Dave Fearis, CGCS Retired, photographed last month at St. Andrews GC, Overland Park, Kan.

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Golfdom sits down with seven veteran superintendents from around the country to discuss their careers, the future of the business and advice for today’s superintendent.

COLUMNS
// 6 Keeping up with The Jones—Seth Jones
// 16 At the Turn—Mark Woodward
// 18 From the Back Tees—Joel Jackson
// 46 The Turf Doc—Karl Danneberger
// 47 Clark Talks Turf—Clark Throssell

DEPARTMENTS
// 8 Starter
// 12 Golfdom Gallery
// 14 My Second Office
// 48 Professional Grade
// 54 The 19th Hole

SUPER SCIENCE
// 34 Herbicide resistant annual bluegrass
// 40 PCNB turns 50

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QUESTIONS AND ANSWERS
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Thought blasts from around the Golfdom

A lot has been going on these last few weeks, so instead of one theme, I’m going to blast out a few thoughts in bullet form:

• I’m thrilled with the way this month’s cover story turned out. You might remember in the April issue we had a cover story titled “Early to Rise,” written by senior editor Beth Geraci, where we highlighted superintendents under the age of 30. This month, we go the opposite direction and talk about the business with superintendents who have been in the industry for longer than those young guys have been alive. All of these former superintendents have seen a lot of change in the industry. I think you’ll find it interesting reading. Though they all worked in the same business for a long time, they all walked away from it with different perspectives.

• Speaking of Beth, I should mention that Ms. Geraci has left Golfdom to pursue other career opportunities. We all wish her the best, and we’re sad to see her go. She felt her muse wanted to take her elsewhere, and luckily for her she can follow that muse. We’ll miss seeing her byline in the magazine, and are in the process of finding her replacement.

• My old friend Steve Southard, CGCS for the city of Loveland, Colo., called me with the news that he’s released his second book on pace of play, titled “Golf — The Complete Guide to Mastering Pace of Play.” Steve is quickly becoming the foremost authority on pace of play, now teaching classes for the GCSAA and the Canadian GSA as well as consulting with the USGA. His first book was great (I should know, I read it three times! OK, I had to... I was Steve’s editor.) His new book offers even more on this hot-button issue. The first 52 pages are available for free download at paceandproduction.com. I think about what the USGA is doing with their “While we’re young!” campaign, I think about the challenges the game has today and how some courses are rerouting players so they can play a five-hole round, etc…. Trust me, get on the Southard pace of play bandwagon now. If time is an issue, who wouldn’t want to help get their golfers around the course in the most efficient manner possible?

• The North Coast Media team (which includes Golfdom, Landscape Management and Pest Management Professional magazines, among others) checked out the Responsible Industry meeting out in Half Moon Bay, Calif. It was a great meeting, check out a few photos from the event in our Golfdom Gallery section on page 12. While I was out there our friends from GenNext Biotech set me up with Dean Kinney, sales and marketing director for Sierra Pacific Turf Supply. I learned about the GenNext line, which Kinney described as “unlike anything I’ve ever seen before.” I’ll look into it more on my end, in the meantime, if you have any stories on the product, I’m an easy guy to reach, when I want to be…

• Golfdom has formed a strategic partnership with The BoardRoom magazine. The BoardRoom is the official publication for the Association of Private Club Directors and was voted the No. 1 magazine in the private club industry. It doesn’t mean much for you the reader, unless you’re a subscriber of The BoardRoom, then you can expect to see some of our content over there (and occasionally, their content over here in some form.) But this is good news for Golfdom to get exposed to even more professionals in our industry. We’re making more friends and getting noticed in more places, which is a good thing.

• The Chiefs are 1-0. One more W and we match last season’s total!

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TORO EXPANDING BLOOMINGTON, MINN. HQ

It will be quite a celebration next summer at The Toro Co.’s headquarters. Not only will the company be celebrating its 100th year in business, but they’ll also be toasting a new $25 million expansion to its headquarters in Bloomington, Minn. The three-story addition will be 75,000 square feet when complete, and be utilized as office space and additional room for testing and new product development.

“We are investing in our Bloomington facility to enable our businesses to continue to meet the needs of our customers,” said Michael J. Hoffman, Toro’s chairman and chief executive officer. “With the anticipated growth of our businesses, through ongoing product development and the addition of recent acquisitions taking us into new markets, this investment will help to expand our technical capacity and further the innovation our customers expect.

Toro’s office is 400,000 square feet and houses almost 950 employees, research and development and manufacturing space. It has been located in its current location since 1962.

Ryan Company will lead the project, utilizing Toro’s line of construction and utility digging equipment.

“Considering our Bloomington roots go back to 1952, our decision to continue to grow here is a natural choice.”

MICHAEL J. HOFFMAN // Toro Chairman and CEO
There was a lot of red, white and blue waving at golf courses around the country this summer. And that added up to $20,000 for the Wounded Warrior Project, courtesy of BASF.

BASF pledged a $100 donation for every photo they received of Old Glory waving at a golf course. The chemical company asked superintendents who use or have used Honor Intrinsic brand fungicide to participate. The Wounded Warrior Project is a non-profit whose mission is to honor and empower injured service members.

Kevin Ross, CGCS at the CC of the Rockies, was one of the 254 superintendents from around the country to submit a photo.

“I didn’t want to let $100 (for the Wounded Warrior Project) to slide by,” laughed the superintendent, currently immersed in a major renovation project. “We had a couple flags left over from our 4th of July tournament, so we went down to the signature hole, No. 12, and took a shot along the river.”

To see all the photos, visit basfturftalk.com/honor-america/
Superintendents — and their best friends — made headlines in a recent story in the New York Times. In the Sept. 1st article “Chasing Off Wildlife, with Course Etiquette,” by Lisa Mickey, several superintendents from around the country were asked about their dogs and how they work on the course. Superintendents included two members of Golfdom’s editorial advisory board — Damon Di Giorgio, Fieldstone GC, Greenville, Del. and Bill Irving, Lawrence, CC, Lawrence, Kan. — as well as Alton Sheffield, North Ride CC, Raleigh, N.C.; Brian Peters, the Preserve at Jordan Lake GC, Chapel Hill, N.C.; Scott Gallup, Capital Hills at Albany (N.Y.) GC; and Mike Cooper, assistant superintendent at TPC Sawgrass, Ponte Vedra, Fla.

“Sometimes, he (as in Ozzie, pictured with Irving on page 14) has this look like, ‘God, I just have the best job in the world,’” Irving told the NY Times. For the full story visit: tinyurl.com/m6noq3g.
A SIGN OF THE TIMES

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Easy RISEers How convenient must this year’s Responsible Industry for a Sound Environment (RISE) meeting been for GCSAA President Pat Finlen (center, with Golfdom EIC Seth Jones and fellow board member John O’Keefe)? The meeting was held at the Ritz Carlton in Half Moon Bay, Calif. — walking distance from Finlen’s house!

Drinks are on us We rediscovered something we already knew: it’s much easier to make friends when you’re the one buying drinks.

The guy’s got balls Lawrence (Kan.) CC superintendent Bill Irving had quite a day at the ballpark. The Royals lost, but Irving came away with not one, but two foul balls.

Dinelli’s den Golfdom spent two hours at North Shore CC in Northbrook, Ill. to talk turf with Dan Dinelli, CGCS (right) and Juan Villareal, foreman. We learned so many insights, we’re planning on returning next summer, but with an extra voice recorder.

NCM hits the links North Coast Media’s Craig MacGregor, North American sales manager, and Kevin Stoltman, president and CEO, on the 18th tee on the Old Course at Half Moon Bay Golf Links. MacGregor crushed his drive into a gorge. But hey, that’s good business golf, when you’re playing with the boss!

99 cans of beer on the wall Seth found the perfect place for an off-site lunch meeting during RISE: Cameron’s Restaurant & Inn. Along with Dean Kinney, sales and marketing manager for Sierra Pacific Turf Supply, the two felt like they were back in jolly old England.
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About our host

It didn’t take long for Lawrence (Kan.) CC superintendent BILL IRVING to become a fan of the local team. The Omaha, Neb., native bleeds Nebraska Cornhusker red (he graduated from the school in 1998), but being so close to the University of Kansas has allowed him to adopt the local Jayhawks.

“Coach (Bill) Self was just out here. It’s hard not to be a fan when all of the basketball coaches play out here regularly,” Irving says. “It’s hard not to be a fan and root for them when they come out and root for you at the golf course. It’s a fair trade.” Irving has been at LCC for almost six years now. He arrived from Kearney (Neb.) CC, where he was the superintendent for four years.

A look around Irving’s office shows some of his favorite things — from his kid’s artwork to sports memorabilia of his favorite teams.
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“We have such a deep passion for what we do that we develop a strong sense of sharing what we’ve learned from being in the business.”

MARK WOODWARD, Contributing Editor

The gift of wisdom

Whether we realize it or not we’ve all had them in one form or another. They could have been a coach, a teacher, a minister, an employer, a friend, parents or even another relative. They’ve taught us great lessons about our jobs, our education and our families. Most important, they’ve taught us the lessons of life.

And if you really think about it, the things we learned from them individually aren’t big things. It’s the small things over an extended period of time that collectively add up to the “big thing” and that is the way we live our lives.

By now you’ve most likely figured out that I’m talking about mentors. Mentors are the type of people who change lives.

If you talk to someone who has been fortunate enough to have had one, they will tell you, “I wouldn’t be where I am today if it weren’t for (insert mentor’s name here).”

The golf industry is full of them. Mine happened to be my grandfather, but many successful superintendents in our industry today give credit for their success to someone in their past whom they worked for or helped educate them.

Mentoring has a great deal to do with two people developing a very strong relationship. As with everything in golf, mentors and protégés develop these strong relationships not only based on what the mentor teaches but also the feelings of trust and confidence the protégé has in the mentor. It has a great deal to do with respect. Mentors have the ability to garner respect from people who seek advice, counseling and knowledge from them.

That’s because mentors are generally veterans in their fields and have been through everything that one can go through and still survive. In some instances, they’ve learned things the hard way or through trial and error. Because of this, they have that special type of knowledge that only comes with experience. This issue of Golfdom is filled with such people (see “Let’s grab a cup of coffee,” page 20). These men have seen a lot in our industry, and I’m excited to see what I can learn from them today.

Many of the superintendents I know — including myself — who have had mentors, maintain the mentoring/protégé relationship throughout their careers. They then maintain a lifelong relationship in their personal lives, even after the mentor retires.

And then something very special happens: the protégé becomes a mentor. And based on the lessons they’ve learned, they now pass on their knowledge and the knowledge they learned from their mentor. And the cycle goes on.

There is an immense amount of satisfaction that comes with mentoring someone. The cool thing about mentoring is in most cases you learn from teaching others so everyone benefits.

In golf you often hear people say that they want to give back to the industry. I’ve said it myself, many times. But it’s true. We have such a deep passion for what we do that we develop a strong sense of sharing what we’ve learned from being in the business. There’s something very satisfying in assisting a fellow superintendent in solving a problem.

Many times just talking a problem through with someone and bouncing ideas off each other leads to a good outcome. In my experience, superintendents are very good at this.

Mentoring can come in just about all facets of our lives. If you have a chance, think about mentoring someone not only to give back to your profession but also to give back to your community. My wife has a saying she uses on me occasionally when she helps someone out and that is, “I give 10 percent but I get back 90 percent in return.” I’ve found that it works that way almost every time. It truly is a gift.

Mark Woodward is president of Mark Woodward and Associates, principal of DaMarCo Golf, CEO of MasterStep Golf Group and a contributing editor for Golfdom.
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A tale of two golf worlds

After 30-plus years in the golf industry, I have a mix of chlorophyll and ink in my blood. The chlorophyll is from my years as a superintendent, and the ink from my years as a journalist covering this great industry.

I used that blend of elements to my advantage when I attended the annual Turf & Ornamental Communicators Association (TOCA) and International Network of Golf (ING) annual spring conferences. They are my journalists’ education equivalent of the Golf Industry Show and Florida Turfgrass Association turf conference.

At the TOCA conference we talk turf, landscape and pest control, and I’m rubbing elbows and talking shop with folks from all the industry publications. Our educational sessions are focused on using the latest technologies in order to keep you informed. We also have sessions on refreshing our creative juices. We want to get and keep your attention so we can educate you in the latest products and innovations. We are also in the business of helping to grow the game so we can all stay employed.

A couple of examples from this year’s TOCA out in Portland, Ore., were the presentations by Dr. Milt Engleke on the latest turfgrass breeding research, which leads to grasses better suited to a variety of ecosystems around the country, rather than one turf fits all. That was followed by two writing workshops by renowned writing instructor Ann Wylie, who challenged us to “write like a roller coaster” to jump-start our creativity.

A couple of weeks later I attended the International Network of Golf Conference at the Reunion Resort, just 20 miles from my house in Orlando, and also the same facility that soon will have hosted its second Golfdom Summit. At the ING, I venture into the golf lifestyle side of the industry. Attendees are from golfing publications, which primarily talk about, travel, resorts, golf equipment (balls and sticks), training aids and apparel. It’s the front-of-the-house part of the business. I enjoy attending these sessions so I might help in some small way to provide a connection between the clubhouse and golf maintenance.

I see more people are becoming aware of the environmental issues facing golf, especially in the area of water availability. Getting the “playing the game” folks and golf maintenance folks on the same page is critical for addressing regulatory and growing the game issues. They go hand in hand.

This year ING had a “Best Practices” session, which covered topics like marketing the facility, effectively using online media, charitable fundraising and a host of growing the game topics.

All these topics depend on a well-maintained golf course to attract and retain golfers. Two topics got my atten-
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Protect your work of art.
Dave Fearis has “been at it for a while,” he laughs. His first job on a golf course came as the back nine starter… at age 14.
Golfdom sits down with seven veteran superintendents from around the country to discuss their careers, the future of the business and advice for today’s superintendent.

BY SETH JONES, CHRIS LEWIS AND STEVEN TINGLE

In just these next few pages of the magazine, there is collectively more than 250 years of experience in this great industry.

These veteran superintendents — all retired Certified Golf Course Superintendents and happy to give their time to chat about the business — come from across the nation and have grown (and killed) just about every grass imaginable. Among them are former presidents of the GCSAA, hosts of majors and mentors to an innumerable amount of superintendents out there working on golf courses today.

So, how do you take your coffee? Grab a cup and join us for one heck of a conversation.

GOLFDOM: Looking back at your career, knowing what you do now... would you do it all over again?

Dave Fearis: I probably would, in some capacity. I think it’s a young man’s profession. It’s a sacrifice. Your job, unfortunately, comes first. It’s hard to describe, that course becomes such a big part of you... superintendents are very proud. First thing in the morning, it’s a neat experience to drive around and see the course without anyone on it... to see the beauty of it.

Randy Nichols: If you are talking about doing it all over again during the same time period, I would do it all over again. If you are talking about working as a superintendent again in today’s environment, I am not so sure. Back in the ’60s, when I was first introduced to the turf/golf business, the pressure on the superintendent was self-imposed. Today, the expectations are either difficult, or nearly im-
possible to achieve. “Perfect” is not good enough in many cases, even if you have a limited budget.

Joseph Hahn: I would absolutely do it again. It gave me the opportunity to do nine tournaments including three majors. I also got to do a lot of traveling and I got a lot of satisfaction when things went right and I learned to take it when Mother Nature humbled me. Plus I’ve enjoyed the opportunity to work with the 30 or so young guys who have gone on after working with me to become superintendents or assistants.

Charles Tadge: I think I would if I had the same conditions. But today things have changed a lot. There are opportunities if you get hooked up with the right golf course but a lot of the other opportunities are not as good. When I got out of Purdue there were a lot of the old timers retiring in the next few years, so there were a lot of opportunities for good jobs. That cycle hasn’t repeated itself yet.

Alan Andreasen: No. It’s too brutal of a business. If I had to do it all over again with the knowledge I have now I would look at something probably in golf but with some equity. You know, where you’ve got some kind of security rather than the whims of a board of directors or a management company.

Bruce Wolfrom: Sometime in my last 50 years in the business, I realized I was providing an arena where the “average Joe” could be a hero. Anyone, at any age, could have a hole-in-one, a birdie, an eagle. Even if the golfer never thought about my involvement in his or her moment of success, it’s rewarding to know I was involved in that success. So I definitely would do it all over again.

Mike Bavier: I definitely would do it all over again. Working as a superintendent provided me the opportunity to make a living by enhancing the beauty of this earth and helping (my crew) feel a sense of accomplishment, while working to sustain an environment for the pleasure of golfers, as well as others.

How do you think the future of the game looks?

Bavier: It’s been a tough few years for everyone. Play has been down in most areas.

Right now, I feel the focus should be on getting new players involved, especially juniors, as they are the future of the game, while also maintaining the interest of long-time players.

Fearis: I work at St. Andrews, our maintenance facility is right next to these 12 soccer fields Overland Park (Kan.) has, and those babies are always crowded. I thought this the other day: you can’t play soccer when you’re 50.

I think this Golf 2.0 is the way to go, showing the pluses of what golf can do besides just being outdoors. At different courses I’ve worked at, you get these emails about cut rates. All they’re stressing is price. They’re not promoting the game.

I remember Steve (Mona, then the CEO of GCSAA) and I went to a National Golf Foundation conference... they told us the growth of the game is in women and kids. Women don’t play because of intimidation and time. And kids don’t play because of cost and accessibility. That holds true to a point now.

Nichols: Unfortunately, I do not see a bright future for golf, nor our superintendent industry. I am not seeing the youth of today embracing the game as it has in past decades. Today’s professional people do not have six or more hours available to complete a round of golf anymore. Many are more family-oriented than in the past, whereas my generation was work-oriented, neglecting our families.

Many courses have closed and many more are in bankruptcy protection or are considering “shutting the doors” altogether. New federal government mandates have made things even worse. Superintendents now have to worry about point source pollution, pesticide restrictions, water use restrictions and air pollution, particularly new restrictions on diesel engines, which drive up costs. These restrictions may lead to even more course closures.

History could very well repeat itself, as only the rich will be able to afford the game of golf again.

Wolfrom: I think the future of the game is bright. Golf is a game that can be played by anyone at any age. I believe that more and more people are realizing that.

There are a lot more junior programs around, too. Schools, public courses and recreation de-
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partments are introducing kids to the game with classes, camps, leagues and clinics. There was a time when lessons for kids were only available at private clubs, which limited the number of new players. Now, anyone, anywhere, can take up the game at any age.

We’ll probably see a few more courses close, but we’re going to reach a point again where the demand is greater than the available courses, so we’ll see new courses once more.

**Andreasen:** I think the future of the game looks outstanding for PGA Tour golf. Those courses have the TV technology to make their courses look good. It’s almost mandatory, I think, excluding the USGA for a minute, that Tour golf knows that a large part of their popularity is the beauty of the golf course regardless of the playing conditions.

The average Joe Golfer kind of understands Scottish golf but they won’t tolerate it at their own course. The USGA and the GCSAA have been making the pitch for years and years that you don’t need lush park-like conditions to play golf.

In my area I’m seeing a lot of jobs that used to be $90,000-a-year jobs are now $55,000- to $60,000-a-year jobs and the superintendent’s job is being filled by high school graduates.

**What advice do you have for today’s superintendent?**

**Andreasen:** Go back to college. After you get out and you have your degree and you have a job at a golf course get into some night classes, get a secondary skill.

**Tadge:** I would say keep your eyes and ears open and do the best job you can, even though the situation you’re in might not be what you want it to be yet and you may have to move on to a different job. But I still think there are opportunities for the young superintendent.

**Wolfrom:** If you haven’t already, get a four-year degree. It doesn’t have to be in turf. Business is a good degree to have. Be a professional. Wear a suit and tie to local and national superintendent meetings. Give back to the community you live in. Be a leader at your golf course, not a follower.

If you don’t have strong communication skills, work on that. Write letters to your board of directors, owners and players. Don’t rely on blogs, Twitter or Facebook. Use whole sentences. I’ve seen too many knowledgeable, talented people fail, due to their lack of ability to communicate. Always look for new knowledge. Research is continuously finding new answers to old problems. The most important asset you have is you. Develop yourself and you’ll go far.

**Fears:** Most of them are coming out of the turf schools. The only thing turf schools don’t teach them is communication. I’ll readily admit I wasn’t the best superintendent, but I knew how to communicate.

On weekends I’d get there and do set-up, change tee markers, then I’d come back to the pro shop — the assistant pro was inevitably late — so I’d go in and make a pot of coffee and greet the early golfers. It’s the little things, but it’s on that line of communication.

You can’t speak to the golfers in agronomic terms. These are businessmen and businesswomen. You’ve got to make it relate.

**Nichols:** First, receive the best education possible. Then, work (as an intern or assistant) at a club/facility similar to the facility you desire to be a superintendent at, and network with everyone in the industry — assistant superintendents, superintendents, sales representatives, university personnel, golf professionals, general managers, club officials and other allied professional groups.

Be involved with your professional associations as often as possible.

And, finally, never forget how extremely important education is. Continue to receive certifications throughout your career.

**Bavier:** Most superintendents are experiencing the downsizing of their crew and budgets. Sure, superintendents are working longer hours, but they are also realizing that their sacrifice will have a positive, long-term effect on the game, as they are maintaining golfers’ participation.

Most importantly, however, during these difficult periods, it is still necessary to maintain an acceptable balance of time between work and family.
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Different climates, root-zone mix composition, golfer expectations and budgets all play a role in today’s modern golf course, turning something as important as fertility management from an art form to a science. And with recent advances in the understanding of nutrient behavior, smart superintendents are putting even more science into the process.

Who knew something as simple as fall fertilization could be so complicated? And the big question — with so many fertilizer choices readily available, what’s the most efficient and cost effective way to manage fall fertilization for your course?

Todd Lederer, superintendent for the town of Mooresville, N.C., brings 25 years of industry experience to his fertilization programs. When it comes to implementing successful fall fertilization programs, Lederer has found the two main factors — and an unlikely duo — are plant growth regulators and a controlled-release fertilizer.

“Plant growth regulators are as equally important in any fertility program regardless of weather conditions to yield a successful growing season,” says Lederer. “I have been using PGRs in our fall fertility programs for the courses’ greens, fairways and tees, and we have decreased mowing frequency and spikes in growth.”

In addition to PGRs and fertilizers, every year Lederer completes soil testing on the Mooresstown course, which consists of taking soil samples, sending them to Harris laboratory, where it is analyzed to determine deficiencies of phosphorus (P) and potassium (K) pH levels.

Researchers at Penn State University have also noted that applying nutrients such as phosphorus and potassium in late fall can maximize

Superintendents can simplify fall fertilization with control and slow release fertilizers, producing green and healthy turf for the following season.

BY ERIC MILTNER, PH.D.
root growth and plant maturation, as well as enhance turf’s hardiness, disease resistance and wear tolerance into the following summer.

“Nitrogen is what drives the uptake of nutrients and plant growth in the absence of heat or during stressful climate conditions,” says Lederer. “By testing our soils we determine what areas are deficient, which usually requires more phosphorus and potassium and we base our fertilization efforts for the following year off the results.”

**Capitalizing on temperature**

By using a controlled-release fertilizer, superintendent Bryan McBride of Moss Creek GC near Dayton, Ohio has successfully been able to get nutrients into the turf when the root zone needs it most. And by incorporating a thorough fall fertilization campaign, McBride is able to keep his turf’s nitrogen levels up year-round, allowing his turf to better fight disease through the entire year.

“I save on gas, time and labor by fertilizing in the late fall once with Spread it & Forget it controlled-release fertilizer,” says McBride. “The technology of the advanced polymer coating is activated by soil temperature. It just sits there after one application and the nitrogen release shuts down in cold soil so the granules do not release too soon.”

*Continued on page 28*
Southern Grasses Need Southern Weed Control

When it comes to weed control, customization is key. Southern grasses, for example, have unique challenges due to the nearly year-round growing season and other factors such as sensitivity to select herbicides and low shade and traffic tolerance. Herbicide producers have increased their use of field research and chemistry to develop formulations that target weeds in a specific region such as the South.

According to Jim Goodrich, product specialist for Kansas City, Missouri-based PBI-Gordon Corporation, carfentrazone is an ingredient that, when formulated with 2,4-D, MCPP and dicamba, provides proven broadleaf weed control in southern grasses. Carfentrazone works in this combination to inhibit a key enzyme in chlorophyll production, causing cell membranes to rupture and quickly disintegrate.

Also important in the South, is an effective herbicide that is highly selective in most established warm- and cool-season turfgrasses including: bermuda, zoysia, bahia grass, common St. Augustine, buffalograss, centipedegrass, seashore paspalum and tall fescue.

One product that meets these criteria is SpeedZone® Southern from PBI-Gordon. The product is proven in university and cooperators’ tests to produce fast-acting response and visible activity within hours. Important in the often-moist South, it is rain-fast in just three hours and causes weed death in 7-14 days.

Enhancing spring green-up
Fall fertilization will also enhance spring green-up without the excessive growth that often accompanies early-spring fertilization. This green-up often will last into mid-spring, so an early spring fertilizer application is not needed.

“Fall fertilization is the most important fertilization of the year,” says McBride. “The plants need to have enough nutrients to make it through winter and come out strong in the spring. By giving the plant enough nutrients with a controlled-release fertilizer, I have been able to cut my fungicide budget and still have strong, healthy turf.”

“It is important to remember to fertilize turf before it undergoes stress,” says Bob Raley, Turf Agronomist, Agrium Advanced Technologies. “Fall feeding enables cool-season grasses to establish strong roots for the spring growing season and prepares grasses more effectively to survive stresses of the summer golf season.”

The best time to prepare greens to bounce back quickly in the spring is (depending on geography) during the late-fall; for McBride, he applies a controlled-release fertilizer in late-October, after the course has shut down for the season.

“Many superintendents go out three or four times with a slow release fertilizer, but I have been using Spread it & Forget it consistently for four years,” says McBride. “I apply it once per year on...
Fall fertilization will enhance spring green-up without the excessive growth that often comes with early-spring fertilization. Green-up will often last into mid-spring, so an early spring fertilization app is not needed.

Mooresville GC’s fall fertilization schedule

AERIFICATION
- Bentgrass greens mid-September
- 419 Bermuda tees and fairways mid-July

PRIMO MAXX – PLANT GROWTH REGULATOR
- Applies on greens September-November using GGD (growing degree day method)
- Applies on fairways and tees June-September every 18 to 21 days

DURATION CR CONTROLLED-RELEASE FERTILIZER
- Applies one pound of nitrogen/1,000 sq. ft. in a controlled-release fertilizer and a granular soil conditioner with humic acid to regulate the soil pH levels
- Depending on weather and turf conditions, in mid-October Lederer applies an additional 0.5 pounds of nitrogen/1,000 sq. ft. across his course
- Fairways – 2.5-3.5 pounds/1,000 sq. ft. of nitrogen
- Greens and tees – 3.5 -4.5 pounds/1,000 sq. ft. annually

The competition can talk all they want, but when the checkered flag drops, the winner is clear: SpeedZone® Southern Broadleaf Herbicide for Turf. SpeedZone Southern delivers broad-spectrum control of the toughest weeds fast. In fact, you can see visible results within 24 hours. That means more happy golfers, and it’s one of the reasons SpeedZone is the #1 speed herbicide on the market.
Why controlled-release fertilizers work

Fertilizer manufacturers accomplish a controlled- or slow-release reaction with compounds that bind with the highly soluble nutrient sources or by encapsulation of the fertilizer source within a water-insoluble coating. The purpose of a controlled-release fertilizer is to prevent 100-percent release of the nutrients immediately following application, but instead to promote metered feeding, based on soil temperature.

Industry-leading products release their nutrients through a proprietary polymer coating, and by varying coating thicknesses water can move through the coating at different speeds to the nutrients inside. This extends the time of feeding, ensuring nutrients are delivered when the plant’s root zone is most ready to absorb the nutrition.

Continued from page 29

season,” says McBride. “One year we had so much rain during the season and typically you would see surges in certain areas, but our course maintained smooth, even growth. Our golfers were very happy.”

Maximizing root growth

Fall fertilization yields an increase in rooting, maximizing root growth of cool-season turfgrasses that occurs in spring and fall. Some root growth will occur in winter if temperatures are above freezing, whereas little if any growth occurs in summer. During fall fertilization in most regions the roots are still growing at a time when shoot growth has ceased, thus allowing the roots to make full use of the fertilizer.

“When fertilizer is applied in late fall there is an increase in the plant’s carbohydrate reserves that occurs,” says Raley. “Turfgrasses accumulate carbohydrates in stems and roots during fall, which gives turf a slight advantage to resist winter injury and aid in disease and environmental stress resistance the following spring and summer.”

When deciding on a fall fertilizer program, remember to consider climate and grass type to determine what will work best on the course. Slow- and controlled-release fertilizers effectively deliver more nutrients to intended plants when needed — nutrients stay in the root zone and feed the plant at the root, which results in green, healthy turf in fall and spring, while promoting disease resistance in the summer.

Eric Miltner is a Turf Agronomist at Agrium Advanced Technologies. He can be reached at emiltner@agriumat.com.
Yet the industry has lacked a truly comprehensive approach to address facility-wide (i.e., not just the golf course) regulatory compliance, risk management, liability containment and improvements in best management practice adoption.

Enter the Environmental Management System framework. For over a decade, more sophisticated Environmental Management Systems (EMS) have been providing businesses of all shapes and sizes the type of credible and effective approach to managing environmental impacts and opportunities that the regulatory community and environmental organizations alike expect. The most-widely adopted type of EMS is the internationally-recognized ISO 14001 EMS standard (see sidebar, page 32) first introduced for worldwide use in 1996. This management standard is based on a "Plan/Do/Check/Act" approach to handling environmental expectations, obligations and aspirations and built to provide organizations a clear path to environmental excellence.

The ISO 14001 Environmental Management System standard provides a number of advantages for golf course owners and operations — namely, it is established, proven, "ready-to-use" and already widely accepted. It is globally pervasive (in use in over 140 countries) and has already been adopted by hundreds of thousands of organizations, including businesses, governments, schools and nonprofits alike.

In other words, since it is consensus-based, transparent in its development and already internationally recognized, the ISO 14001 EMS framework is ready to work for golf with no further caveats.

An EMS specific for golf
The e-par Environmental Management System for Golf is an online platform that allows anyone with knowledge of operations to develop an ISO 14001-compliant EMS for the golf course, clubhouse and pro shop. Initially developed in Australia over a decade ago and now in use in over two dozen countries, the e-par EMS was brought to the U.S. about two years ago.

The e-par EMS platform is "live" and has

QUESTIONS AND ANSWERS

“The EMS framework makes sense for golf operations by helping to identify all aspects of your facility’s environmental impact.”

DAVID SMALLWOOD
DIRECTOR OF AGRONOMY, KAPALUA GOLF (HI)
been “in-use” in the field for over a year now. So, what has been learned so far about the value Environmental Management Systems in general, and the e-par EMS for Golf, specifically? Are the benefits that other business sectors have experienced from EMS adoption also being experience by golf professionals? We picked a handful of potential EMS benefits and asked e-par EMS for Golf members to respond.

CAN IT HELP TO EFFECTIVELY AND EFFICIENTLY MANAGE ENVIRONMENTAL ISSUES?

“The EMS framework makes sense for golf operations by helping to identify all aspects of your facility’s environmental impact. It made a lot of sense for us to adopt the program at Kapalua because we are such a large facility that has many moving parts. E-par’s EMS specifically enabled us to identify all of our potential environmental risks and map out plans of how we could proactively manage our interaction with the environment.”

DAVID SMALLWOOD
Director of Agronomy
Kapalua (Hawaii) Golf

CAN IT HELP MEET GROWING INDUSTRY STANDARDS?

“This is a huge step in the process to help keep the game of golf moving forward in its sustainability and environmental efforts. Being proactive rather than reactive will serve us well with our membership, allied associations, the golf world and maybe most importantly, with those who are the detractors of the game, question its effect on the environment, and question if we are responsible stewards of the lands we manage.”

PETE GRASS, CGCS
Hilands GC, Billings, Mont.

CAN IT HELP MEET EXPECTATIONS OF THE REGULATORY COMMUNITY?

“If I am talking with Department of Environmental Conservation, insurance representatives, or government officials, I speak mostly about e-par and our Environmental Management System.”

MATT CEPLO, CGCS
Rockland CC, Sparkill, N.Y.

CAN IT HELP MEET COMMUNITY EXPECTATIONS?

“We’re surrounded by homes, with an older development and a newer one. The people in the older development decided that they should be concerned about the rural water supply and the quality of the water. They were concerned about their wells. I was able to use the EMS to demonstrate that we are taking responsibility and had documented our strengths and weaknesses for water best management practices. I also mentioned to the local residents that the EMS met the ISO 14001 standard. While most people don’t know what that really is specifically, it gave us some real legitimacy that our environmental management approach wasn’t just pulled out of thin air, that it was based on an internationally-recognized standard.”

ERIC FOERSTER, CGCS, MG
Ironbridge GC, Glenwood Springs, Colo.

DOES AN EMS HELP TO TRACK AND REPORT ON ENVIRONMENTAL PERFORMANCE GOALS?

“The process of building the EMS really opened my eyes up to the tracking and documentation we really should be doing, and the EMS provides the platform to do that more efficiently. It still takes some time to keep up with it, but it’s a lot better than doing it ‘hit or miss’ like before.”

ERIC FOERSTER

DOES AN EMS HELP TO REDUCE AND MANAGE ENVIRONMENTAL RISK?

“I look at an EMS as an insurance program with benefits. No one ever wants to have to use their insurance because that means there has been an accident, but when something does happen you’re sure glad it’s there.”

ADAM IKAMAS, CGCS
Michigan GCSAA Executive Director

Kevin A. Fletcher, Ph.D., is the president and CEO of e-par USA. He can be reached at kevin@eparusa.com.
MEASURING GREEN SPEED
IS THERE REALLY AN APP FOR THAT?

By Marcus Jones, Ph.D.

Many superintendents record green speed and use this data to tailor agronomic practices. Typically superintendents use a Stimpmeter to get speed measurements.

The iStimp is a recent application supported by iOS devices such as the iPod Touch, iPhone and iPad. The iStimp is available to anyone who has an iOS device for a fee of $0.99. A green speed measurement is obtained by rolling a golf ball off the iOS device and measuring the distance the ball travels with a built-in ruler. The iStimp application then uses algorithms to generate a Stimpmeter value. A comparison of the iStimp on the iPad, iPhone and iPod touch has not been conducted. The objective of this study was to determine the accuracy of the iStimp application compared to the USGA Stimpmeter.

Stimpmeter measurements were recorded on putting greens at two different golf courses with medium and fast green speeds according to USGA green speed definitions. Stimpmeter readings were obtained with the three iOS devices and a USGA Stimpmeter. A research Stimpmeter, which is known to produce equivalent results to the USGA device, was also included. Three people, each with varying experience using Stimpmeters, operated each device. All accessories (cases, etc.) were removed from each iOS device with the exception of screen protectors.

Researchers in Iowa and Indiana put the iStimp to the test. The results were less than stellar.

The research Stimpmeter produced a statistically similar reading of 11.8 feet. Research Stimpmeters have proven to yield green speed values similar to the USGA device. The three iOS devices equipped with the iStimp app failed to produce Stimpmeter values similar to the USGA device. The iStimp application when utilized on the iPad 2 underestimated Stimpmeter readings by 9 percent. In contrast, the iStimp application overestimated Stimpmeter readings on the iPhone 4 and iPod touch 4th Generation by 21 percent and 16 percent, respectively.

Marcus Jones Ph.D., Iowa State University, Ames, Iowa and Quincy Law, Purdue University, West Lafayette, Ind. Marcus Jones can be reached at marcusajones@gmail.com for more information.
In my opinion, herbicide resistance is a major cause of reduced annual bluegrass control. Superintendents normally place the blame of unsuccessful annual bluegrass control on misapplication, mistiming and unfavorable environmental conditions — but in my research and observation, herbicide resistance is a widespread problem that is rarely considered as a possible cause of the problem.

In this article, I will define and explain herbicide resistance, relate this information to annual bluegrass and discuss how there are not easy solutions to solving the problem of herbicide resistance.

**HERBICIDE RESISTANCE DEFINED**

When a herbicide is labeled for use, there is a given expectation for weed control.

---

**FIGURE 1**

A classic case of a herbicide resistance pattern. In this case, a sulfonylurea herbicide was applied for postemergence control of *Poa annua*. Clearly some plants died as they should have and others did not. The pattern is seemingly random and there is no obvious spray pattern that could have caused the effect.
A labeled herbicide rate is established to provide an average level of control that is consistent based on potentially hundreds of research trials. Herbicide resistance arises when a weed species is able to survive and reproduce following a labeled herbicide treatment that has been confirmed to kill the given plant species. There can be varying degrees of resistance, from 1.5 to 2 times the normal labeled rate to resistance over 100 times the normal labeled rate. The degree of resistance often depends on the type of resistance pressure to which the plant has been exposed.

Herbicide resistance is a process of selection (some say natural selection, but herbicides are not very natural, so let’s just say selection.) If one were to apply the same mode of action annually one would be applying selection pressure. Selection pressure with a herbicide eliminates the plants that are susceptible and only allows resistant plants to survive. Over several years one could eliminate a susceptible population entirely, only allowing for resistant plants to survive.

There are two basic ways in which a weed species can develop resistance — non-target site and target site. Target site resistance is a change in the protein or enzyme that a herbicide binds to or interferes with that causes plant death. Small changes of just one amino acid in a 500 amino acid enzyme can change the way a herbicide binds, thus preventing the herbicide from acting. Target site resistance is known to occur in mitotic-inhibiting herbicides (prodiamine, pendimethalin, oryzalin), PS II-inhibiting herbicides (atrazine, simazine, diuron), and 5-enolpyruvate shikimate-3-phosphate inhibitors (glyphosate).

Non-target site herbicide resistance changes the way the herbicide behaves or is treated within the plant. Simply preventing the herbicide from absorbing in the plant would be a form of non-target site resistance. Other ways include changes that limit how the herbicide moves within the plant and the degradation of the herbicide within the plant. Such changes are actually not simple at all and would require multiple genetic changes to achieve such a resistance mechanism. Non-target resistance is most common in glyphosate resistant weeds.

**HERBICIDE RESISTANT ANNUAL BLUEGRASS**

Separate populations of annual bluegrass have developed resistance to almost all herbicides in use. The International Survey of Herbicide Resistance currently reports annual bluegrass resistance to photosystem II inhibitors (atrazine, simazine, diuron), photosystem I inhibitors (paraquat), inhibitors of very long-chain fatty acids (ethofumesate), mitotic-inhibiting herbicides (prodiamine, pendimethalin) and 5-enolpyruvate shikimate-3-phosphate inhibitors (glyphosate).

With this amount of resistance, there are very few herbicides that are still effective in all situations.
What if annual bluegrass populations develop resistance to Velocity (bispyribac) which my research group has found? What are your options?

Continued from page 35

Herbicides that are effective are Specticle (indaziflam), Kerb (pronamide) and Finale (glufosinate.) See Ian Heap’s website http://www.weedscience.com for more information on herbicide resistant weeds throughout the world.

WHY IS ANNUAL BLUEGRASS SO ADAPTABLE?

There are a few reasons why annual bluegrass is so adaptable to herbicide treatment. First, there is a lot of seed out there. Imagine all the potential millions of plants that are treated on one golf course in a given season. Now compound that with more golf courses and applying herbicides in successive years. There are an incalculable number of individual plants that would be treated. With that many plants, you eventually will find the one that is herbicide resistant (Figure 1.)

Second, annual bluegrass is a polyploid. Polyploids are species that are hybrids of two similar species or whose genomes have simply doubled. Think of it this way, humans (you and I, presumably) are diploids — this means that we have two sets of chromosomes. Polyploids have more than two sets of chromosomes.

In the case of annual bluegrass, it is a tetraploid — meaning that it has four sets of chromosomes — two sets from Poa infirma and two set from Poa supina, which are its ancestral parents.

But why is polyploidization beneficial? Think of it this way: If you have a diploid plant that has only two sets of the acetolactate synthase gene, one copy of the gene could be mutated to be resistant, which will eventually become two copies of the gene with the mutation if herbicide treatments continue to be applied.

The problem is that most mutations actually make the plant less fit or simply weaker compared to non-mutated plants. With a tetraploid, two copies of a gene from one parent can mutate and two copies of the same gene can remain in their fit form. So one plant, annual bluegrass in this case, can have the best of both worlds — it can make two fit copies of the gene for when no herbicide is being applied and makes two less fit herbicide resistant copies of the gene to help plants survive when herbicides are being applied.

WHAT IF…?

So what if one has an annual bluegrass population that develops resistance to a given herbicide or a class of herbicides with the same mode of action? The most immediate response is to change to another herbicide or herbicide mode of action, right?

Changing to another herbicide may not be that easy. Depending on the desirable turfgrass to be treated, adjacent turfgrass to the treated area and the level of weed control desired there maybe few to no options available.

Consider controlling annual bluegrass in bermudagrass surrounding a creeping bentgrass putting green. What if annual bluegrass develops resistance to dinitroaniline herbicides (prodiamine, pendimethalin) and is cross-resistant to dithiopyr? What are your options now?

One could use oxadiazon, but it has to be applied as a granular to dry turf to prevent injury and can only be applied as a liquid to dormant turfgrass. Glyphosate and glufosinate are options, but bermudagrass dormancy is questionable in greens surrounds and drift onto the putting green is possible. Sulfonylureas are options, but they are prone to off-target movement with surface water or tracking via tires and foot
traffic. Specticle (indaziflam) is a very effective preemergence herbicide for annual bluegrass, but it has off-target movement issues similar to sulfonylurea herbicides. Paclobutrazol can control annual bluegrass with multiple applications but bermudagrass green-up delay can occur. Sureguard (flumioxazin) is a new option that reportedly has less possibility for off-target movement, but lateral movement and traffic movement in turfgrass is difficult to predict. Xonerate (amicarbazone) is a new herbicide that controls annual bluegrass, but controlling larger plants may take two applications.

Confused yet? What would you choose to do?

Consider creeping bentgrass fairways or even greens. What if annual bluegrass populations develop resistance to Velocity (bispyribac), which my research group has found? What are your options?

One could use dinitroanilines or dithiopyr, but these herbicides present potential problems with root pruning and creeping bentgrass’ ability to tolerate stressful conditions. Xonerate can be used in creeping bentgrass fairways, but repeat applications are needed in fairways, and very low rates and repeat applications are needed on greens. Even with these precautions, some injury is possible. Paclobutrazol can control annual bluegrass

Continued on page 38
Continued from page 37

with repeat applications, but growth regulation and slight injury will occur. Oxadiazon, glufosinate, glyphosate, flumioxazin are not options.

The point is that changing to another herbicide or herbicide mode of action is not as easy as simply substituting another herbicide in for the one you lost. It is much more dynamic than that. In most situations one will have to totally restructure your application regime and modify your expectations for control. Trying to simply place a new herbicide in your current management plan is often the proverbial square peg in a round hole.

**PREVENTING HERBICIDE RESISTANCE**

When herbicide resistance prevention is discussed the first prevention strategy that is mentioned is “rotate modes of action.” But what does this mean?

Let’s use the example of using Specticle, which currently does not have any resistance issues, for preemergence control. Does rotating modes of action mean that in one year you should use Specticle and the next year use something completely different? And how often should you rotate modes of action — 1, 3, 5 years? Or do you change and treat half the acreage with Specticle and half with something else? What about tank-mixing another mode of action? Does that count as ‘rotating herbicides’?

A final thought is that “spraying low herbicide rates increases resistance development.” There is little to no evidence for this. It is possible that spraying low rates can aid in selection of non-target resistance mechanisms but not target site, but that is only speculative. One could also speculate that increasing herbicide rate, which increases selection pressure, could speed-up resistance development. In either case, one has to remember that herbicides do not cause the mutation, herbicides select for the mutation. Applying lower rates actually lowers the selection pressure.

Herbicide resistant annual bluegrass is a real and immediate problem in turfgrass management. Superintendents across the country are struggling with this issue and they do not even know it. Herbicide resistance will likely continue to develop in other weed species in the future as well.

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This fall marks the 50th snow mold season since PCNB was first registered in 1964. An active ingredient must possess a unique combination of characteristics to remain viable in the marketplace for five decades. PCNB continues to be selected by superintendents based on its performance, economical cost, mode of action and versatility.

This active ingredient is currently marketed in two formulations under the Turfcide brand — Turfcide 400 flowable turf fungicide and Turfcide 10-percent Granular turf fungicide.

Turfcide products are renowned for their cost-effectiveness. And after nearly 50 years of use on golf courses, there has been no evidence of resistance development by pink and gray snow molds. So Turfcide products have an important role to play in maintaining our ability to control snow molds over the long run and are viewed by many superintendents as the foundation of their snow mold control program.

Their versatility makes these products ideally suited for this role. They may be applied to golf course fairways, greens and tees and they may be applied alone or Turfcide 400 may be tank-mixed with other fungicides. Used alone, Turfcide products provide cost-effectiveness. Used in tank-mixtures, Turfcide 400 makes good products better and better products best.

**TARGET DISEASES AND APPLICATION TIMING**

Turfcide products are primarily applied for control of pink snow mold (*Microdochium nivale*) and gray snow molds (*Typhula incarnata* and *T. ishikariensis*). Turfcide products should be applied just before the first snowfall or when temperatures remain below 60 degrees F and extended wet conditions are expected. Many superintendents make their application soon after the last mowing in the fall.

In most locations, pink snow mold is the primary species confronted by superintendents because its development does not require snow cover. If cool, wet conditions persist without snow cover, then additional applications of Turfcide products can be made at 4 to 6 week intervals if conditions warrant them. Gray snow mold development requires 60 and 90 days of continual snow cover for *T. incarnata* and *T. ishikariensis*, respectively, so superintendents make sure that their fungicide application is on the ground before winter settles in for good.

**APPLICATION RATES AND POST-APPLICATION IRRIGATION**

The labeled application rates for Turfcide 400 applied for snow mold control are 12 to 16 fluid ounces of product per 1,000 square feet. Turfcide 10 percent Granular is applied at 5 to 10 pounds per 1,000 square feet for gray snow mold control and from 5 to 7.5 pounds per 1,000 square feet for pink snow mold control. The active ingredient must be moved into the thatch to ensure effective control. Thus, applications must be followed by 1/4 inch of either irrigation or rainfall on the day of application.

As strange as it may sound to superintendents in the northern regions of...
the country, it is often difficult for university researchers to achieve high levels of snow mold on the sites where they conduct replicated small plot efficacy trials. This held true during the winter of 2012/2013, in spite of long periods of snow cover in many areas. Under low snow mold pressure, many treatments provide acceptable control. The real effectiveness test comes at sites with intense snow mold pressure. Fortunately, two field trials from AMVAC’s 2012/2013 snow mold efficacy program showed very high levels of disease when evaluated in the spring. This level of disease pressure allowed Turfcide to demonstrate its versatility for snow mold control.

Paul Koch, Ph.D. and coworkers at the University of Wisconsin conducted a field trial in Champion, Mich., that developed 78.8 percent disease severity (primarily *T. ishikariensis*) in the untreated plots (Koch et al., 2013). Table 1 shows the results from selected treatments that were included in the trial.

The treatments were applied October 30, 2012 and were rated at 189 days after application on May 8, 2013. The low label rate of Turfcide 400 (12 fl. oz. per 1,000 sq. ft.) provided greater than 90 percent control. A treatment of Turfcide 400 applied at 8 fl. oz./1,000 sq. ft. was included in the trial as a reference for other treatments where this rate of Turfcide was tank-mixed with companion products. Turfcide was tank-mixed with Banner Maxx II (propiconazole) (2 fl. oz./1,000 sq. ft.), Daconil Ultrex (chlorothalonil) (3.2 oz./1,000 sq. ft.) and Interface (3 fl. oz./1,000 sq. ft.).

Each of these tank-mixtures provided excellent control under high snow mold pressure and the combinations provided significantly better control than did the companion products applied alone. The Interface plus Turfcide treatment was applied at a number of locations last fall and certain results may lead to a new area of further research.

Charles Golob, M.S. and William Johnston, Ph.D. of Washington State University conducted a field trial in Columbia Falls, Mont., that developed 91.3 percent disease severity (65-percent pink snow mold [*Microdochium nivale*] and 35-percent gray snow mold [*Typhula* spp.]) (Golob and Johnston, 2013). Table 2 shows the results from selected treatments that were included in the trial. The treatments were applied November 2, 2012 and were rated for snow mold at 145 days after application on March 28, 2013. Under such severe disease pressure, the high label rate of Turfcide 400 (16 fl. oz./1,000 sq. ft.) was required to provide excellent control. Tank-mixtures of Turfcide applied at 8 fl. oz./1,000 sq. ft. with companion products performed exceptionally well in this trial. The combination of Interface (iprodione + trifloxystrobin)

Continued on page 42
Continued from page 41

(3 fl. oz./1,000 sq. ft.) plus Turfcide at 8 fl. oz. /1,000 sq. ft. provided significantly better control than did the combination of Interface (3 fl. oz./1,000 sq. ft.) plus Chipco Triton (triticonazole) (0.75 fl. oz./1,000 sq. ft.). The combination of Concert II (chlorothalonil + propiconazole) (8.5 fl. oz./1,000 sq. ft.) plus Turfcide provided significantly better control than did the combination of Concert II (8.5 fl. oz./1,000 sq. ft.) plus Banner Maxx II (1 fl. oz./1,000 sq. ft.).

An issue with Turfcide that most superintendents are well aware of is that under certain situations there may be a transient yellowing of creeping bentgrass after application. This has generally been managed through application timing by using the snow mold rates only after the turf has stopped growing in the fall. Applying Turfcide immediately prior to precipitation or irrigating the treated area after application minimizes the potential for yellowing by moving the active ingredient from the leaves into the thatch.

An interesting area for further research has been discovered recently by Geunhwa Jung, Ph.D. of the University of Massachusetts. Table 3 shows phytotoxicity ratings for two treatments from a trial that he conducted in Queensbury, N.Y. (Popko and Jung, 2013). The results show a marked reduction in phytotoxicity of creeping bentgrass when Turfcide 400 was tank-mixed with Interface. These results suggest that the StressGard Formulation Technology that is included in Interface may also help to reduce phytotoxicity by PCNB. As one can imagine, additional research on this topic will be conducted in 2013.

At the completion of their first half-century of use, Turfcide brand products are still an important component of snow mold management programs based on their performance, economy, versatility and mode of action. And current research is focused on expanding these attributes to redefine their place in the market for many years to come.

Charles Silcox, Ph.D., is a Product Development Manager with Amvac Environmental Products and can be reached at charless@amvac-chemical.com.

References

Golob, C.T. and Johnston, W.J. 2013. AMWC - Turfcide 400 and AMV4820 alone combined with other fungicides or compared to other fungicides to control pink and gray snow mold on fairways. 2012-13. Online.


Treat Your Course Before Old Man Winter Tees Off

While the weather conditions can be extremely variable, it’s not too late to plan a sound preventive fungicide program for combating tough winter diseases such as snow mold. Syngenta invests extensively on Research and Development efforts across multiple geographic regions to provide you with the best snow mold recommendations. It is important to take into account the climate variability, length of control, infections from pink and gray snow mold and other diseases such as anthracnose that can infect turf with or without snow cover. With the Syngenta snow mold assurance program, you get the best possible snow mold solution for your course and we stand behind it every step of the way.

Maximize Your Protection on Greens and Tees

Keeping your greens and tees protected during the winter months is critical. Instrata® fungicide is the foremost product for protection against pink and gray snow mold as well as preventing spring pressure of diseases such as anthracnose. By combining three active ingredients, Instrata at a rate of 9.0–11.0 fl oz per 1,000 ft² outperforms conventional snow mold products for 120+ days of control.

Minimize Snow Mold Damage on your Fairways

Finding an effective and cost efficient program for fairways is critical. The combination of Concert® II fungicide at a rate of 8.5 fl oz + Banner Maxx® II fungicide at a rate of 1.0 fl oz per 1,000 ft² brings greens-grade quality to your fairways for 120 days of pink and gray snow mold protection.

Scan the QR code for additional efficacy trials.
Snow Mold Assurance Program

Enjoy a Winter Without Worry of Disease

Syngenta snow mold assurance program takes the uncertainty out of snow mold protection. Instead of trying to predict the particular weather conditions, superintendents now have a stress-free way of controlling pink and gray snow mold on greens, tees and fairways. The Syngenta program provides everything you need to ensure your course opens on time with the ultimate playability in the spring.

### Syngenta Preventive Snow Mold Recommendations

<table>
<thead>
<tr>
<th>Greens</th>
<th>120+ days of control</th>
<th>Instrata 9.0 – 11.0* fl oz per 1,000 ft²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fairways</td>
<td>120 days of control</td>
<td>Concert II 8.5 fl oz + Banner Maxx II 1.0 fl oz per 1,000 ft²</td>
</tr>
</tbody>
</table>

*2) 5.5 fl oz applications or (1) 11 fl oz application.

### Key Agronomic Practices:

- Give your snow mold application an advantage by utilizing a fall clean-up application to control cool season disease
- Summer stresses, such as plant diseases, take a toll on turfgrass health, give your turfgrass the best chance for recovery with properly timed clean-up and snow mold applications
- Apply snow mold applications prior to snowfall as a single or a split application
- Additional applications may be necessary in absence of permanent snow cover
- Apply in a minimum carrier volume of 50 gallons of water per acre on fairways and tees, and 90 gallons of water per acre for putting greens
- For enhanced turf quality and improved color as the snow melts, tank mix a pigment to the above recommendations. While it won’t enhance your disease control, pigments provide superior visual turf quality after snow melt, and the color boosts turf recovery and growth coming out of dormancy in the spring.

### Instrata Volume Pricing

- Instrata Price $135/gallon when ≥ 25 gallons purchased on a single invoice
- 25 gallons treats 6.7–8.7 acres @ 9–11 oz per 1,000 ft² respectively

### Snow Mold Solution Pallet

- Banner Maxx II 2 x 1 gal – 2 cases (4 gal total)
- Concert II 2 x 2.5 gal – 7 cases (35 gal total)
- Snow Mold Solution: $2,900/pallet
- Treats 12 acres @ 8.5oz Concert + 1 oz Banner per 1,000 ft²

### Syngenta Snow Mold Assurance Terms and Conditions

User must follow prescribed guidelines herein regarding application rates and timing for the user’s region and apply on a minimum of 3 acres of greens or 20 acres of fairways in order to qualify for the Program. Instrata and Snow Mold Pallet Offer brand purchases and product applications must be made between August 1, 2013 and September 9, 2013 (“Qualifying Period”). All claims must be reported to and submitted in writing to your Syngenta territory manager within two (2) weeks after snow melt and no later than April 15, 2014. In the event you notify your Syngenta territory manager of snow mold Breakthrough exceeding 15%, your Syngenta territory manager will investigate and, if warranted, supply Syngenta products for rescue treatment with a value not to exceed the value of the Syngenta products already purchased and applied by user on the applicable acreage during the Qualifying Period. A “Breakthrough” is defined as more than 15% occurrence of snow mold snow mold control as compared to untreated areas of similar turf density, turf type, and environment at the discretion of the Syngenta territory manager and the user. Syngenta’s determination as to whether less than acceptable control exists will be final. Syngenta retains the right to audit purchase records in assessing claims made pursuant to the Program. Syngenta will not pay for any application for rescue treatments. Cultural practices, mechanical issues or any other factors that are deemed contrary to standard practices and methods for preventive snow mold control will render the claim ineligible. Syngenta reserves the right to modify or discontinue this Program at any time without prior notice.

### Terms and Conditions

- Prices and terms for the products purchased from Syngenta through a Syngenta Authorized Agent are determined by Syngenta.
- Syngenta reserves the right to modify or discontinue this Offer at any time.
- Contact a Syngenta Authorized Agent for official terms and conditions.

Call the Syngenta Customer Center at 1-866-SYNGENTA (796-4368) to learn more.
Search Golfdom HD on the App Store™
Direct link: http://itunes.com/apps/GolfdomHD
For more information, visit Golfdom.com

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I have been fortunate to visit many of these golf courses, in part due to our Ohio State Extension Specialist Pam Sherratt. Pam is often contacted by a local extension agent, a small town, or maybe an owner to make a visit to a golf course. Pam’s primary expertise is in athletic fields, so she often invites one of the turfgrass faculty to go under the auspicious purpose to “provide backup.” I rarely pass up an invitation even though I know Pam is more than qualified to provide suggestions and recommendations.

I personally enjoy the road trips. It allows me to get out of the office and into the real world. The trips themselves consist of talking turf with Pam with periodic stops at a Dairy Queen, and if we come across one — Starbucks. Many of the destinations are in remote areas. I know we are close to our destination when the voice in Pam’s GPS says, “Danger, you are in an unspecified area, proceed with caution. Make a legal U-turn…”

I am always pleasantly surprised by the visits because they are never what I expected. For example, one visit was made to the Morgan County Fairgrounds and Golf Course in McConnelsville, Ohio. The golf course is a 9-hole Par 3 located on the fairgrounds along the Muskingum River.

The course is run by one employee along with volunteers associated with the fair’s board. The enthusiasm and love they show to this golf course can’t help but make you excited to be around them. The reason for the visit was to help them achieve their goal of better quality greens. I asked about the fairways, and was informed that is where the RVs park during the fair. We focused on improving the greens.

As we were leaving I asked one of the board members if Demolition Derby was still an event at the fair. His reply was a classic, “Cash for junkers killed the Demolition Derby.” I found ways to use that quote a number of times this past summer.

A second example is Glenlaurel Inn in Southeast Ohio. As Pam and I traveled down a rather nondescript winding road and through a hollow, we came upon the golf course, to which Pam said looking at the greens, “It looks like they’ve started renovating them.” My reply was, “Those are sand greens.” Pam replied, “Oops,” and had a good laugh. This was the first time I have seen sand greens in Ohio. For Pam, it was possibly her first time seeing sand greens anywhere.

Glenlaurel is a luxurious Scottish Inn with an eight-hole Scottish links golf course. Hurdzan Design worked with the owners to lay out the course eight years ago. I asked one of the owners, why eight holes? And he replied with a smirk, “So that you would ask me.” What makes the course unique, besides the sand greens and eight holes, is that you play the course with four hickory-shafted clubs and a golf ball that is limited to 60 percent distance of an ordinary golf ball.

Their issue was how to improve the quality of those sand greens. No matter where you go it always seems like the focus of discussion is on improving the quality of greens.

I bring these courses up not to give some agronomic insight or even promote better conditioned courses. What these courses represent, in part, is what is good about golf: the people who have a passion and love for the game and the close attachment they have for the golf course. Whether you’re in New York City or the hollows of West Virginia, people who associate themselves with golf are people I like to be around.

Karl Danneberger, Ph.D., Golfdom’s science editor and a professor at The Ohio State University, can be reached at danneberger.1@osu.edu.
Winding down the bermudagrass season in preparation for overseeding

Jason Kruse, Ph.D., is an assistant professor of turfgrass science at the University of Florida. Jason’s research focuses on turfgrass fertility and management. Jason can be reached at jkk@ufl.edu.

Q What should a superintendent be thinking about right now in preparation for overseeding?
A successful overseeding program relies heavily on a well-developed thatch management program. Thatch control is a yearlong process. At this point most superintendents should be wrapping up their thatch-control activities. Their efforts, along with the cooler weather, will be easing the bermudagrass toward dormancy. If the thatch control isn’t completed by now, there isn’t much that can be done now to manage thatch.

Q Assuming the thatch control is completed, what steps can a superintendent take to ease the bermudagrass into dormancy?
First, for central Florida we suggest no nitrogen fertilizer after mid-August. Let the bermudagrass take its cues from the shorter day length and cooler temperatures to decrease leaf growth and start to enter dormancy.

Second, raise the mowing height on all areas of the golf course. A small change in mowing height will improve bermudagrass health whether overseeding or not. The higher mowing height will lead to more leaf area which will provide the plants with more carbohydrates and a larger root system. Most golfers will not notice a slight increase of about 0.03 inches on putting greens at this time of the year. Since the bermudagrass is growing slowly this time of year naturally, a slight increase in mowing height is easier to accommodate.

Q What tips do you have for successfully overseeding greens?
Look at the calendar and note your planned overseeding date when planning the last preemergence herbicide application to make sure that all pre-emergence herbicides have dissipated by the time you plant.

Water management is extremely important for a successful overseeding, especially in the first 7 to 14 days after seed germination. The challenge for superintendents is to keep the surface moist without being too wet. Too much water and the seedling turf is very susceptible to diseases. Too little water, the seedlings dry out and die.

Raise the mowing height for the first 14 days after the seedlings emerge. This will give the seedling turf a chance to develop a root system and become established. After about 14 days the mowing height can be gradually lowered.

Keep the reels and bed knives sharp. New seedlings aren’t anchored in the soil very well. A slightly dull mower can tear out the seedling turf rather than cut it. If the mower tears out the seedling turf plants, a poor stand will result that looks bad and plays poorly.

“The challenge for superintendents is to keep the surface moist without being too wet. Too much water and the seedling turf is very susceptible to diseases. Too little water, the seedlings dry out and die.”

JASON KRUSE, PH.D.

About one week after seed germination, apply a foliar nitrogen source at a low rate using a nitrogen source with a low burn potential. Using a low rate of nitrogen is important to not stimulate bermudagrass growth. The goal is for the bermudagrass to go dormant. Once the bermudagrass is dormant, the overseeded turf stand can be fertilized at higher rates to encourage the growth and development of the overseeded turf.

Some superintendents topdress right after seeding to enhance seed to soil contact and enhance establishment. It is important to carefully manage topdressing application in the weeks after germination to minimize damage to the seedling turf. Wait until the seedling turf has developed a root system and is well anchored before topdressing.

Q Anything else to add?
Believe it or not, it is important to begin planning for the transition back to bermudagrass in the spring. Coordinate golf events with the planned time to remove the overseeded turf. Holding overseeded turf too long in spring increases the risk of damaging or killing the bermudagrass base.
SNOW MOLD SEASON NEARS
DISREGARD THE LATE HEAT WAVE, WINTER IS COMING

BY Seth Jones // Editor-in-Chief

1. Snow mold webinar
In a recent free GCSAA TV webinar, Matt Giese, M.S., Midwest technical manager for Syngenta, discussed the need for a sound snow mold program, particularly if your course has a history of the disease. The main concepts discussed in the Webinar are:
- The importance of understanding snow mold
- Distinguishing between snow mold species
- Timing and recommendations for control
- Post-emergent control
gcsaa.tv/webinars/sponsored/view.php?id=205

2. Interface
From Bayer comes Interface, providing flexible, effective disease control under all conditions and mitigating plant stress. The combination of iprodione, trifloxystrobin and Stress Gard Formulation Technology provides a solution for diseases and plant stresses under hot, cool, wet or dry conditions. As a non-DMI fungicide, Interface can be applied throughout the year without harmful plant growth regulator effects, and help control DMI-resistant plant pathogens. Interface delivers effective control of key diseases, provides plant health benefits and improves turf color and quality. Use Interface alone or in combination with Tartan or Chipco Triton FLO for pink and gray snow mold control. backedbybayer.com/interface

3. Trinity
BASF’S Trinity fungicide delivers value for controlling a broad spectrum of diseases. Plus, it’s the ideal tank mix or rotation partner for Insignia fungicide to control your most troublesome turf problems. Trinity controls a broad spectrum of diseases, including gray and pink snow mold, anthracnose, brown patch, take-all patch, summer patch and dollar spot. Trinity is highly rainfast and is quickly absorbed by leaves, crown and roots; acropetal penetrant; provides both contact and upwardly systemic activity. betterturf.basf.us/products/trinity-fungicide.html

4. Enclave
From Quali-Pro comes Enclave, a new broad-spectrum fungicide. The first product of its kind in North America, Enclave is formulated with Quad-Control Technology that delivers effective, long-lasting protection from snow mold, anthracnose, brown patch, dollar spot and a broad range of ornamental diseases. From now through Dec. 6th, Quali-Pro is offering a $25 rebate per case on Enclave, and a $20 rebate per 30-gallon drum or $3 per case on Foursome turf pigment. quali-pro.com/products/enclave/

5. Turfcide 400
AMVAC ENVIRONMENTAL PRODUCTS offers Turfcide 400, preventing soil borne diseases in turf and labeled ornamentals. Turfcide is an excellent solution for control of persistent diseases of turf – from snow mold and brown patch to leaf spot and dollar spot. Turfcide is a contact fungicide to which no resistance has developed after nearly 50 years of use. Available in both granular and liquid formulations. amvac-chemical.com/

SNOW MOLD IS A DAMAGING TURFGRASS DISEASE that occurs wherever snow cover is prevalent. Damage from snow mold fungi usually becomes apparent as the snow melts and exposes the grass. Snow mold appears as circular patches (at least 3 to 12 inches) of dead and matted grass blades. In severe cases, these patches coalesce. The web-like mycelium of pink snow mold (Microdochium nivale) may initially look white and mature to a faint pink to salmon color. Gray snow mold (Typhula spp.) is white to gray in color.

TIPS FROM DR. THROSSELL
- Always apply your product after the last mowing of the year. If it gets warm again and you have to mow again, it’s going to cut down on your success rate.
- How many days of snow cover are you expecting? The length of your winter determines your strategy. A good rule of thumb, the longer your snow cover, the more active ingredients you’ll need. If you have a short snow cover, one active ingredient may do the trick. But if you have a long winter, you might need three active ingredients to get you through.
- Spring may seem like a long ways away. But when the snow melts, keep in mind that you’re not out of the woods yet — it’s still possible to get pink snow mold.
SNOW MOLD CONTROL

CONTINUED ONLINE
For more listings of top Snow Mold Control products, go to golfdom.com/SnowMold
One Cause. One Goal. One Percent.

One Cause: Help golf course management professionals and their dependents that are having trouble paying medical bills due to the lack of comprehensive insurance or adequate financial resources.

One Goal: Raise $10 million in 10 years to support these families.

One Percent: Donate 1% of your 2013 revenue, maintenance budget, or salary over the next 10 years in 10 payments.

Example Contribution:

2013 maintenance budget = $65,000

1% = $650

Donation = $65 per year for 10 years

To learn more about One for the Wee One, visit weeone.org/onepercent or call (630) 457-7276.
**TIPS FROM DR. THROSSELL**

“Be open to the idea of bionutritionals. Be willing to try them, but have reasonable expectations. I think a lot of products get over sold, and that’s the problem — sometimes they promise the world. They offer improvements but not drastic improvements. Don’t think it’ll drastically change the condition of your turf, but instead think of noticeable, incremental improvements.”

1. **GenNext Biotech**
   
   **GENNEXT BIOTECH** is a bio-nutritional that contains a water soluble carbon in a fertilizer carrier. It improves color, increases turf density, improves root depth and mass, while increasing green smoothness and speed. A key to GenNext Biotech is that it promotes bentgrass growth, allowing the bentgrass to out-compete Poa annua, without actually hurting the Poa annua. The C&D balanced turf grass formulation contains over 3,000 complexes of natural organic ingredients, microbiological bi-products, organic hormones, extracts, and enzyme complexes delivered in a high energy liquid fertilizer carrier.

   Gennextbiotech.com

2. **Holganix**
   
   **HOLGANIX** is a 100-percent natural organic bio-nutritional product that promotes strong plant health by naturally increasing resistance to disease and insect damage through significant root and cell wall development. Holganix begins with a proprietary plant-based compost tea containing no animal or human by-products. Its active bio-nutrients include peat-based hummates, endo- and ecto-mycorrhizae, tricaderma, yucca extract, and melaleuca oil. The end product is a highly evolved formula, teeming with beneficial microbiological organisms, that helps to recreate the natural soil environment your plants need to thrive.

   Holganix.com

3. **Merge**
   
   BioCharge your turf fertility program with **PATHWAY’S** flagship microbial product series Merge which offers product deployment options with your granular and liquid fertilizer, as well as a soluble “PowerPac” for tank mixing with liquid fertilizer and pesticide applications. Benefits include easy application; a cost effective “pure culture” science; metabolites, enzymes and bio-surfactants accelerate nutrient cycling and root architecture for your soil and turf; turf uniformity, density and color; manages nematode populations; balance organic matter; increase turf tolerance to weather extremes, disease and other pressure.

   Pathwaybiological.com

4. **Diamond Grow Organic**
   
   **Plants Choice Diamond Grow Organic Humic Acid**, available from **SOLU-CAL USA**, delivers the benefits of humic/fulvic acid cation exchange without the high cost of other humates traditionally offered in the turf market. It is an organic biostimulant available in both liquid and powder concentrations. Derived from natural organic humus, with sea kelp, potash and other natural plant hormones combined, it helps plants use stored and applied nutrients efficiently.

   Solu-cal.com

CONTINUED ONLINE

For more listings of Bionutritionals, go to golfdom.com/Bionutritionals
1. Grounds Wheelie
From **WHEEL SPRAY CORP.**, the WS-485 Grounds Wheelie features the motorless system that Wheel Spray Corp. is known for. Similar to the WS-480 Grounds Wheelie, the difference lies in the larger tires that are designed to make pushing easy in tall southern grasses or hilly, uneven surfaces. The WS-485 is used to apply liquid fertilizers, herbicides, fungicides and growth regulators. The twin wheel pumps spray a fan of solution 6-feet wide, at the rate of 1000 sq. ft. per gallon.

Wheelspray.com

2. Backpack blower
**ECHO INC.** announces the release of what the company calls the most powerful low-noise backpack blower on the market, the Echo PB-760LN. The PB-760LN boasts a larger muffler, sound deadening insulation and a mid-pipe baffle to help lower the machine’s sound output to 65 dB(A). The annoying whine common to outdated leaf blowers, generated by the main impeller fan, is essentially gone on these models. The PB-760LN features 535 cubic feet per minute (CFM) of air volume at 214 miles per hour.

Echo-USA.com

3. Deep-cycle batteries
**U.S. BATTERY MANUFACTURING**’s 6-volt, 8 volt and 12-volt deep-cycle golf car batteries incorporate the company’s exclusive XC2® formulation and Diamond Plate Technology. This combination of extremely efficient synthetic tetrabasic lead sulfate crystal structures (TTBLS), allow U.S. Battery’s products to reach peak capacity in fewer cycles, to provide higher total energy delivery, and extended battery life. The batteries reach peak capacity in as little as 25 cycles, the company says. U.S. Battery’s deep-cycle batteries are available in a variety of sizes and amp-hour capacity ratings.

USBattery.com

4. UtiliGuard
**THE DITCH WITCH** organization introduces UtiliGuard, a new utility locating system with numerous industry-first features that combine to offer unprecedented locating accuracy. Among UtiliGuard’s many innovative features is Ambient Interference Measurement (AIM), which scans the surrounding area for noise and recommends the best frequency among the 70 it provides, resulting in faster, more accurate locates.

Ditchwitch.com

**CONTINUED ONLINE**
For more listings of Labor Saving Equipment, go to golfdom.com/laborsave

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**WORK SMARTER, NOT HARDER**

**FIVE TIPS FROM REFINETHEMIND.COM**

1. Get an early start
2. Devote your entire focus to the task at hand
3. Sleep at least 7 to 8 hours
4. Learn to say “no”
5. Complete the most important task first
Forget blue or red; the vote goes to **Emerald® fungicide** for the best dollar spot control on turf in every region of the U.S. With a single application, **Emerald fungicide** delivers unsurpassed dollar spot control for 14 to 28 days. And use **Curalan® EG fungicide** for that second application for economical control of dollar spot. For best results, include **Emerald fungicide** in your first application in spring followed by **Curalan EG fungicide**. Then use **Curalan EG fungicide** followed by **Emerald fungicide** for your last two fungicide applications in fall.

Always read and follow label directions.

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Deron, what can I get you from the bar? I’ll have a regular Shock Top or a Blue Moon, thanks.

Where are you from originally? Mifflintown, Pa. It’s a small town right between Harrisburg and State College. That’s how people know it — a small town you drive through on the way to Penn State.

You got your start in the industry at Riviera CC in Los Angeles, right? That had to be culture shock... To a 22-year-old farm boy from rural Pennsylvania? Yeah! I just remember thinking that L.A. was big... really, really big.

I know you love to play golf... what are your favorite highlights of playing? I had a hole-in-one during my time in L.A. It was at Tierra Rejada GC (in Moorpark, Calif.) I also love that my good friend Jim Rattigan (superintendent/general manager, Schuylkill CC, Orwigsburg, Pa.) and I won the Sullivan four-ball tournament at Lebanon CC (North Cornwall Township, Pa.)

What did you do to celebrate the hole-in-one? I did nothing, we had to work the next morning! It was late, the clubhouse wasn’t even open to grab a drink. That saved me some money.

NFL football kicks off tonight.

Are you ready? I’ll have the game on, but I’ll probably only make it through the first quarter. What time does it kick off? ...OK, I probably won’t even make it through the first quarter.

Who are your teams? Pittsburgh everything. Go Pirates! And the Penn State Nittany Lions.

What’s your favorite piece of equipment? Probably my (Toro Procore) 648 and (Toro Procore) 1298. They’re great machines, plus, once they roll out in late spring, it’s the sign of another golf season complete in Florida.

Any new tools or techniques that you’re impressed with? Man, I’m old-school. I still primarily use a soil probe. I should probably invest in a soil moisture meter to help with time and water management.

If you had my job for a day, what would you do? I guess I’d do a series of articles on the things you don’t learn in turf school... for example, “how to manage a culturally diverse crew.”

That’s a good idea, I like it! Aw, man... the game was just delayed for lightning... Now there’s definitely no chance of me catching any of the game!

As interviewed by Seth Jones, September 5th, 2013.

“WATER MANAGEMENT IS IMPORTANT HERE, AND YOU HAVE TO STAY ON TOP OF YOUR INSECT AND WEED PROGRAMS.”

Deron Zendt
SUPERINTENDENT // Banyan Golf Club, West Palm Beach, Fla.
You wouldn’t use a race car to measure green speed.

With Secure™ you no longer need to use systemic fungicides in place of contact disease protection.

Introducing Secure™ fungicide, a game changing multi-site contact that is the perfect rotation partner to Daconil Action.™ Secure is the only registered fungicide for turf in FRAC group 29 and has no known resistance and low risk of future resistance. With Secure, you now have the contacts you need to complete your disease management program. Secure. Your rotation, your way.

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- Visually superior turf coloration
- Smoother playing surface
- Increased root mass and density
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Faster, Stronger, Smoother, Denser, Healthier.
GenNextBiotech.com

It starts with the next generation of plant science.

GenNext Biotech products combine natural enzymatically organic ingredients to provide your turf the plant health it requires.

Repeated applications reduce:
- irrigation needs
- chemical inputs
- poa annua populations

Thanks to Tony Hartsock at Colorado Golf Clubs and Golf Enviro Systems Inc for showing the world what fast, firm and healthy looks like with GenNext during the Solheim Cup telecasts.