In general, plant health is the most important thing we do," Kennedy continues. "Without that we cannot do all the other things that are required by our members. If it's not healthy we can't make it roll 12 for long, or mow tight if it's not healthy. I just think it's key."

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NORTHERN EXPOSURE

BY SETH JONES

PHOTO: ©USGA/JOHN MUMMERT

Two Oregonians bring their fine fescue expertise to Chambers Bay and the 2015 U.S. Open — the first ever to be played in the Pacific Northwest.

Mike Davis, USGA Executive Director, and Darin Bevard, USGA Director of Championship Agronomy, are a day behind schedule. As the names suggest, they had to travel far (Far Hills, N.J.) to get to this place (University Place, Wash.) But they're through the travel delays and ready to do a walk-through of all 18 holes with Chambers Bay Director of Agronomy Eric Johnson and Superintendent Josh Lewis.

Before they can get started, Davis asks a good question: "How are we getting down there?"

All that's visible from the Chambers Bay parking lot is a small clubhouse and the entrance of a walking path. Step over to the patio and look around, and the view is intoxicating: 18 holes of links-style golf inside a 975-acre property neatly tucked along the coast of the Puget Sound.

To get to No. 1 tee? Either grow wings or catch a shuttle ride down the steep, winding slope. (Then say goodbye to the free ride — Chambers Bay, a public course, is walking-only.)

The bowl makes for an interesting 250-acre golf amphitheater. From most holes on the course the other 17 holes are visible, including the lone fir tree on No. 15. The Puget Sound makes for a fun backdrop, but don't forget the Olympic Mountains in the distance. And sound — imagine the roar of a birdie putt on No. 18 on Sunday — travels fast.

Not bad for a former sand and gravel pit.

Oregon State Beavers

The duo responsible for the conditions of this Robert Trent Jones II-designed gem, Johnson and Lewis, are two Oregon natives who have known each other for 15 years.

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// NORTHERN EXPOSURE

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Johnson wanted to manage baseball fields, but switched to golf courses back in the '90s because there were more jobs available. He went to Oregon State University and after graduation was hired as the assistant superintendent at Spyglass Hill GC in Pebble Beach, Calif.

They gave him a baptism by fire — he was notified on his first day that it was also the superintendent's last. After a month with no superintendent, he took over the position.

"(Lewis and Johnson) are both easy to talk to and most important they're very responsive to the needs (the USGA) has," Bevard says. "Their knowledge of maintaining fine fescue, as well as their backgrounds and past experience... they've been educating me while making sure things are taken care of."

Five years later Johnson moved to Bandon Dunes in Bandon, Ore., taking the job of renovation superintendent. It was there he first met the young Josh Lewis, at the time fresh out of high school. A golf nut, Lewis was working the courses at Bandon Dunes Golf Resort — including construction at Bandon Trails and grow-in at Old Macdonald — as a way to pay for his golf habit.

Lewis was compelled by his bosses to get his degree in turf. Like Johnson, he headed to Oregon State, and following that accepted the first assistant position at Pasatiempo GC in Santa Cruz, Calif.

Two years later, KemperSports, which manages both Bandon Dunes Resort and Chambers Bay, reunited Johnson and Lewis at Chambers Bay as the team to take on the 2015 U.S. Open. Now the two work in tandem, experts on fine fescue and maintaining turf in their home territory

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PHOTO BY: SETH JONES

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Darin Bevard, Eric Johnson, Josh Lewis and Mike Davis discuss course set-up during a walk-through in mid-March. "I make this comment virtually every year: the most important person at the U.S. Open is indeed the superintendents. They're the ones who make it happen on the golf course," Davis said.

Continued from page 30

of the Pacific Northwest.

The two have divided responsibilities by having Johnson take on most of the paperwork and meetings, while Lewis puts in most of his hours on the golf course.

"Josh is out there (on the course) twice as much as I am, because I'm doing all this stuff," Lewis says, pointing to the spreadsheet on his computer screen. "I'll go out and see all 18 every couple days, but mostly I just look at the hot spots. Josh basically keeps a pulse on things. It's been that way since we hired him back in the old days."

Rob Golembiewski, Ph.D., at Bayer Environmental Science, ran the turf program at Oregon State from 2008 to 2012. Knowing both Johnson and Lewis well, he says the U.S. Open couldn't be in better hands.

"I got to know Eric when he was at Bandon, and Josh, in some ways, has grown up on courses out there," Golembiewski says. "They both have their strengths and they complement each other very well. I don't think you could have a better dual set-up for a U.S. Open."

Fun with fine fescue

This U.S. Open has several firsts, among them: first U.S. Open in the Pacific Northwest; first new U.S. Open venue since the 1970s; first U.S. Open on fine fescue turf.

Turf types are only mildly interesting to the layperson, but the look and feel of Chambers Bay's fine fescue could become a major storyline in June.

"It's a real different feel, a grass that can provide a superior putting surface when it's maintained right," says Golembiewski, who has played the course several times. "It's also a grass that can be susceptible to wear, and you're not going to see the recovery you want to if it gets beat up pretty good."

Another first, this one for the USGA: it's Darin Bevard's first U.S. Open as the USGA's Director of Championship Agronomy. Previously he was the director of the Mid-Atlantic Region for the USGA Green Section. He says he isn't worried about the fine fescue's performance, but agrees that it will be a different process prepping the course for the best players in the world.

"We're used to talking about cutting heights of 1/10th of an inch for a *Poa* or a bentgrass. Here we'll be looking at cutting heights of 3/16ths, which is different from what we're used to," he says. "There's a little bit of a learning curve there, but Eric and Josh probably know as much about it as anyone."

PHOTO BY: SETH JONES

One thing Johnson and Lewis definitely don't know: What color this U.S. Open will be.

"Purely from a turf perspective the color of the golf course is going to be whatever the color of the golf course is," Lewis says. "We're not at all concerned about that. The weather is going to dictate how green we are or how brown we are. We are more concerned about the surface that we are providing. You don't play golf on a color. You play golf on a surface. Whatever the color that surface is, that's the color."

As fond of fine fescue as Lewis is, he hopes it doesn't take any of the spotlight.

"Hopefully when it's all said and done, we're having a conversation about the drama of the championship, and we're not talking a whole lot about grass," Lewis says. "We want to be the offensive linemen of the turf world."

The British U.S. Open?

There's been a lot of talk that this U.S. Open will play and look more like a British Open. Lewis, a 5-handicap, hopes that prediction holds true and the pros leave their 60-degree wedges at home.

"I would love to see somebody hit a putter from 50 yards off the green," Lewis says. "That would be the ultimate for me. That would tell me we have done our job."

Jay Blasi, the project architect for Chambers Bay, thinks this might be the widest U.S. Open ever. But that doesn't mean it's going to be easy.

Jay Blasi

"We've got fairways that are 50 yards wide. No. 13 is 103-yards wide in a certain spot. The unique aspect is, there are all these side boards/kicker slopes/undulations — they're there to be used," Blasi says. "To get your ball close to the hole, oftentimes the way to do that is to play away from the hole, and let the slope take you there."

Firm and fast is the key. If the wind gets involved, watch out. Blasi recalls the way Shinnecock played in 2004.

The British Open feel will be thanks to the sandy soil at the former sand and gravel mine. "We were so excited it was a sandy site," Blasi says. "Sand is like gold or oil to a golf architect."

The sandy soil is what allows Johnson and Lewis to keep the fine fescue firm with reasonable mowing heights. Currently they're mowing greens at .200", and Lewis doesn't expect to have to go below .170".

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PHOTO COURTESY: JAY BLASI

The lone fir tree on the course stands out on the 250-acre property.

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"The sandy soil is very free-draining, and it's a mild climate," Lewis says. "You have to have the right turf in the right spot. I tell the guys in the transition zone, or mid-Atlantic, wherever — those guys are my heroes. How they keep grass kicking in August in Tennessee, I don't know."

Everybody's U.S. Open

As the clock winds down and the U.S. Open nears, the area's excitement grows.

"You walk into any public area wearing a USGA golf shirt, and the people will stop you and tell you just how excited they are for the tournament to start," Bevard says.

Even eight weeks out it's not too soon to start bragging about the work of the superintendents involved. At the U.S. Open's media day in late April, Mike Davis did just that, mentioning Johnson and Lewis by name.

"I make this comment virtually every year: the most important person at the U.S. Open is indeed the superintendents," Davis told the assembled media. "They're the ones who make it happen on the golf course. And guys, you have been superb — you know your fescue grasses."

It helps to have a course so visually striking.

"(Chambers Bay) is unique. It offers a lot of different ways to set up the golf course to provide a challenge to the players," Bevard says. "But I also think the setting on the Puget Sound, as well as the dramatic appearance of the property... aesthetically, it's going to be spectacular."

Lewis says that hosting a major has always been on his "professional bucket list." But he also thinks this U.S. Open is just as important to his many colleagues in the area.

"I was up in Canada last week doing a talk, and the guys in Western Canada are so excited about this," he says. "It spans from Washington, Oregon, into Idaho, British Columbia, even the guys in Alberta. This is not just ours, it's everybody's up here."

Johnson, who has a quiet demeanor, allows that the 2015 U.S. Open is "exciting to a degree, especially for guys like me from the Pacific Northwest," but says he doesn't want to get carried away in the hyperbole.

"I want to keep it as low-key as possible and keep it in perspective," he says. "Let's get through this, get it done. The ultimate reward would be having it come back."

PHOTO: ©USGA/JOHN MUMMERT

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

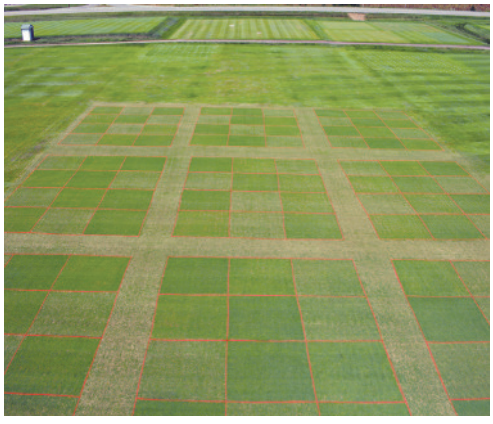
Super Science

// FOCUS ON FAIRWAYS

IMPACT OF IRRIGATION REGIME AND HOST CULTIVAR ON DOLLAR SPOT OF CREEPING BENTGRASS

By Nancy Dykema

Dollar spot, caused by *Sclerotinia homoeocarpa,* is an important disease of turfgrass. Irrigation practices and host resistance can impact disease incidence and aesthetics on fairway turfgrass. This study was conducted to determine the impact of irrigation regime, based on timing and frequency, as well as creeping bentgrass cultivar, on dollar spot incidence in creeping bentgrass turf managed as a fairway. Irrigation was applied at either 10 p.m. daily or twice weekly, or 5 a.m. daily, on fairway plots established to each of three creeping bentgrass cultivars; Declaration, Flagstick and L-93. Total weekly irrigation volume was approximately the same among all treatments.



Aerial photograph showing irrigation blocks (large plots) and cultivar subplots within irrigation plots treated as follows (from center column, top to bottom): 5 a.m. daily (top center), 10 p.m. twice weekly (middle center), 10 p.m. daily (bottom center).

Declaration and Flagstick were considered resistant to dollar spot and L-93 was considered susceptible. Plots watered at 10 p.m. daily exhibited significantly less disease than those irrigated at 10 p.m. twice weekly, regardless of creeping bentgrass cultivar. Flagstick developed the least amount of dollar spot each year among all cultivars. In 2011 and 2013, the Flagstick plots receiving daily irrigation (a.m. or p.m.) did not significantly differ and exhibited less dollar spot than those irrigated at 10 p.m. twice weekly for the same cultivar.

These data indicate that daily watering decreases the amount of dollar spot infection in creeping bentgrass fairway turf compared to twice-weekly watering.

Nancy Dykema, Joe Vargas, Ph.D., Kevin Frank, Ph.D., and William Kirk, Ph.D., Michigan State University. Nancy Dykema can be reached at dykema@msu.edu for more information.

PHOTO BY: PAUL GIORDANO

NEWS UPDATES

RISE DELIVERS POLLINATOR PETITION TO WHITE HOUSE COUNCIL

RISE (Responsible Industry for a Sound Environment) delivered its pollinator petition to the White House Council on Environmental Quality. The petition emphasizes an array of factors affecting bee health and calls for President Obama to protect pollinators by creating more habitat and forage areas. It also asks him to consider all sources of information on and contributors to the pollinator health issue.

"Our petition shows President Obama that citizens want a balanced and substantive conversation to happen on the pollinator health issue," says Aaron Hobbs, RISE president. "The pollinator issue is very complex and research points to multiple factors affecting pollinators, including pests and parasites, microbial diseases, nutrition problems, bee management practices and climate change."

RISE, a national association representing the manufacturers, formulators, distributors and other industry leaders involved with pesticide and fertilizer products, gathered nearly 600 signatures on its petition.

"We do applaud the White House for including in its Presidential Memorandum about pollinators a focus on more research, developing a public education plan and seeking ways to increase and improve pollinator habitat," said Hobbs. "However, in order to have a meaningful contribution to pollinator health, balanced conversations need to continue."

"WHEN LIGHT PASSES THROUGH A TREE... MUCH OF THE LIGHT THAT REACHES THE TURF WILL NOT (BE) AVAILABLE TO PLANTS FOR PHOTOSYNTHESIS."

Mike Richardson, Ph.D.

(see full story on page 36)

//SHADY SITUATIONS

Daily light integration—a new way to document shade issues

By Mike Richardson, Ph.D. and Jason Kruse, Ph.D.

It has been estimated that more than 25 percent of all turfgrasses are exposed to some level of shade, with shade being produced by a variety of sources, including trees, hardscape structures and buildings. There are a number of factors that will contribute to whether a turfgrass can thrive in a shaded environment, including the species and cultivar planted, management practices that can be modified to enhance shade tolerance, and the presence or absence of other stress factors such as drought or traffic. Of the turfgrass species that are used worldwide, cool-season grasses such as tall fescue, Kentucky bluegrass and the fineleaf fescues are the most shade-tolerant grasses that we have available to us. For warm-season grasses, St. Augustinegrass and centipedegrass are adequately adapted to shaded environments, but are generally restricted to landscape turfgrass situations. The warm-season grasses, bermudagrass and zoysiagrass, are more widely adapted to a range of environments such as landscapes, athletic fields and golf courses. While zoysiagrass is relatively well-adapted to low light conditions, bermudagrass has very poor shade tolerance and will not survive in very low light conditions.

We often get questions from turfgrass managers related to shade, such as "is this site too shaded for a warm-season grass like bermudagrass" or "how much light does bermudagrass need?" Unfortunately, these are not always easy questions to answer because there are so many variables involved in shade tolerance and it can be difficult to quantify how much shade you actually have at your site. Fortunately, some of these answers are starting to become clear through research and there are also tools now available to turfgrass managers that will allow you to measure how much shade a site is actually receiving.

FIGURE 1

A putting green growing in a shaded environment where lack of sunlight may limit turfgrass performance.

In relation to the first question regarding "is this site too shaded," we need to be able to measure how much light the site is getting. Measuring light in an appropriate manner is one of the most important aspects of determining how much light is actually available to a turfgrass stand. When solar radiation passes through the atmosphere and strikes the earth, your skin, or a plant, it has a very broad range of radiation types (Figure 2). Some of the wavelengths are very short and have high energy like ultraviolet radiation, which can burn your skin if you get too much of it. Some of the light is made up of longer wavelengths that have lower energy and can include infrared waves. Infrared radiation can affect plants and is often used to signal changes in development such as flower production or seed germination. However, the most important radiation that comes from the sun in relation to plant growth is that radiation that is in the "visible" spectrum of light (400-700 nm) and will show up as one of the colors of the rainbow (red, orange, yellow, green, blue, indigo, and violet — i.e. ROY G BIV). When light passes through a tree or is blocked by a building, much of the light that ultimately reaches the turf will be in a longer wavelength and not available to plants for photosynthesis.

There are a number of types of meters available to measure light, but in order to get an accurate measurement of the light that is important for plant growth, you need to use a meter that only measures photosynthetically active radiation, or what is commonly referred to as PAR light (400-700 nm). In recent years, this technology has

PHOTOS BY: MIKE RICHARDSON

become more affordable and there are a number of different options that you can use to accurately measure PAR light (Table 1).

The first thing that you need to be aware of is that PAR light is measured in units of µmol/m²/sec. So, when you measure PAR light, you are only getting an instantaneous measure for that second. In order to really use the measurement that you get with a light meter, it is important to convert your measurements into a total light load per day or something that is commonly referred to as Daily Light Integral or DLI. Although there are some devices that will do this for you, such as the DLI meter listed in Table 1, with other devices you will need to make some simple calculations to get the total light load for a single day. For example, if you were using a hand-held meter and measuring the light once per hour during the day you could estimate the light load for each hour as following:

Meter Reading **(µmol/m²/sec) x (60 sec/min) x (60 min/hour) = µmol/m²/hour**

If you take a reading once each hour during the day, you can do the same calculation with each reading and then sum all the readings for the day to get a total light load. The final number will be divided by 1,000,000 to convert µmol/m²/day into mol/m²/day, which is the total light load at the site or the DLI. An example of this type of measurement and calculation is given in Table 2.

QUESTION—HOW MUCH LIGHT DOES BERMUDAGRASS OR OTHER WARM-SEASON GRASSES NEED?

There have been a few published studies to date that have actually calculated the DLI requirements for warm-season grasses, and more studies are ongoing both at the University of

Continued on page 38

FIGURE 2

The spectrum of light that strikes the earth's surface.

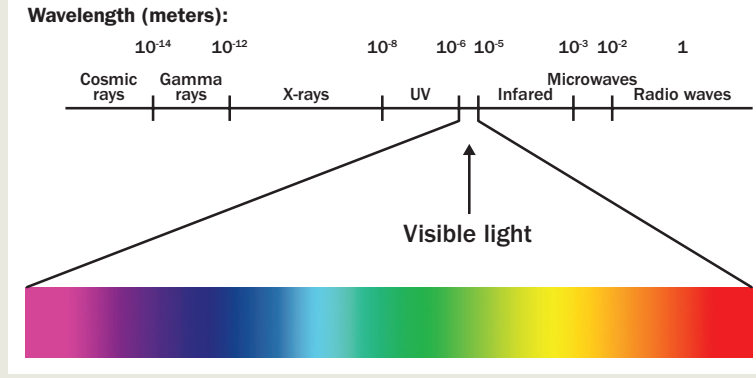


TABLE 1

Devices available to measure PAR light and calculate daily light integrals.

Hand-held Quantum Sensor (~$200) – this meter is very affordable and can be used to measure PAR light in any environment. It should always be positioned so that the sensor, which is in the dome on top, is pointed straight up. This will give a more accurate reading of the actual light striking the surface. The reading is an instantaneous reading of PAR and is recorded as µmol/m²/sec.	
Mini-weather station with PAR sensor (~$600) – this system has the same technology as the hand-held sensor, but it also has data logging capabilities that allow it to measure and record the light values as frequently as every minute. When this system is put into place, it will record light striking the turf over a full day (or several days) and allow a total light load to be calculated easily from the data.	
Daily light integration meter ($60 for 1; $170 for 3) – this device has a PAR sensor located in the top of the instrument and it can be placed in a turf setting easily by inserting the probe into the soil. This device measures PAR for a 24-hour period and calculates the total light load striking the surface over a 24-hour period. Although this device is the simplest to use, the one deficiency is that it is more difficult to get a very accurate measurement of daily light integration – it will be an approximation but is likely accurate enough to get a good estimate of the DLI.	

TABLE 2

Calculating the total light load at a specific site with the hand-held light meter.

Time	Column B Actual measurement	Column C PAR Light per minute	Column D PAR light per hour	Column E PAR light per hour (mol)
	µmol/m²/sec	Multiply Col B by 60 µmol/m²/min	Multiply Col C by 60 µmol/m²/hour	Divide Col D by 1,000,000 mol/m²/hour
6:30 AM	200	12000	720000	0.72
7:30 AM	450	27000	1620000	1.62
8:30 AM	700	42000	2520000	2.52
9:30 AM	1000	60000	3600000	3.60
10:30 AM	1200	72000	4320000	4.32
11:30 AM	1600	96000	5760000	5.76
12:30 PM	1800	108000	6480000	6.48
1:30 PM	1600	96000	5760000	5.76
2:30 PM	1200	72000	4320000	4.32
3:30 PM	1000	60000	3600000	3.60
4:30 PM	700	42000	2520000	2.52
5:30 PM	450	27000	1620000	1.62
6:30 PM	200	12000	720000	0.72
7:30 PM	100	6000	360000	0.36
		Total light load for the day (sum all in Col E)		**43.92**

Continued from page 37

Arkansas and the University of Florida and elsewhere. In a recent study at Florida (Glenn, 2012) the minimum light requirement for several grasses was calculated across two growing seasons (Table 3). In that study, more light was needed in the summer season than in spring and fall, but two of the bermudagrass varieties (Celebration and Tifgrand) needed less light to maintain acceptable quality than Tifway. You can also see from these results that grasses such as centipede, St. Augustine and zoysiagrass all had lower DLI requirements than bermudagrass. Remember, a lower DLI means better shade tolerance.

In a study conducted at Clemson University on a Tifeagle putting green (Bunnell, 2005), determined that this type of bermudagrass needed a daily light load of 32.6 mol/m²/day to sustain turfgrass quality. The differences between the Florida and Clemson studies are primarily due to intensity of

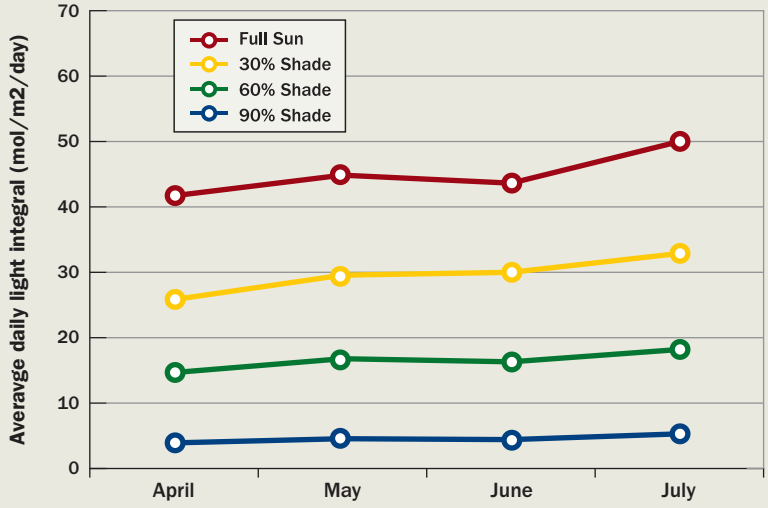
TABLE 3

Minimum light required (DLI) to maintain acceptable quality in several warm-season turfgrasses (Glen et al., 2012).

Cultivar and species	Spring/Fall	Summer
	mol/m²/day	
'Tifway' hybrid bermudagrass	18.6	22.4
'Celebration' common bermudagrass	15.7	19.5
'Tifgrand' hybrid bermudagrass	15.4	18.6
'Tifblair' centipedegrass	14.7	13.5
'Floratam' St. Augustinegrass	11.6	11.8
'Palisades' zoysiagrass (*japonica*)	11.3	11.3
'Diamond' zoysiagrass (*matrella*)	11.1	11.3

FIGURE 3

Average daily light integrals for four shade treatments imposed on a bermudagrass trial in the spring of 2014.



management and clearly demonstrate that management practices such as mowing height will play an important role in how much light bermudagrass needs to be maintained in a shaded environment. It also points out that mowing heights should be raised in shaded environments to reduce the light requirement of the grass.

In an ongoing study at the University of Arkansas, we are looking at the performance of overseeded and non-overseeded bermudagrass in an athletic field environment in which we have four levels of shade including full sun, 30 percent shade, 60 percent shade and 90 percent shade. In Figure 3, you can see the average DLI for the 4 different light levels over 4 months in 2014. The performance of the bermudagrass in the 60 percent and especially the 90 percent shade treatments declined rapidly, as the DLI in those treatments was approximately 15 mol/day in the 60 percent treatment and 5 mol/day in the 90 percent treatment. The overseeded perennial ryegrass, which is a cool-season grass, continues to perform well in the 60 percent shade treatment and would have a lower DLI requirement than the bermudagrass. Based on these results and those from Florida, we would currently recommend a minimum DLI of 20-25 mol/m^2/day to adequately maintain bermudagrass in a turf setting where the mowing height is 1 inch or higher.

Although research is beginning to quantify how much light is needed to sustain turfgrass species under varying management practices, more effort is needed to confidently apply these results to a range of turfgrass applications. However, even with the limited data that are currently available to turfgrass managers, understanding how to accurately measure the light received at a specific site is the first step in applying these results to management decisions.

Mike Richardson, Ph.D., is a professor of turfgrass science at the University of Arkansas. Jason Kruse, Ph.D., is an assistant professor of turfgrass science at the University of Florida.

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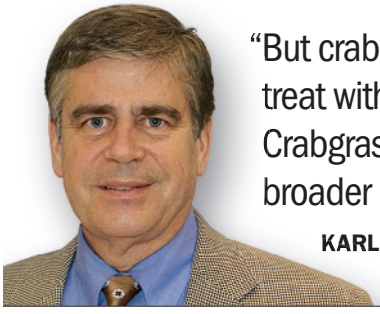
Glenn, B., J. Kruse, and J. B. Unruh. 2012. Daily light integral requirements for twelve warm-season turfgrasses. Int. Ann. Meet. p. 72111.

Bunnell, B. T., L. B. McCarty, J. E. Faust, W. C. Bridges, N. C. Rajapakse, and W. C. Bridges. 2005. Quantifying a daily light integral requirement



"But crabgrass is more than a weed we treat with a pre-emergent herbicide. Crabgrass has taken on a much broader meaning in our society."

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

Hanging out with crabgrass

Crabgrass is a ubiquitous weed of turf. Germination starts in January or February in the southern United States and it appears throughout the northern areas in spring as temperatures warm. But crabgrass is more than a weed we treat with a pre-emergent herbicide. Crabgrass has taken on a much broader meaning in our society.

Crabgrass has become synonymous with the suburban experience. Scholars have written books like "Crabgrass Frontier" to describe the history of the American suburban experience. Crabgrass, especially this time of the year, becomes fodder for comedians and superintendents. One of my favorite crabgrass jokes is "Work may be the crabgrass of life, but money is still the water that keeps it green" (source: jokebuddha.com.)

Although crabgrass has few redeeming characteristics, it has practical use as a summer forage and hay crop. The first cut of crabgrass sometimes yields more than 15 percent crude protein and 60 percent total digestible nutrients, according to the University of Florida Extension. But I find crabgrass fascinating not because of some large societal meaning, or as a joke, but as a plant that exhibits some really cool ecological aspects in its growth and development.

Crabgrass is an annual summer weed whose life span is pretty short. Its life's race begins at germination, followed by growth and development to where it produces seed just prior to crossing the finish line — better known as death at the first fall frost.

Crabgrass faces several obstacles on its short life journey and it grows well in environments that are unpredictable or ephemeral. These environments are characterized by a short period of favorable conditions followed by unfavorable conditions.

Crabgrass germination occurs in a short period when spring soil temperatures rise above 55 degrees with moisture present. It needs an open or exposed area or thinning turf to flourish and grow. Crabgrass doesn't like competition from other plants. Competing with turfgrass plants diverts some of its energy from the goal of completing its life cycle as fast as possible.

Crabgrass, like warm-season turfgrasses, are C4 plants that need high light intensities to flourish. A dense, high-cut turf shades the crabgrass plants, slowing their growth rate. When the growth rate of crabgrass or any weed decreases in the presence of competition, it's called "density-dependent growth." The best non-chemical control of crabgrass involves maintaining a dense turf mowed at an optimum height of cut.

Picture an area of bare soil where crabgrass has just germinated and the little plants are just beginning to grow. Looking closely, there seem to be hundreds of these crabgrass plants crowding in and giving the appearance of a uniform turf cover, almost like a carpet. Come back to the same place a few months later and you'd notice that the area still looks like full cover, but now many of those little plants are gone, replaced with fewer larger crabgrass plants. Why? A couple of things could have occurred. Germinating crabgrass seedlings do not suffer much mortality, especially in a habitat with little competition, but do suffer mortality if the habitat changes rapidly, as in a severe drought. More likely, however, the crabgrass plants as they grow and develop come into contact with each other and begin to compete for nutrients, light, moisture and space. This competition leads to winners and losers. The losers die to make room for continued growth of the winners.

As the crabgrass is approaching its end, this single small germinating plant of just a few months ago is now capable of producing 150 to 700 tillers and 150,000 seeds (*Digitaria sanguinalis.*) So the next time you hear a joke like "Your grades aren't good enough for an Ivy League school. Have you considered crabgrass?" remember what a difficult and short life it has.

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

Suppressing annual bluegrass in fairways with plant growth regulators

Cale Bigelow, Ph.D., is a turfgrass scientist at Purdue University. He has conducted numerous studies on annual bluegrass control with plant growth regulators and cultural practices. Cale can be reached at cbigelow@purdue.edu for more information.

Q Briefly outline the application program of plant growth regulators (PGRs) for creeping bentgrass fairways in the Midwest.

We suggest using products that contain either Trimmit (paclobutrazol) or Cutless (flurprimidol) applied at the medium or high label rate every 21 days from mid-May to early October. Applications before mid-May or after early-October will sometimes discolor the turf. With this program we have had success in reducing annual bluegrass populations from 30 percent in spring of the first year to 5 percent in spring of the following year.

The good thing about these application programs is that annual bluegrass gradually fades out, the creeping bentgrass fills in and there are no bare spots.

An added benefit of any PGR program is the reduction in leaf growth, which helps with clipping management and provides flexibility during those difficult to mow, rainy periods.

If budgets are tight, an alternative would be to apply either Trimmit or Cutless as above, but only from late August to early October, when annual bluegrass seed is germinating. There will still be a reduction in the annual bluegrass population, just not as great as when applied all season long.

Q How long should a superintendent stay on the PGR program?

There is no single answer to this question. Much depends on the size of the annual bluegrass seed bank in the soil. On older golf courses with a well-developed seed bank, or on courses with a substantial annual bluegrass population or both, follow the program every year.

Q What are the similarities and differences between Trimmit and Cutless?

Both are effective PGRs, both are root absorbed and both need to be watered in after application. About the only difference is that in some years in some experiments, Trimmit may provide slightly — 2 percent to 5 percent — more reduction in annual bluegrass populations than Cutless. On the other hand, Cutless is less likely to discolor bentgrass than Trimmit and often is reported to cause less discoloration of cool-season rough surrounds where overspray occurs.

Q What cultural practices do you recommend in conjunction with the PGR program to control annual bluegrass?

Roch Gaussion and Bruce Branham's research showing that removing clippings helps reduces annual bluegrass populations, especially during spring seedhead production, still stands.

Cultivation to relieve soil compaction is a must. While there are as many cultivation programs as there are superintendents, some superintendents are deep-tine aerifying with solid tines in mid to late fall. Aerifying at this time upsets fewer golfers, and not pulling cores leaves the annual bluegrass seed buried in the soil.

Gaussion also showed that high annual nitrogen rates can promote annual bluegrass. If you want to use lower annual nitrogen rates, consider a spoon-feeding program. On an established fairway with reasonable soil organic matter (not thatch), apply 0.2 lbs. nitrogen per 1,000 sq. ft. every two weeks per month of the growing season. You can add soluble nitrogen in combination with your other spray applications.

Applying a preemergent herbicide in late August to control germinating annual bluegrass seed also is an option, but realize this may interfere with overseeding/interseeding practices.

Q Anything else you would like to add?

Develop a realistic plan for annual bluegrass suppression, stick with it for several years and carefully evaluate the results at the same time each year before trying something else. Remember that annual bluegrass and creeping bentgrass populations in mixed stands will ebb and flow seasonally. Be cautious jumping on the latest control idea or product bandwagon. While you should fine-tune the plan, don't make changes to your program every time you read a new idea or someone tells you what great success the superintendent down the road is having with their program. Lastly, remember annual bluegrass is a tenacious and adaptable plant, and "100 percent control" forever is unrealistic. The best we can expect is suppression.

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

Professional Grade

NEW PRODUCT HIGHLIGHTS // **WETTING AGENTS, PLANT NUTRITION AND HEAVY EQUIPMENT**

A FITNESS INFOMERCIAL FOR YOUR TURF

THE FOLLOWING IS A MESSAGE BROUGHT TO YOU BY THE FOLKS AT *GOLFDOM,* EST. 1927

By Grant B. Gannon // *Associate Editor*

DO YOU NEED HELP GETTING YOUR course in shape and ready for the upcoming summer season? Well, *Golfdom* wants to PUMP (clap) YOU UP!

Are you supplying the proper amount of water to your grass but it refuses to soak it in? We have wetting agents.

Want your course to look like some kind of Hulk/baseball player hybrid? Beef it up with a plant nutrition product.

Have a big project but your puny human arms can't lift hundreds of pounds? We provide some options for heavy lifting .

1. OARS HS & PS

AQUA-AID, INC. offers the wetting agents OARS Penetrating branched surfactant (PS) and OARS Hydration branched surfactant (HS). Both are listed as organic acid removal re-distributing polyfunctional branched patented surfactant technologies and represent a different surfactant strategy for turf. Its shedding of its branch surfactants allows OARS PS and OARS HS branched surfactants to compensate for biological degradation and provide significantly more uniformity and longer lasting performance in the soil. Providing wetting and re-wetting achieves a firm-playing surface with less water applied.

Aquaaid.com

2. Quelant-Minors

Quelant-Minors from **MACRO-SORB** is formulated to deliver a balanced complement of secondary nutrients and micronutrients directly to the turf plant foliage where it can be absorbed and moved to its consumption points. Combined with these nutrients is Macro-Sorb's amino acid technology to promote correction and prevent micronutrient deficiencies in turfgrass. The formulation of Quelant-Minors helps avoid creating additional deficiencies caused by correcting single elements. For instance, correction of an iron deficiency may induce a magnesium or zinc deficiency.

Macrosorb.com

3. Revolution

Revolution, a wetting agent from **AQUATROLS**, supports water repellency issues and offers water management as well as plant health benefits. The patented molecular structure allows it to balance air and water ratios in the rootzone under wet or dry conditions. More than 10 years of university research has shown Revolution can produce dry, firm putting surfaces, reduce the need to hand water and strengthens a plant's natural ability to withstand stress and disease.

Aquatrols.com

4. Plant Food Co.

THE PLANT FOOD CO.'S plant nutrition product Phosphite 30, 0-0-27 contains potassium phosphites that perform two functions: Potassium aids in producing a more turgid, resilient cell, and phosphites stimulate the plant's natural defense mechanism, protecting itself from certain diseases. Phosphite 30, 0-0-27 is manufactured using a patented, high pressure, high heat reaction that fuses the phosphite molecules together resulting in a long-chain, linear polymer potassium polyphosphate. Products blended with water at much cooler temperatures are vulnerable to oxidation more rapidly. Phosphite 30, 0-0-27 is a pH neutral product that provides tank mix compatibility with many different nutrients and plant protectants.

Plantfoodco.com

5. 415F2 Backhoe Loader

If you are taking on a project too large for just manual labor, turn to **CAT'S** new F2 series of backhoe loaders. A part of the recently released series is a new basic model, the 415F2. The machine is powered by a C3.4B engine that meets Tier 4 final emission standards and does not require diesel exhaust fluid. The 415F2 can reach a maximum dig depth of 14.25 feet and it can lift up to 5,280 pounds with the stick. A newly designed operator's station provides ample leg room for comfortably rotating the seat, and the air-suspension seat provides exceptional comfort when driving the machine.

Cat.com

6. S450 Skid-Steer Loader

If you are working on a tight jobsite but feel you still need some mechanical help, the S450 skid-steer loader from **BOBCAT** allows for increased access and can be utilized on a task where manual labor and tools might have been used previously. When paired with a bucket, its width is 62 inches but provides a spacious optional enclosed cab with heat and air conditioning. The S450 can run on regular diesel gasoline and its auxiliary hydraulic pressure has been increased 20 percent. Available for the first time on a Bobcat skid-steer loader this size is a two-speed drive system that allows a maximum speed of 7.1 mph in low range and 9.2 in high range.

Bobcat.com


OARS Ps
OARS Hs

1


QUELANT-Minors
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Revolution

3


2 X 2.5 GAL
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Phosphite 30
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4

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Bobcat
Bobcat

6

The 19th Hole with...

Chuck Calhoun

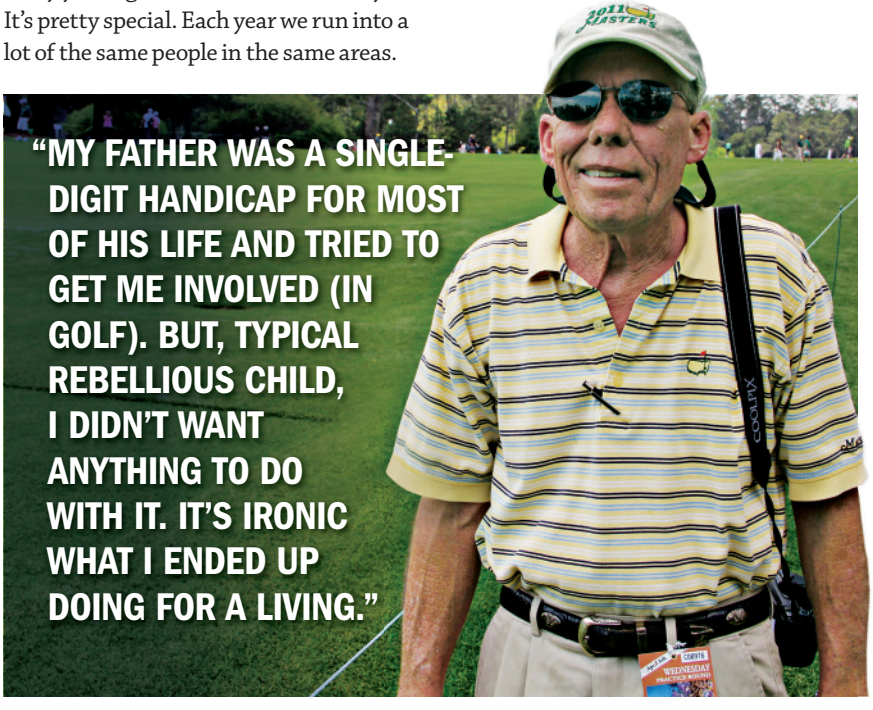
SUPERINTENDENT // Sandridge Golf Club, Vero Beach, Fla.

After 18 holes, what's your drink of choice? A Bud Light bottle.

Tell me about your crew at Sandridge. We've got 36 holes and a small staff — eight guys on each side. But a really solid, long-term staff. I run the Lakes course, I've got a younger guy running the Dunes course, Ryan Duffell. He'll go far, he's going to take over. I've had a good run, but I'm looking forward to hanging up my hat in a few years.

A small crew, but good enough you can get away for a few days to enjoy the Masters, right? It's on my calendar every year. I go for the tournament days. It's pretty special. Each year we run into a lot of the same people in the same areas. Even the security guards, some of them I've known for 20 years.

What do you think is the most dangerous part of working on a golf maintenance crew? The golfer's inattention to us being out there. We spend a lot of training and safety meetings making sure our employees are aware of the golfers, because (the golfers) don't care, they don't think about us. They think we were supposed to get everything done at 3 a.m., and make no noise in the process.



What's your team? Eagles.

How did they do in the draft? They got a good receiver in the first round. I think the (Marcus) Mariota hype was more the press than Chip Kelly mortgaging the farm to get him. (Kelly's) a pretty smart guy. I've got my expectations for this year. But I've been living and dying with them for a long time.

Who is your favorite golfer of all time? I was always a Jack man. I had no choice, back in the day you had one black-and-white TV in your house, and on the weekends my dad had it on golf. My father was an Arnie fan. So when Jack came along, father/son rivalry, right away I was a Jack guy. I have had the privilege to meet Mr. Nicklaus a couple times off the course and I was very impressed with him, so I'm still a big Jack fan. I don't think anyone will ever accomplish what he did.

Tell me about your family. I've got a wife and a 33-year-old daughter and I just got my first grandbaby about 14 months ago. His name's London, he's quite the lad, always has a smile on his face. You can't ask for much more than that.

As interviewed by Seth Jones, May 1st, 2015.

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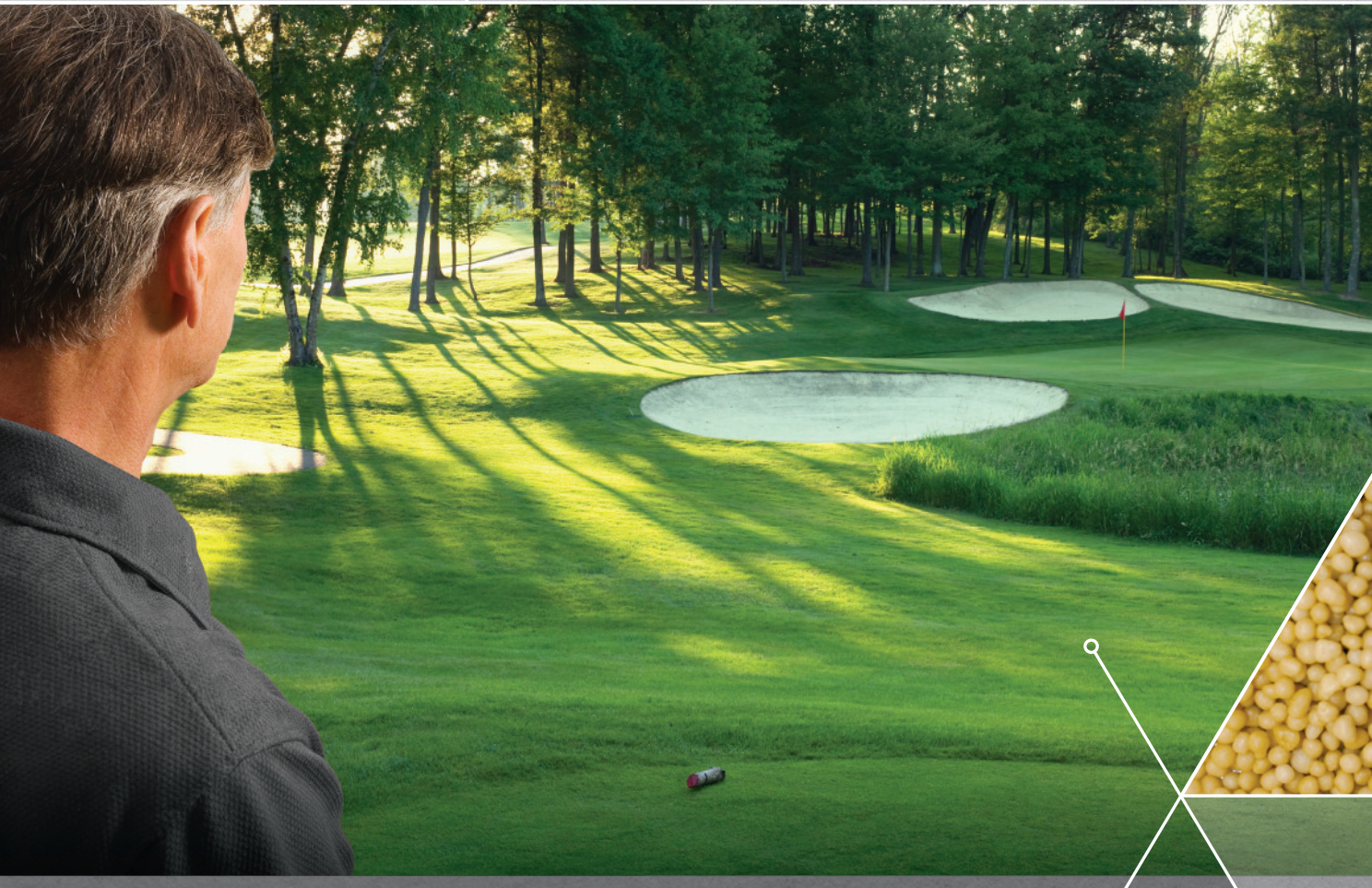
THE POWER TO MAKE THINGS GROW

KOCH TURF & ORNAMENTAL



Your obsession. Your turf.
FEED BOTH.

You live and breathe your course. And with these enhanced efficiency fertilizers you'll breathe easier. Extended longevities mean fewer applications. This saves time, fuel and frees up your crew to get other work done. With consistent feeding, more nitrogen is taken up by your turf. So you get more out of what you paid for, because less is lost to the environment.

You have a passion for how your turf looks and plays. Feed it with a more efficient way to fertilize.

Consult with your distributor for more applied advantages, or visit **KochTurf.com**.

Duration CR® Controlled-Release Fertilizer | XCU® Slow-Release Fertilizer | UMAXX® STABILIZED NITROGEN

Stress reduction claims should originate from a research department, not a marketing department.

HERITAGE ACTION™ FUNGICIDE VS **INSIGNIA® SC INTRINSIC® FUNGICIDE**

DROUGHT STRESS TRIAL CONDUCTED AT SYNGENTA RESEARCH FACILITY[1]

INSIGNIA SC INTRINSIC—0.4 OZ/1,000FT² SPRAY

HERITAGE ACTION—0.2 OZ/1,000FT² SPRAY

Turf is never *intrinsically* fooled—which is why Heritage Action delivers hybrid technology that is real. Heritage Action has not one but two active ingredients that work together to not only provide enhanced disease control, but protection from abiotic stressors like heat and drought as well. For the facts regarding actual turf quality improvement, visit **GreenCastOnline.com/HeritageAction**.

COMING SUMMER 2015

Heritage Action™ Fungicide

syngenta®

@SyngentaTurf **#Time4HeritageAction**

[1] Photos taken after water was withheld for 8 days. For information on trial application dates and spray intervals visit GreenCastOnline.com/HeritageAction.