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GOLF COURSE INDUSTRY

SERVING THE BUSINESS
OF GOLF COURSE MANAGEMENT

NO MORE GUESSING GAMES

ALL WILL BE REVEALED

MAGIC 8-BALL SAYS: Moisture meters take the guesswork out of watering.

ALL SIGNS POINT
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THE ZONTEK AWARD

There are, I am told, a few of you who read this magazine backwards. You claim to start with the back page and read whatever ramblings I've offered in "Parting Shots" and then you leaf through in the exact opposite manner in which we have intended.

Stop doing that. It disrupts the whole feng shui of GCI.

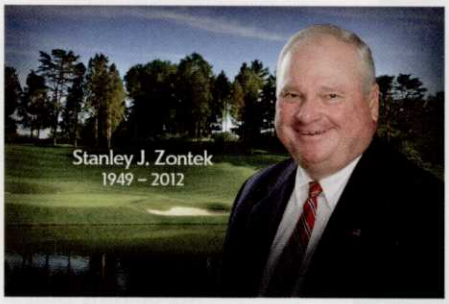
Anyway, those of you who read backasswards already know that I wrote my column about the advice I'd give to young people considering a career as a superintendent these days. The very short version is: you damned well better be passionate about this business or you'll never make it.

When I wrote that, I heard a little voice in the back of my head saying 'Right on.'

It was Stan Zontek's voice.

In the months since Stan passed, I've heard dozens of awesome, funny, outrageous Stan stories. All of them were in different contexts – speeches, course visits, trips overseas, etc. – but they had one common theme: his passion and enthusiasm for turf, turfheads and the game of golf.

What, I've been wondering, could we do to continue to foster that passion even though Stan's not around in person to do it for us?



To that end, I'm pleased to announce that we have created the Stan Zontek Memorial Scholarship Award to be presented to an outstanding turf student who demonstrates the passion and commitment to the spirit that Stan embodied. The award, an unrestricted grant of $2,500, will be given to one student based on academic performance, advisor/superintendent recommendations and an essay about why they're passionate about a career as a superintendent.

Pat Jones
Editorial director and publisher

I'll do the judging for this one myself. Maybe Stanley will whisper into my ear a little and help. He'll probably be saying, "Jonesy, pick the Penn State kid." In my imagination, even Stan's ghost bleeds Nittany blue.

//

For the love of God, download the new GCI app. By now, we've probably pounded you to death with emails and website articles and notes tied to carrier pigeons and skywriting over the San Diego Convention Center telling you to please download the new app. It's just that good.

Big props go to our entire technical team for creating this thing, but it truly does take a village to do something like this. We're a modestly sized company with just about 100 employees who work on about 20 different magazines in about a dozen different markets. The core group of people who thought up, developed, designed and wrote this app was probably about a dozen folks. There are huge media companies that haven't done anything nearly this innovative. Seriously. I'm very proud and very humbled to get to be a part of it.

Mostly, I hope you like it and you find it useful. It's fun as hell, that's for sure, but the idea is to create a full multimedia experience – right there on your iPad or phone – that enhances your ability to learn and get better at your job. Frankly, we're just beginning to harness the power that this platform gives us. In short, it's pretty damned good but it's just the tip of the iceberg.

I hope you're enjoying GCI and all the strange places we go. Come along for the ride with us. I promise it'll never be boring! **GCI**

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We'd like to hear from you.

E-mail us at gci@gie.net with your thoughts and opinions.

One short

Kaminski

We'd like to say that we planted this as an Easter egg to see if everyone was paying attention. In reality, it was just an oversight on our part, but you guys are definitely paying attention. Many of you emailed to let us know that in John "Johnny Turf Nerd" Kaminski's January column – "Top 10 excuses (and my answers) for not continuing your education" – he forgot to include a No. 8. So here it is:

8. I forgot to register

This is more of an afterthought since I somehow forgot to include No. 8 in the original publication. It just goes to show you that sometimes you need to slow down, take a breath and regroup. If you forgot to register for an educational conference then it's probably a sign that you're putting too much on yourself and could probably use this as an opportunity to get away from the day to day!

Enter bit.ly/127Ads8 into your web browser to read John's column.

What it's really like

I wanted to let you know that Pat's "Running scared" column (Parting Shots, December 2012) was right on and well written and most importantly good advice to all.

Good job. Also downloaded the mobile app and I am looking forward to using it regularly.

Don Rossi
Director of sales
Cleary Chemical Corp.

Reading Pat Jones' work has been a regular and enjoyable activity. Pat is one of the few people writing about the turf industry that really understands how tough it is out there.

His article "Running scared" (Parting Shots, December 2012) is another example of this insight, and I thank him for being forthwith about how golf maintenance is these days.

It is rather disheartening to see members of the industry press on a regular basis still trying to pass along the idea that things aren't as dire as they really are, or hearing an industry organization heralding a small upswing in rounds as the beginning of the end of terrible times.

Things are not good out here, and I only fear they will get worse.

Oklahoma-based superintendent
Name withheld by request

To read this column, **enter bit.ly/X6AzaZ** to read Pat Jones' column, "Running scared."

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[EDITOR'S NOTEBOOK]

Keeping green green

Rain Bird's Intelligent Use of Water Summit shares smart-water practices that work, and encourages the golf industry to take a leadership position in innovative water management practices.

Brown doesn't have to be the new green if the industry better manages its available water resources and applies practices that more efficiently and effectively keeps turf green. That was the resounding message of Rain Bird's 2013 Intelligent Use of Water Summit, which took place last month at Michigan State University.

The conference on stewardship of water resources in the golf industry and featured a lineup of water experts and golf course superintendents who described the programs and efforts in practice to conserve and better utilize available water.

Keynote speaker and author of "The Big Thirst" Charles Fishman says there is no "global" water crisis. Rather, all water issues are local issues that need to be solved at the local level.

Fishman argues that, as a resource, water is too cheap, and with such a low price point it contributes to waste and inhibits the development of new ways to use and conserve it.

"Free is the wrong price for water. When a resource as important as water is free it's misused .... There is no incentive to use it correctly .... Water is so cheap it's starved of innovation .... We could solve all of our water problems by charging just a little bit more. No one is immune to water problems."

Many of the tools and technology needed to use water more efficiently already exist, Fishman says. Instead, they're just not being used.

"We have the tools we need (for smart water use)," he says. "What we need is the leadership (to use them)." He adds the golf industry can play that leadership role and serve as a benchmark for innovative, smart-water use in their respective communities. Examples are readily available among superintendents who have overcome water challenges. Fishman adds that smart water practices bring added benefits, as well.

"You save a little on water and then there's a cascade of savings that goes along with it," he says, adding smart-water practices also reduce energy and material costs. "You start saving on water and other good things happen."

Here are some other key points that came up during the various panel discussions.

U of Calif's Dr. Ali Harivandi: "Drought has become a part of our life ... because of that we have to look at other sources of water if you want to survive in (the turf) industry .... (Solutions are) expensive, but we can do it. Especially in areas where we don't have access to water .... We can all start praying for rain ... but we can also use the science and knowledge that is out there."

Desert Mountain Club's Shawn Emerson: "Brown is the new green? Where did they get that from? I'm about growing green grass. In saying that, I want to be more efficient and more educated (about water use) ... and we have the tools today to do this (grow green turf efficiently). You have to understand that you need to put all of the processes together ...." Emerson also added that, when it comes to irrigating efficiently and smart water use, knowing your numbers is job security. Superintendents need to take their technical skills and run with them, but they should never stop learning and improving.

Atlanta Athletic Club's Ken Mangum offers some great advice: "Your two eyes are the most important tools you have as a superintendent .... Be observant. See and notice things (on your course) before they become obvious to others."

Rutgers turfgrass researcher Stacy Bonos reports on ongoing research and developments to breed bentgrass and fescue that is both salt tolerant and drought resistant ... they have breeds that are solid (stay green) for each individual stress, the challenge is a single breed that remains green when exposed to both criteria.

From
THE FEED

The new GCI app went live, and readers took a spin with the January issue. Naturally, redefining how magazines can be read made quite a splash in social media. Here's what readers have been saying.

Campbell Chemicals @campbellturf
Showed new @GCImagazine iPad mag app to our turf committee today. Let's just say they were very impressed

Michael Benkusky @benkuskygolf
Awesome new iPad app by @GCImagazine Come back and wipe your fingerprints off my screen!

Jeff Ryan @jeffryan
Great re-tooling of the app it's a quantum leap forward. Now about the face of the organization.....

Gary Deters @gdeters_turf
Just downloaded the App. It is ridiculously good. All that info in my phone. Thanks.

Andrew Hardy @pheasantturf
Thank you for scaring the crap out of me on the iPad app. Almost made my son cry haha

iTurfapps @iturfapps
About time someone harnesses the ability and power of an iPad for multimedia delivery! Great job @GCImagazine on new app!

Bob Porter@hiawathaturf
Best thing I noticed right away. It downloads the issue for reading offline, like most other magazine apps. Nice!

David Beanblossom@DBeanblossom
love, love, love the new IPad app. It's going to take me days instead of hours to read each magazine now. #awesome, #fantastic

Join the conversation
on Twitter @GCIMagazine!

Recycling rewarded

Remember a few months ago when we took notice of Royal Oaks Country Club's new GreenDrop Recycling Stations throughout the course, making it easy for players to self-sort recyclables on the fly? It turns out the GCI team wasn't the only group paying attention.

The Vancouver, Wash., course was named Facility of the Year by the Oregon Golf Association for its efforts, as well as in recognition of hosting annual events raising funds for local non-profit organizations. Marcia LaFond, club manager, received the award at the 2012 OGA annual awards meeting.

While the stations have shown up around the country, Royal Oaks is the first golf facility to place them on the course.

GOLF.COMEDY

Golf has been a centerpiece of famous comedy for years, from the wit of Bob Hope to the ineffable Caddyshack. It was really only a matter of time before a new platform for comics went back to the course. Comedian Paul Rodriguez is at the head of the brand new web series "Comics Open," featured on ClickonGolf.TV. Rodriguez plays a course owner who changes his clubhouse to a comedy club just for the chance to be his own emcee; he also imports a Russian mail-order bride (Maria Zyrianova) to be his new golf partner.

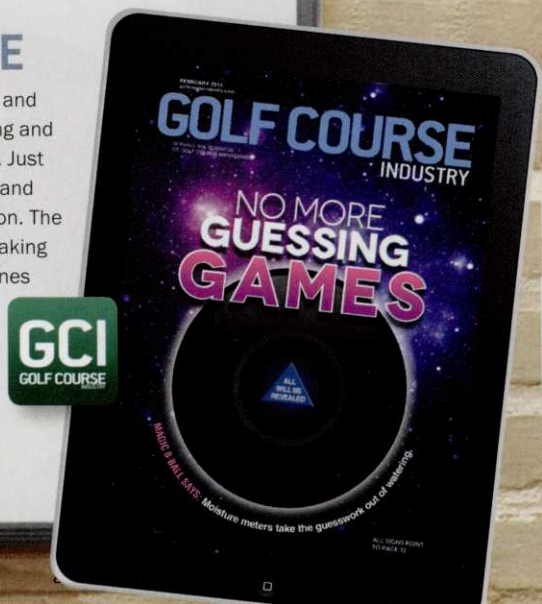
Agronomics might not be at the forefront of the jokes, since the first season has Rodriguez chipping a shot out of an open grave and an army tank trekking across the fairway. But River Bend Golf Links outside Jacksonville, Fla., owned by Stephen Joost and Scott Gladysz, provided a fitting home for the slapstick, being a former U.S. Navy-owned course.

"Golf has hundreds of jokes that have been told over the years," says Paul Madden, the show's producer. "We'll mine those, and mix in a few new ones. I don't think that well will ever run dry."

GCI GOES NATIVE

If you're reading this page digitally and nothing is moving – stop everything and go download our new app right now. Just search for "GCI" in the iTunes store and you'll snag our new native app edition. The new issue will load within the app, taking you on to what the future of magazines looks like. Both the iPad and iPhone versions will be available in time for the Golf Industry Show.

Head to **bit.ly/GCIapp13** to pick up the new native app and prepare to be amazed!



Henry DeLozier is a principal in the Global Golf Advisors consultancy. DeLozier joined Global Golf Advisors in 2008 after nine years as the vice president of golf for Pulte Homes. He is a past president of the National Golf Course Owners Association's board of directors and serves on the PGA of America's Employers Advisory Council.

INNOVATION AT ITS BEST

Innovation comes in all shapes and sizes and from all corners of the golf business. Here are four examples of innovation that give us more to look forward to in 2013.

Jim Singerling, the longtime CEO of the Club Managers Association of America, gets my vote as one of 2012's unsung champions. Alarmed at ever-increasing insurance premiums (estimated in excess of 220 percent over the last decade) that made insurance practically unaffordable for many clubs, for Singerling enough was enough.

What he decided to do was take his argument – basically that underwriting standards for private clubs over-estimated their risk – directly to the insurance companies. At the same time he and CMAA staffers were creating what they call the ClubDNA Program to leverage the association's membership for lower-cost coverage. The work is paying off. Jeff Magoon, the CMAA senior vice president of risk management, reports that clubs have increased their coverage value and decreased their premiums by an average of 10 percent from 2012 levels. Here's hoping that the clubs that benefit will redirect the savings into new member services.

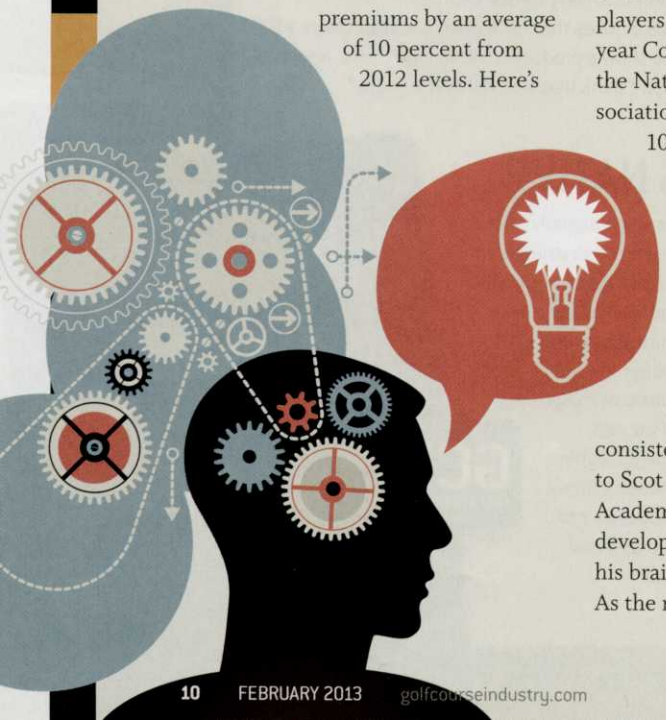
> A recent trip to Asia gave me insight to the preparations teens are making for the [Olympic] Games. But the real winner will be golf and everyone in the world who loves the game.

Kristopher Hart, a clever young man who loves golf, also displayed an innovative spirit. While a student at Bryant University in Smithfield, R.I., Kris tried to play golf as often as his pizza-sized college budget allowed. After graduation and landing in the investment field, it dawned on Kris that college students were prime targets for courses with a lot of white space on their tee sheets. Course owners who have embraced Kris' College Golf Pass have discovered new demand for golf in the 20-to-25 age cohort, a group that American Express says makes up 27 percent of the golf category spend.

More than 140 New England courses now welcome College Golf Pass players during off-peak times. Late last year College Golf Pass merged with the National Collegiate Club Golf Association, which represents more than 100 college and university competitive club golf programs, swelling CGP membership to nearly 3,000 students. Unless your course sells every tee time every day, you might see how College Golf Pass can increase demand with potential members.

Ever wish your swing had the consistency of a machine? Thanks to Scot Nei at the Tourbound Golf Academy in Chicago anyone can develop proper swing skills using his brainchild, the Swing Robot. As the robot proves, it doesn't take long to develop a repeatable motion. Scot shows video examples of raw beginners progressing from dainty brushes at the ball to a bona fide golf swing in as little as three weeks. The ability to ingrain repetitive motion is enhanced significantly by consistent rehearsal on the robot. Will the Swing Robot revolutionize golf instruction? Perhaps. It will certainly accelerate teaching and learning swing basics. I'm all for anything that helps golfers find success. Success leads to fun and enjoyment, and that's what keeps us all coming back for more.

A final spirit of innovation recognition goes to the stodgy International Olympic Committee, which cleared the way for golf's return to the world stage in 2016. The anticipation is already starting to build for the global competition that will be held on the Gil Hanse-designed course in Rio de Janeiro. We've heard that Rory McIlroy is debating his participation because he's not sure which flag he should fly from his bag – Northern Ireland's or Great Britain's. Rest assured most of the world's top players will be there, with many countries seeing golf and the Olympics as a perfect opportunity to up their medal count. Fine players – many capable of winning gold – will emerge from every corner of the globe. A recent trip to Asia gave me insight to the preparations teens are making for the games. But the real winner will be golf and everyone in the world who loves the game. New champions will emerge, and the world will see golf for what it is – the greatest game of all. **GCI**



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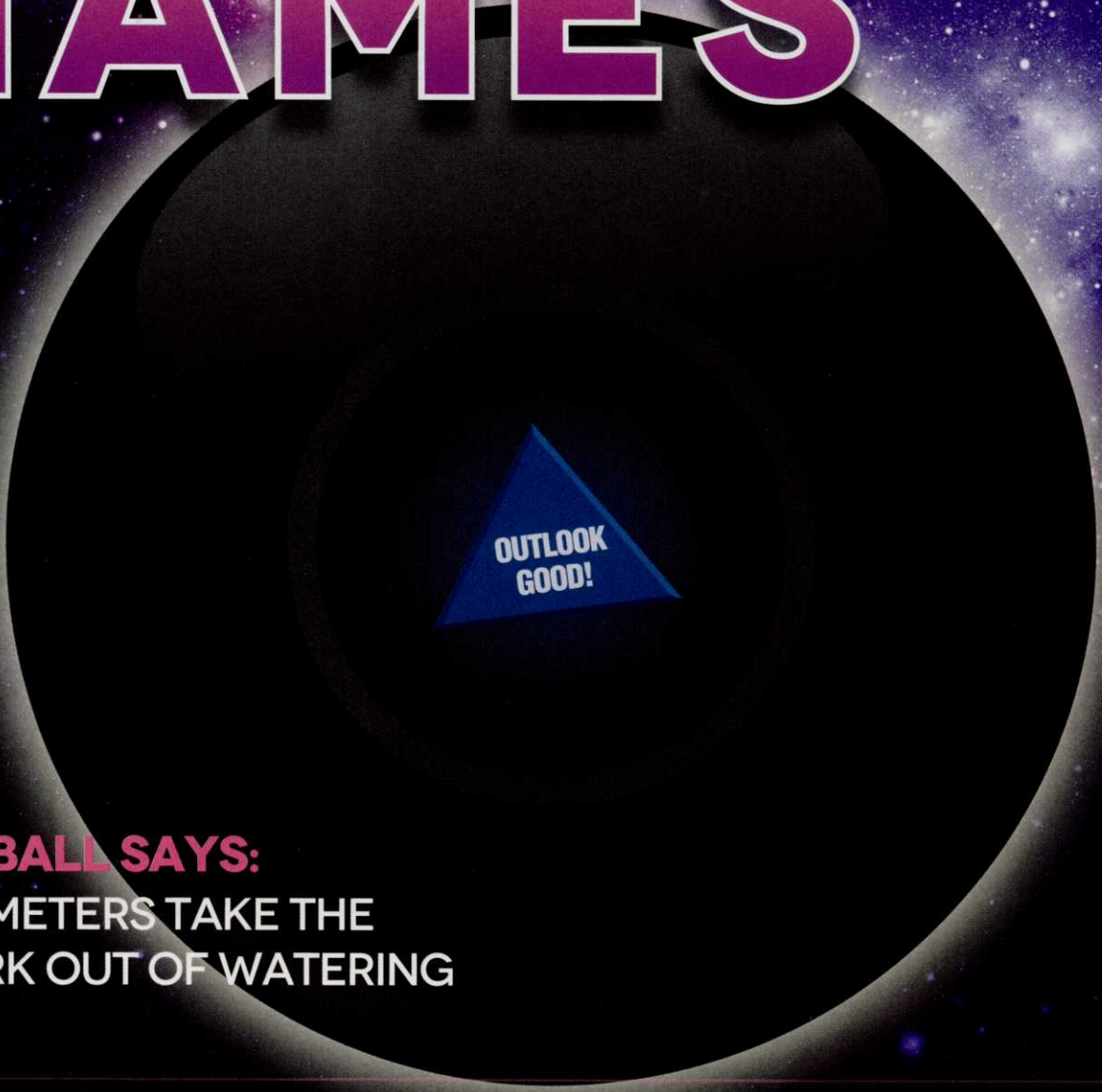

MAGIC 8-BALL SAYS:

MOISTURE METERS TAKE THE GUESSWORK OUT OF WATERING

BY ROB THOMAS

Water is the lifeblood of a golf course. Without it, the turf cannot survive. Conversely, too much can be detrimental to turf health, as well as costly and environmentally unsound if coming through excessive watering practices. Many superintendents are foregoing the guessing game of when to water through the use of soil moisture meters.

Garrett Luck, has been at North Shore Country Club in Mequon, Wis., for 12 years, the last seven as head superintendent. It wasn't until 2011 that they began using soil moisture meters, starting with the FieldScout TDR 300 from Spectrum Technologies. He says their goal was twofold – first, to more effectively hand water greens.

"During the summer, especially during periods of high temperatures and humidity, we rely predominantly on hand watering," Luck says. "This allows us to manage our bent/*Poa* greens with great success by reducing the risk of overwatering. After extensive use, we have established a threshold number at which the turf requires supplemental water. Staff has been trained to monitor the moisture values and various locations throughout the green and water only the areas that fall below our threshold.

"The second goal was to provide uniformly firm putting surfaces without sacrificing the health of the turf," he adds. "By using the meter at various locations across all putting surfaces, we are able to dial in our moisture on all putting surfaces on the entire course."

In 2012 Luck upgraded the irrigation control system to the Toro Lynx with VP controllers, including a set of Turf Guard soil monitoring sensors.

"I have been very impressed with these sensors that can be placed within the soil profile and monitor soil moisture, soil temperature and salinity," he says. "While salinity is not an issue at NSCC, both the moisture and temperature aspects have proven useful. Since certain pesticide applications are tied closely to soil temperature, we now properly time these applications with great certainty."

Timing allows Luck to realize improved results and eliminates the needs for future applications, which is both good for the environment and the bottom line, he says.

"Perhaps the most important aspect of the Turf Guard system is its ability to feed real-time data back to our central irrigation computer," Luck says. "This allows us to constantly monitor the moisture of our playing surfaces on our central computer, my iPhone, or my iPad. It is safe to say we water our greens considerably less now that we utilize this tool.

"The fact that the Turf Guard system documents all information from the sensors could prove to be valuable in communicating with the membership," he adds. "In situations where turf loss may occur on challenging areas, the data from the sensors could be used to explain the differences from one green to another."

Alan FitzGerald, superintendent at LedgeRock Golf Club in Mohnton, Pa., started using the TDR 300 handhelds four or five years ago to get a better idea of how his turf and, in particular, the greens were performing. Prior to that he would base watering on what he could see in the field.

"I am a firm believer in deep and infrequent irrigation practices, so once I would see uniform wilting, I knew it was time to re-soak the greens," FitzGerald says. "I thought the moisture meters would give me a little more guidance and let me know sooner than have the turf get too stressed out.

"It also helps in the days before the deep soak is due, as isolated dry spots start to appear," he adds. "We know how much they need to be hit to carry the green through to watering with the overheads."

FitzGerald adds the Toro Turf Guard in-ground sensors to monitor temperature, setting them to give notice once they reach a predetermined limit. Referring to them as a "snapshot" because of their placement, he installed the sensors in areas that give a good general indicator.

"I have two in a green I want to monitor – one in a known good/dry area, one in a wet/poorer area – so it gives a good average indicator of what's happening and can alert me to something before I can see by eye," he says. "I've installed them in a number of greens that are good

KEY POINTS:

MOISTURE METERS

- Low learning curve
- Assess moisture primarily on greens
- Provides for consistent and firmer playing surface
- Develops benchmarks to recognize anomalies
- Defines greens moisture threshold

indicators of all the greens."

FitzGerald initially installed Turf Guard at LedgeRock as a couple of pocketed greens started thinning out from lack of air movement. They took trees out and did as much culturally as possible, but still needed more air. The greens needed fans, but he knew it was going to be a major capital outlay.

"I had demoed the Turf Guard sensors so knew what they could do and show that a fan would help," he says. "The board approved the purchase of the sensors and a fan to see if it made a difference. I was able to show a 2-4 degree difference in temperature at a 2-inch depth, which showed the fan was working."

Since then he's adds fans to all the "bad" greens, which now play just like the others on the course.

Add Andy Ragsdale, superintendent at the Ritz-Carlton Golf Club in Orlando, Fla., and Mark Rawlins, CGCS at Longaberger Golf Club in Nashport, Ohio, to the list of those who use the TDR 300.

Rawlins was looking for a method to determine when areas of the greens were going to need irrigated to prevent wilt, but didn't want to apply water if it wasn't needed.

"[I] or the assistant superintendent will go around the course and check the high areas and the low areas of the greens and collars and record the moisture reading," Rawlins says. "This will first be done in the morning, usually while changing the hole locations. We will know at this point if hand watering will need to be done that day. Depending on the weather, most days we will also check the areas in the afternoon just to make sure."

FROM THE FIELD // Tool of the trade

The modern soil moisture meter has revolutionized the way turf managers apply one of Mother Nature's most important resources – water. Manufacturers have given us the flexibility to monitor not only moisture levels, but also temperature and salinity from the same unit. This data allows us to take a more objective approach to scheduling our irrigation cycles and daytime hand watering. One of my greatest concerns about the use of this technology is the rate at which it is implemented into management practices. Yes, information can be collected soon after the installation of a sub-surface unit or through the use of a portable device, but it takes time to extrapolate the information needed to get the most out of these tools.


Jordan

I often hear superintendents share their positive experience with soil moisture meters in an over-simplified, rudimentary manner. Ladies and gentlemen, this is not the fuel gauge on your car. We all know that when the low-fuel indicator appears on our dashboard that we ought to make it a priority to refuel, but the presence of an arbitrary number on a graph or LCD display doesn't necessarily mean that it is or isn't time to add water to a green, tee or fairway.

It may take an entire growing season to combine visuals observations with the numeric data to create relationships that are most useful for your property. It's only after this step that we may truly interpret and apply the information that is being collected by the moisture meters. For example, if the 10th green begins to exhibit drought stress at value X, we can evaluate our options and make a decision concerning the need for water. Furthermore, depending on how wide-spread the data collection is on your property, you can begin to group areas with similar characteristics. It's unlikely that all putting greens on a golf course have the same moisture requirements. Instead of watering all greens, selectively water greens in groups. For example, Group A greens may only require deep watering every five days, whereas Group B may require watering every four days. Certainly allow for variations in this schedule as weather, chemical applications, and golfing events may require the watering schedule to be modified. In the end, this will allow for irrigating in a more predictable and efficient manner.

Nate Jordan is a superintendent at Saratoga Lake Golf Club, Saratoga Springs, N.Y., and a frequent GCI contributor.

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FROM THE FIELD // Moisture Meter Basics

These days a golf course superintendent can only do so much with rolling and mowing and those practices are pretty consistent. Now the goal is firmness and consistency.

As such, handheld moisture meters have become a popular item with golf course superintendents. I talked with superintendents Eric Greytok, Belfair Plantation, Bluffton, S.C.; Jonathan Jennings, Shinnecock Hills Golf Club in Southampton, N.Y.; Tim O'Neill, Country Club of Darien, Darien, Conn.; and Pat Sisk, Milwaukee Country Club, River Hills, Wis.; about what portable meter they use and how they use it on their golf course. The Spectrum Technologies Field Scout TDR 300 seems to be the popular choice as all four superintendents were using it, each having two per 18 holes.

The meters come with different length probes. Sisk at Milwaukee Country Club is using 3-inch probes to manage the rootzone on his bentgrass greens, while O'Neill uses the 1-1/2-inch probes to manage on the greens at the Country Club of Darien. Greytok and Jennings were also using the 3-inch probes at Belfair and Shinnecock Hills, respectively.

While Sisk uses the meter to help fine tune his irrigation schedule, the other three superintendents are using the meter to aid in syringing their greens. Greytok, Jennings, and O'Neill use their meters to try and maintain a specific moisture range on their greens. Jennings says his "sweet spot" is between 12 percent and 17 percent moisture while O'Neill aims for 13 percent and knows that wilting will occur at 10 percent. Greytok also has specific target moisture levels he is aiming for and knows at what percentage wilt will occur.

All four of the superintendents queried take a number of readings on greens, from as little as five to as many as 20 to obtain an average moisture content.

They probe known hot spots or other trigger areas first. With time they have discovered that the moisture members provide reliable information that can be used to indicate when syringing needs to take place. For example, O'Neill and Greytok can measure moisture on the greens between 9 a.m. and 10 a.m. and know at what time they will need to syringe their greens. Sisk probes his greens mid to late afternoon and uses those readings to adjust his nightly irrigation schedule.

All four superintendents report that you do not need a lot of experience to use the moisture meters and technicians tend to catch on rather quickly. They are using the meter primarily on the greens and only occasionally will take readings on tees and fairways. They report that using the meter provides for a more consistent, dryer and firmer surface and also develops benchmarks for differences and to recognize anomalies. The meter also helps to fine the threshold so greens can be kept at the edge, not too dry and not too wet.

Monitoring soil moisture with a portable probe is a useful tool to help maintain the desired level of firmness for many superintendents.

Brian Vinchesi is president of Irrigation Consulting Inc. and authors GCI's "Irrigation Issues" column.

Ragsdale says the process is as easy as walking across the green and checking 12-15 spots for the average reading.

"An irrigation flag could be used to mark areas that need to be hit with the hose, so all spots can be checked and then you can return to hit those dry spots after you put the meter away," Ragsdale says. "Most people know their spots and will go right to them with the meter, so a flag system is not needed."

While Ragsdale wishes more can be done with the meter's GPS and mapping system, Luck wants even more data.

"I would like to see the ability to include mini-weather stations on irrigation controllers that could provide real-time measurements of precipitation, wind, humidity and solar radiation throughout the course," he says. "I believe this could really lend a hand in better dealing with microclimates."

FitzGerald believes, in time, they will provide more data, but now is finding ways to use the data already available.

Handheld moisture meters have become a popular item with superintendents.

Sensors are placed within the soil profile to monitor moisture.

Superintendents do not need a lot of experience to use moisture meters effectively, and technicians tend to catch on to the technology rather quickly.

LEFT TOP, CENTER AND RIGHT: SPECTRUM TECHNOLOGIES; GARRETT LUCK

Meters reduce the cost associated with struggling turf.

"Turf Guard's ability to read temperature is nice and saved me last spring when I was able to see my soil temperatures were still not high enough for growth, even though early in the spring we had really warm daytime temperatures for a few weeks, which was followed by another few weeks of cold," he says.

FitzGerald was able to use that info to hold off on "waking the turf up" during the first warm spell. "Once they told me growth had started and I made my fertilizer applications, the turf jumped to life rather than shutting back down and having to rewake up."

Based on that, FitzGerald believes once more superintendents get out to test them, the more they may be able to be used to predict pesticide application timings, such as crabgrass and grub controls.

"As more people use them, I believe more uses will pop up. Like the spring warm up, I never even thought about that until last year and I realized I had the info at my fingertips," he adds.

FitzGerald expressed a desire for some basic soil nutrient information, too, but says he wasn't sure how useful it would be until he actually used it.

As for tangible benefits to using soil moisture meters, Rawlins has seen plenty of advantages.

"It has improved the consistency of the greens," he says. "We try to keep water off areas of the greens that don't need it while applying water to the areas that require water. This helps to keep the speed and the firmness more consistent from green to green. The greens are healthier now because we can keep them drier, promoting deeper rooting."

FitzGerald, who believes a little stress is good to keep the plant strong, says his greens are healthier because of the meters and doesn't have to look back too far to see the cost of struggling turf.

"In 2010 when the 'bad' greens were struggling, I believe we spent in the region of $12,000 in extra maintenance and labor nursing the greens through the summer (along with poorer playing conditions) which is now eliminated as the combination of the fans and being able to monitor moisture better has them perform as the others on the course," he says.

Hard to find a truly conflicting view of soil moisture meters, but Luck tried.

"The only downside I can see in using these meters is to become too dependent on them," he says. "We still get paid to manage turf during difficult conditions, which requires hard work and long hours on the course.

"During tough conditions, nothing will ever replace an afternoon tour of the course," Luck says. "While these tools will never replace a hands-on, visual inspection, the peace of mind that comes from knowing you have adequate moisture on a Sunday afternoon is priceless." GCI

Digital Extra

The use of moisture meters has grown significantly in the last few years because they allow turf managers to quickly asses soil moisture content, which provides significant long- and short-term benefits. Check out this YouTube video of USGA's Adam Moeller presentation to the Metropolitan Golf Association on moisture meters for better turf. Enter *youtu.be/TO4eu2E4uvE* into your web browser.

Brian Vinchesi, the 2009 EPA WaterSense Irrigation Partner of the Year, is president of Irrigation Consulting Inc., a golf course irrigation design and consulting firm headquartered in Pepperell, Mass., that designs irrigation systems throughout the world. He can be reached at bvinchesi@irrigationconsulting.com or 978/433-8972.

ARE WE GETTING IT?

In today's golf business you cannot pick up an industry trade magazine, attend a conference or log into an Internet site without the mention of water and the fact that it is a dwindling/precious resource.

All of the Golf Course Superintendents Association of America (GCSAA) surveys for the last umpteen number of years have identified water as superintendents' No. 1 issue. It's also quickly becoming an issue for a golf course's management as a whole and not just the superintendent.

Last November, for example, the USGA hosted a Water Summit in Dallas to discuss golf's water use. Golf Course Industry itself devotes one whole issue a year just to water issues, specifically how to more effectively and efficiently use this resource. It's obvious that water use on golf courses is an issue. But do we really get it, or are we just giving it lip service?

In 2001, the GCSAA and the Irrigation Association (IA) recognized that water use on golf courses was becoming an issue and jointly developed a seminar called "Golf Irrigation Auditing." This two-day seminar discusses the relationship between the soil and plant and how they influence an irrigation schedule. The participants in the seminar go out to a golf course and audit an existing irrigation system. Auditing involves, among other things, putting out catch cans and measuring sprinkler uniformity and sprinkler spacing and taking pressure readings. The data collected provides with a little math, the lower quarter distribution uniformity (DULQ) and the net precipitation rate (PRNET) of the feature that was audited.

Auditing helps irrigation managers understand the interaction of the irrigation system with the soil, what the turf's water needs are and can provide solutions to why an irrigation system has poor uniformity. A golf course should strive for DULQ's of 0.7 to 0.8. The net precipitation rate provides the actual rate at which the sprinklers apply water and is much more accurate than the precipitation rate that is in your central control database, which is a theoretical calculation. The audit gives immediate visual and quantitative information on an individual feature or on a comparison basis.

The auditing seminar in addition to being offered at the annual Golf Industry Show was/is available to chapters to be taught locally.

When the seminar was first developed, the classes were very full at each year's GIS show. Some years, there were two separate seminars. Very few GCSAA chapters however offered the seminar and last year the golf irrigation auditing seminar was not offered at GIS. This year (2013) the seminar was offered, but was cancelled due to low enrollment. I, for one, am having a hard time understanding how a seminar specifically designed to show people how to better understand the soil/water/plant relationship and how to irrigate more efficiently is getting so little interest from superintendents.

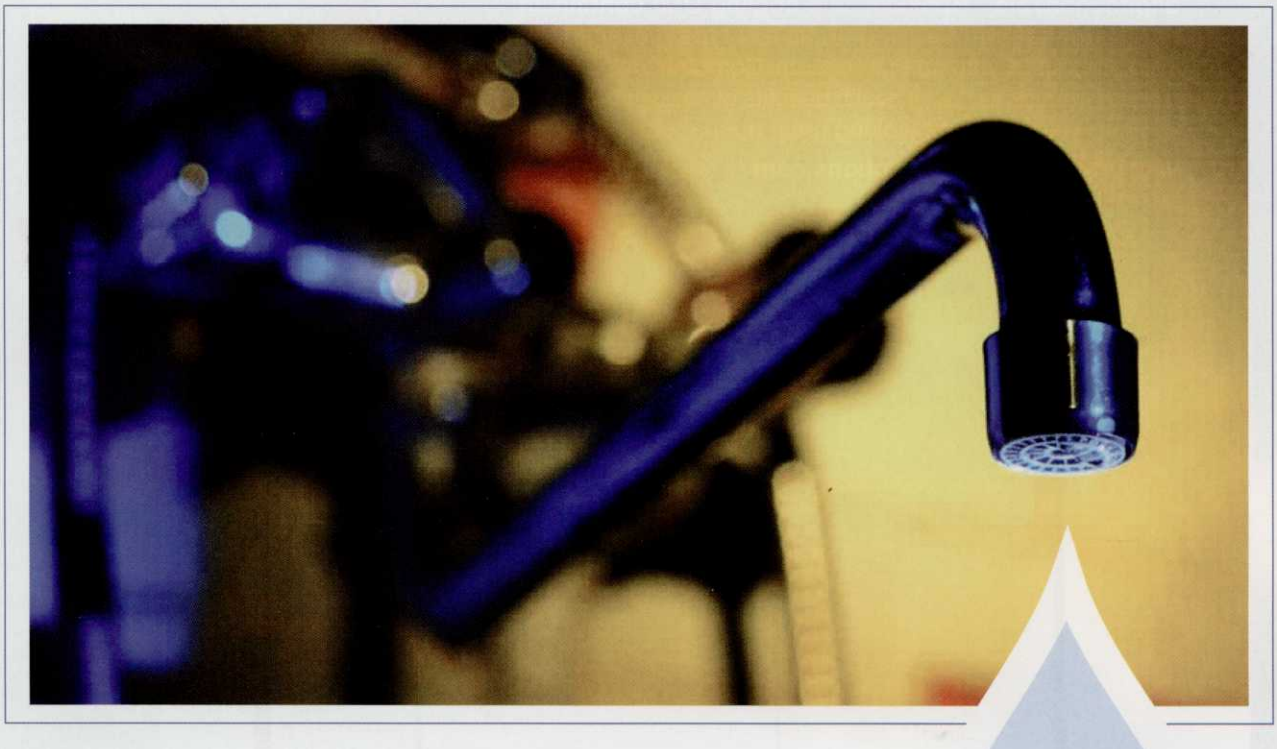
> It's obvious that water use on golf courses is an issue. But do we really get it, or are we just giving it lip service?

Through my consulting work to do many audits, and the results are always eye opening to the superintendent. For example, I recently audited a green that had a precipitation rate of one inch per hour, but was being watered under the thinking that the irrigation applied less than ½ inch per hour. Audits are very educational for both superintendents and their staff and not very time consuming to perform. Once you know how to audit, it can be a valuable tool in a superintendent's tool box.

As time passes and this issue becomes more pressing, you will never have enough knowledge about water. The more you know about how your golf course uses water and how you can better utilize and reduce that consumption, the better off you will be. In the end, it won't matter what type of water you are using.

All water types are under scrutiny, with potable water uses becoming vulnerable in the near future. The more education we can receive the better off you and your golf course will be. Therefore, it would seem that taking an auditing seminar is a good way to increase that knowledge.

So, the bottom line: We hear about all of these water issues, but are we really getting it? **GCI**



Drop by

If I had a nickel for every time I witness water sample tests piled upon tests on shelves with information that is simply ignored or misunderstood, well I would probably be writing a novel on a beach instead of an article piece on an airplane.

The truth is that water quality is one of the most misunderstood parts of any golf course management program. So many get lost in the numbers and forget the simple science behind what is important. Most importantly, we forget to carry through on the practical applications that address our water issues... something I have been privileged to do around the globe with many fine superintendents and property managers.

While considering any of this, please note that I have seen some very 'bad' water situations in the golf industry in particular. For one property in the San Diego, Calif., area, the water was so bad that toxic residues would ring the irrigation pond like a halo. But because the superintendent thinks through his challenges there and knows what the limitations and effects of his water will do, he put a program in place that allows him to manage excellent playing conditions while limiting the impact of the bad water on his property. Look for a future article on the practical solutions to bad water...this article is focusing on what to look for in a water quality test to know what your challenges may be.

First off, here are some truths about water quality:

- Water quality has a direct impact on soil and plant health quality on a daily basis
- The quality of the soil takes on the quality of the water over time
- Water quality can determine if an IPM program, including pesticide applications are

Water quality is one of the most misunderstood parts of any golf course management program. Agronomist Carmen Magro keeps you from getting lost in the numbers and outlines the simple science behind water quality reports.

drop

effective or not right out of the tank and with regard to residual effect on the turf and soil

• The relationship of elements and components in a water sample is much more important than the individual elements themselves. For example: A salt is a salt is a salt…the measurement of electro conductivity (EC) which measures salt conductivity in water is oblivious to what salt is causing the reaction. Therefore, EC alone cannot be used to determine water quality although it often is the case that it is.

• Water quality is dynamic, meaning that it changes often throughout the year. Therefore there is no standard water testing protocol. If your water is fairly consistent, annual or even biennial or triennial tests are fine. If you use wells or have water pumped in and that quality changes during various times of the season, you should test whenever a significant change takes place so you can make informed decisions on what practical changes to make to your program.

To develop or implement any cultural practice or management program on the course, we need to understand what the water quality test is telling us. Water quality is defined as the ability of a water source to meet its beneficial uses. In this case, the beneficial use is to supplement rain for the quality growth and performance of the golf course turfgrass and ornamental landscape. The following are the most important things to look for on a water test and what they mean:

TOTAL SALT CONTENT (TDS). This is a measurement of all dissolved salts but does not tell us which salts. This is also known as a measurement of salinity but this does not necessarily mean sodium (Na+). TDS is roughly 640 times the EC of the water measured in mmhos/cm or dS/m. TDS is typically reported in parts per million (ppm). A TDS level below 480 indicates there is likely not a problem with salts in the water. Between 480 and 1950, potential salt problems exist and this will vary with turf tolerances. Above 1950 we generally see salt related problems and it is imperative that good drainage is in place to be able to move the water through the soil profile to prevent salt buildups in the soil.

ELECTRO-CONDUCTIVITY (EC). This is a measurement of the conductivity of salt reactions in water. As salts dissolve, ions disassociate from each other and carry a charge. That charge gives off energy measured as EC. For example, table salt, sodium chloride (NaCl) dissolves to a Na+ ion and a Cl- ion. These ions give off energy measured as EC. All salts dissolve and give of charges. EC is reported in mmhos/cm or its equivalent dS/m. Therefore 1 mmhos/cm = 1 dS/m.

While EC alone cannot tell us what salts are present, it is another indicator of a potential salt problem as it is another measurement of salinity. Remember that turfgrasses, even of the same variety vary in their tolerances of salt, but if salt indicators show that salts are present, again, it is important to insure that we have the ability to move them through the soil profile and away from active roots so that there is no negative impact on turf growth and performance.

General tolerance levels include:

• **<0.25 dS/m** = Low Salinity Hazard

• **0.25 – 0.75** = Tolerable with moderate leaching and permeability in place

• **0.75 – 2.25** = Not tolerable on soils with restricted drainage or with salt sensitive plants

• **>2.25 dS/m** = generally not an acceptable irrigation water source

If you have an 'unacceptable' source of water but are forced to use it, it is imperative that bad salts are replaced with good salts at the irrigation pumping source and through amendments on the course. In addition, quality drainage characteristics must be in place throughout the irrigated property to prevent salt buildup in the soil.

HARDNESS AND ALKALINITY. These are oftentimes considered the same thing, but specifically they are not. Hardness refers to the level of Calcium carbonate and Magnesium carbonate in the water. However, other metals add to the hardness of the water.

"To develop or implement any cultural practice or management program on the course, we need to understand what the water quality test is telling us."

Sometimes you can taste iron in well water for instance. This iron (Fe3+) increases the hardness level of the water, but typically Calcium and Magnesium are the main drivers. Alkalinity refers to the ability of a water source to neutralize acids. As you can see, hardness and alkalinity go hand in hand. Just as if we have an acid water source we need compounds like Calcium and Magnesium carbonates to neutralize the acid, if we have high levels of Calcium and Magnesium (Hardness), we need to break those down (dissolve them) by using an acid. Remember that it is not the Ca and Mg that do the neutralizing of acid. It is the Carbonate (CO32-) as it associates with H+ ions…the ions that are causing the acid reaction. On the flip side, using acids in the presence of carbonates allows a disassociation of the carbonate compounds to take place. This happens most easily at the pumping source…particularly with using acids. To an extent, we can also address some related hardness issues using appropriate amendments on the course from routine applications of soluble products.

General hardness tolerance levels, reported as parts per million (ppm):

- **0 – 125:** Satisfactory
- **126 – 245:** Possible problem with calcium and magnesium buildup
- **>245:** Likely problem with calcium and magnesium buildup

CARBONATES (CO32-) AND BICARBONATES (HCO3-) THESE LEVELS ARE THE FIRST INDICATORS OF MULTIPLE SALT ISSUES. As carbonates and bicarbonates rise, the sodium absorption ratio (SAR) and exchangeable sodium percentage (ESP) also tend to rise. Without the later indicators, carbonates or bicarbonates alone will not indicate the total problem present but will indicate the likelihood that calcium and magnesium are going to precipitate out of the water solution. That means they turn to solids and are not easily taken up by plants. Calcium and Magnesium carbonate compounds are strong 'marriages' in soil chemistry and are broken with acids. If carbonate and bicarbonate levels are high, there are no free Ca++ or Mg++ ions for easy uptake by the plants.

The following are general tolerance levels of CO32- and HCO3-. But note that the true hazards associated with carbonates and bicarbonates must be assessed using the Residual Sodium Carbonate (RSC) along with SAR and ESP.

Carbonate tolerance levels:

- **0 – 12 ppm:** Satisfactory
- **13 – 62 ppm:** Possible problem developing
- **>62 ppm:** Likely problem with key nutrient precipitation

Bicarbonate tolerance levels:

- **0 – 111 ppm:** Satisfactory
- **112 – 525 ppm:** Possible problem developing
- **>525 ppm:** Likely problem with key nutrient precipitation

RESIDUAL SODIUM CARBONATE (RSC). RSC is equal to the sum of the carbonate and bicarbonate ion concentrations minus the sum of the calcium and magnesium ion concentrations. This is figured out using the meq/l values, not parts per million. The conversion is done by

(continued on page 54)

BASIC TRAI

Is your training regimen killing your maintenance department? Bruce Williams outlines an effective strategy to pass on best practices and eliminate bad habits and shortcuts.

I often tell the story about training that is fitting for golf courses. The story is based on my observations over the years and defines the challenges that all facilities face with being run and managed like a business.

The primary question is how many people would send their children to a school that had no teachers and where the students are only taught or trained by their fellow students? The answer is simple, that nobody in their right mind would do this. Yet, it is commonplace in golf course management for superintendents to follow this practice.

The typical scenario is to hire new employees and then have them show up the next day for work. After a brief welcome with their fellow staff members, the employee is sent to work alongside a co-worker who shows them the ropes on tasks such as bunker raking, weed eating or another job. Therein lies the problem.

Under this scenario, the new employee begins to develop their own idea of what management wants and what defines the facility's maintenance standards. While the new employee may learn some good techniques and the proper way to do things, they may also pick up some bad habits and shortcuts that management would not find acceptable.

There is only one way to prevent this and that is to have a formal training program.

It is hard to imagine what iconic businesses like McDonald's, or highly effective groups like the U.S. military, would have become without the development and investment in proper training programs. In golf I am aware of a number of company-wide training programs, however these tend to be with management companies, high-end country clubs and government-run facilities.

The development of an effective and successful formal training program will take time and money. However, it's an investment that will have an immediate return on investment and will actually make your job easier as a manager of a well-trained staff.

BASICS. Golf courses have a variety of repetitive tasks that need to be accomplished daily to provide desired levels of conditioning and playability. Most of these tasks are done by workers who may not understand what the finished product should look like and whether the job was completed successfully.

Golf courses are living entities and they grow and change daily. However, many of the maintenance practices don't evolve at the same rate and often do not require substantial judgment decisions for the average worker.

For example, mowing greens, nearly 100 percent of the time, is a routine performed the same way over and over and over again. Yes, there are instances when we may have to use different approaches, such as with new seedlings, first mowing of the year, or after aerification. The

NING

BY BRUCE R. WILLIAMS, CGCS

first approach would be to train people to handle the task and then deal with the isolated incidents later in the training cycle and reinforce those practices that are used on a seldom basis.

When staff goes out to mow the greens you want to be sure they understand what scalping is, what straight lines are about, which direction you should be mowing that day. They need to look for isolated dry spots, fix ball marks and be cognoscente of dew removal, overlapping, proper turning and clipping disposal. If all of your operators are doing this daily, then you will have uniformity on your greens and similar putting quality including speed, trueness and look.

TRAINING TRAINERS. Training should be conducted by management and not fellow workers with longevity. To assure standardization of procedures, it is best that training comes from one person on the staff – the superintendent, an assistant superintendent or a foreman. There are a variety of methods that can be utilized. For a training program to be formal in nature, the program should be in writing and reviewed on an annual basis and adjusted when necessary.

It could take a few months to develop an outline and training program, but it is time and money well spent. Other components include video training. I particularly like the Superintendent Video Workshop from EPIC Creative. These videos teach a generic version of various tasks on the golf course and pictures are worth a thousand words. Each individual golf course then must customize their own training program to fit their specific needs.

Training should begin at the point of hire and then be continuous throughout the period of employment. New technologies, new practices and occasional tweaks in programs should be addressed with refresher courses for long-term employees.

Without a formal training program the staff tends to do things in the manner that is quickest, easiest and not in sync with the rest of the team. Without proper training it is very difficult to manage a team that makes up its own rules and where the members call their own plays. So the time invested in the training will result in less time spent managing and teaching on the fly after the mistakes are made.

TRAINING MODULES. Training modules are an efficient and effective way to conduct not only training, but continuing education, as well. Here's a cross section of training modules and what they should include:

- Orientation
- Hazard communication
- Safety
- Standard Operating Procedures (SOP)
- Equipment operation
- Equipment maintenance
- Cultural practices
- Standard tasks

The law requires several of these training modules. While others are not required for employment, they will increase quality and efficiency and also possibly keep your club and department out of some potential law suits.

(TRAINING *continues on page 50*)

Tim Moraghan, principal, ASPIRE Golf (tmoraghan@aspire-golf.com). Follow Tim's blog, Golf Course Confidential at http://www.aspire-golf.com/buzz.html or on Twitter @TimMoraghan

NOT-SO DIRTY DOZEN

Many of us were lucky to grow up in the industry with researchers and scientists who have become legends, among them James Beard, Joe Duich, Joe Vargas, and Paul Rieke. We owe these gentlemen and their legions of research assistants a huge debt of gratitude for what they've done to advance turf over the past three decades.

So who are the next grass gurus? Is there a new generation of scientific wunderkind getting ready to set the standards? Indeed there is.

As I've attended turf conferences, regional meetings and research field days, I've met and listened to a new crop of talented young agronomists who soon will be changing our world. Some of them might not yet be known to you, but they—and their research—won't stay under covers for long.

Here is a list of 12 up-and-comers to keep your eye on, men and women working in soils, turf, weeds and other disciplines critical to our profession. Apologies to the many others not on this list, and thanks to you all for working hard to make our lives, and work, better in so many ways.

Dr. Aaron Patton – *Purdue University, Department of Agronomy*
ajpatton@Purdue.edu
765/ 494-9737
Research Interest: Weed Biology and Control Turfgrass Extension. Current projects include warm season turf grass germplasm evaluation and product evaluation of biopesticides.
Comment: New-wave pesticide research will result in a wider variety of safe products, which besides improving turf will reduce the pressure on superintendents.

Dr. Dara Park – *Clemson University, Horticulture Department*
darep@Clemson.edu
843/ 319-4957
Research Interest: Turf grass, Soil & Water Quality and Quality in Turf grass Systems
Comment: The use and dispersal of effluent water on golf course and landscape turf grass can only grow. Work like this will keep us better informed on how to use effluents wisely and effectively.

Dr. Doug Soldat – *Wisconsin University, Department of Soil Science*
djsoldat@wisc.edu
608/ 263-3631
Research Interest: Evaluation of use of biosolids for improving the economics and environmental sustainability of sod production. Identify water and nutrient management strategies to promote healthy turf grass and minimize the loss of water and nutrients from the root zone.
Comment: It all starts with a properly functioning rooting zone.

Dr. Michelle DeCosta – *University of Massachusetts, Stockbridge School of Agriculture*
mdacosta@psis.umass.edu
413/ 545-2547
Research Interest: Drought Stress and Low Temperature Stress physiology of Cool Season Turf grass. Irrigation management and water use.
Comment: With winter golf on the rise—for which we can thank or curse "global warming"—preventing winter turf decline will lead to more golf and more golfers.

Dr. Gerald Henry – *University of Georgia, College of Agriculture and Environmental Sciences*
gmhenry@uga.edu
706/ 542-2461
Research Interest: Crop and Soil Sciences. Monitored MSMA leaching potential in Bermudagrass. Performance testing of sports fields for assessment of player safety and field playability.
Comment: Golf isn't the only area of turf grass research. Other types of playing fields need better study. And sports field management could offer other career opportunities for us.

Dr. Stacey Bonos – *Rutgers University, Department of Plant Biology and Pathology*
bonos@aesop.rutgers.edu
848/ 932-6367
Research Interest: Developing improved pest resistance and stress tolerant turf grasses for conservation and environmental enhancement in the Northeast. Turf grass breeding for disease resistance and salt tolerance in various turf grasses species.
Comment: The more we can make turf resistant to wear and tear, the more golf—and other games—we can play.

Dr. Jim Kearns – *North Carolina State University, Department of Turf Grass Science*
Jkerns0@gmail.com
608/ 516-8917
Research Interest: Turf grass pathology. In four years at University of Wisconsin the focus was based on disease of cool season turf grasses, in particular dollar spot and snow molds. There will be a shift in research focus once settled into the NC State University system.
Comment: Jim brings a wealth of cool-season turf grass disease experience to the Carolinas, where there remains a large percentage of creeping bent grass.

Dr. Kelly Kopp – *Utah State University, Plants, Soils and Climate*
Kelly.kopp@usu.edu

(MORGAHAN *continues on page 50*)

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READY... OR NOT

TIER IV has officially kicked in, and as a result prices will increase for diesel-powered turf maintenance equipment greater than 25 horsepower. Are you prepared?

By Jason Stahl

By now, most golf course superintendents should have heard of the EPA's Tier IV diesel engine emission reduction mandate and how it will impact their budgets. The mandate took effect on Jan. 1, 2013, and impacts all diesel-powered turf maintenance equipment greater than 25 horsepower. The good news? All Tier IV-compliant turf equipment manufactured after Jan. 1, will be better for the environment and healthier for everyone. The bad news? The equipment will cost more.

But there's more good news. According to Grant Young, director of marketing of the Commercial Division at The Toro Co., turf maintenance is one of the last categories of diesel-powered products to go through the major stage of Tier-IV compliance.

"Because of this, many of our customers have already seen the pricing (and technology) implications of achieving compliance, keeping in mind that the technology drives the cost," says Young.

Young cites over-the-road trucks,

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certain power ranges of tractors, tub grinders, construction equipment and forestry as examples of equipment that has already experienced the major "jump" in price associated with the stiffest tiers of compliance.

"So, comparatively, the price of compliance isn't terribly surprising to anyone who has had experience in one of the other categories, OTR trucks probably being the closest to most," Young says. "That said, it's never easy delivering a message of price increase to customers. In the end, it's a mandatory regulation that has a price associated with it."

Young expects prices to go up 10 to 20 percent, a number that has been consistent with price increases in other power classifications that have gone through Tier IV.

The technology changes are nearly imperceptible, with most of the changes occurring under the hood.

Reaction from customers so far has been mixed, says Young, depending on their knowledge and awareness of Tier IV.

"Those who have already experienced something around Tier IV due to buying an OTR truck for their fleet (or even personal use), for example, aren't really phased by it," he says. "Those who have little or no awareness are more surprised. I would say this is the main reason why we've been out trying to message the issue and what it means. The worst thing for the industry is to have 'surprised' people as of Jan. 1, 2013."

Toro has been spreading that message for the last 18 months through industry associations, conferences, electronic and printed materials, distributors and individual customer visits.

"Because this is a major change to turf maintenance equipment, and because capital purchase schedules are usually planned years out, we feel creating awareness to the change and its implications is critical to being a good partner with our customers," says Young.

Toro's message has been in four parts: What is Tier IV? Why is it happening? When is it happening? And what does it mean to me (in terms of product performance, pricing, capital budget implications, the environment, etc.)?

Mark Ford, marketing manager of John Deere Golf, says his company has not released pricing for its Tier IV compliant products yet but is sensitive to the concerns in the marketplace that Tier IV could have on pricing.

"With that in mind, John Deere has been focused on bringing maximum value to our customers with new product features and benefits, while meeting all regulations," says Ford.

COURTESY OF JACOBSEN

Prepping your ownership

Like a lot of things in life, it comes down to knowledge, preparation and planning. That's exactly the strategy superintendents should take when it comes to informing their bosses about the Tier-IV price increases.

"Capital planning should be a multi-year process," says Grant Young, director of marketing of the Commercial Division at The Toro Co. "And knowing what's coming and what your options are will help superintendents and all stakeholders make the best agronomic and financial decisions for their facilities."

Proactive approaches are often recommended for managing turf diseases, but it's also the way to go when handling situations your ownership might have issues with.

"Look ahead," says Mark Ford, marketing manager of John Deere Golf. "Start talking with your ownership now about the long-term needs of your course and your equipment budget. This will help determine what changes, if any, are needed for your near-term product replacement life cycle."

Jacobsen also emphasizes preparation as the key to superintendents avoiding giving course ownership sticker shock when Tier IV products are released to the market.

"There will be a larger investment in service capabilities with the new engine and filtration technologies. The best way to overcome these obstacles is to prepare for them," says Rachel Luken, product manager for Jacobsen. "Therefore, start educating all levels within the property about the upcoming federally-driven product change. All information needs to be reviewed in order to prepare an accurate equipment replacement plan."

As capital equipment budgets are developed for new or replacement equipment needs, Luken says superintendents should consider the following options:

- Buy on regular routine. When a capital equipment plan calls for new equipment and/or existing equipment's useful life ends, buy what is available and pay market price.
- Buy ahead. Prices are forecasted to rise when Tier-IV compliant equipment is released, so postpone the purchase of higher priced equipment and buy in advance of a regular replacement cycle.
- Buy environmentally friendly. Despite the expected higher prices, actively seek out and purchase the greenest Tier-IV product.
- Buy used. Since equipment is compliant based on the year of engine manufacture, buy equipment that is already in use.

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Adds Mike Koppen, group marketing manager of golf products for John Deere: "We're adding value and additional features to our new Tier IV machines that will increase performance, productivity and operator comfort. We've undertaken Tier IV as an opportunity to redesign our machines from the ground up to provide an overall better machine that is, at the same time, Tier IV compliant."

Ford speculates that there may be some short-term sales fluctuations, but in the long term, he expects sales to be largely unaffected.

Koppen says that end-user reactions, in more often than not, are being driven by uncertainty because they largely haven't seen what a Tier IV-compliant piece of equipment can do.

"When they come face-to-face with a Tier IV piece of equipment, they're pleasantly surprised by new standards in performance, productivity and operator comfort," he says.

John Deere has been getting the word out on Tier IV mostly through its dealer channel.

"We have an enormous amount of experience in smoothly transitioning to new emissions standards," Ford says. "And we have found our best method of communicating changes like this is through our well-trained dealers. They have done very well in so many other regulatory transitions in communicating these changes to our customers."

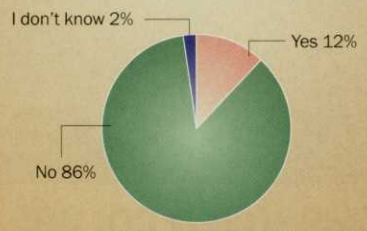
Like Toro, Rachel Luken, product manager for Jacobsen, predicts a 10- to 20-percent price increase for Tier IV-compliant products.

"Of course, customers don't want to pay more, especially when we're talking about increases as high as 10 to 20 percent for higher horsepower, Tier IV-powered products,"

Cost factor

Equipment manufacturers did a solid job educating end users about the nuts and bolts of Tier IV and what it would mean for new model technology. It wasn't a stretch to realize these changes would also mean price increases. Many insiders speculated that these expected price hikes could result in a spike in spending in 2012. However, this turned out not to be the case. The majority of superintendents (86 percent) say Tier IV regulations and the associated costs increases for the technology did not play a factor into 2012 equipment purchasing decisions.

Did you purchase equipment in 2012 specifically because of Tier IV regulations that go into effect in 2013?



Source: GCI State of the Industry research

"So, comparatively, the price of compliance isn't terribly surprising to anyone who has had experience in one of the other categories, OTR trucks probably being the closest to most. That said, it's never easy delivering a message of price increase to customers. In the end, it's a mandatory regulation that has a price associated with it."

— Grant Young, The Toro Co.

says Luken. "But for equipment manufacturers, distributors and end users, this is a 'must-do' in order to comply with federal regulations – the choice is how and when you make that equipment transition and replacement."

Jacobsen is working on alleviating the higher costs, though, via technological innovation.

"In addition to Tier IV final engine and equipment modification solutions with high pressure common rail and exhaust after-treatment systems, Jacobsen is exploring innovative, non-conventional approaches – where technically feasible – to deliver lower emissions and meet compliance," Luken says.

As a precursor to the more conventional solutions, Jacobsen has launched the LF510, a new addition to its line of lightweight fairway mowers. Luken describes it as an alternative, simple Tier IV final solution for 100-inch width of cut applications.

"The market also told us it wanted an affordable fairway mower that provides a superior quality-of-cut. We answered that need by putting Jacobsen's True-Set cutting units with Classic XP reels on an easy-to-use, easy-to-maintain tractor," says Luken.

"In addition, technicians don't have to worry about additional exhaust after-treatment filtration devices, technology or service because the LF510's rugged and reliable Kubota engine is compliant with Tier IV emission regulations."

Jacobsen has chosen to communicate its Tier IV message through its dealer network using sales and technical training sessions where flyers are handed out as education and reference pieces.

In addition, the company is participating in regional/local GCSAA organization meetings, trade shows and conferences, customer roundtable events. **GCI**

Jason Stahl is a Cleveland-based freelance writer and a frequent GCI contributor.

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Jeffrey D. Brauer is a veteran golf course architect responsible for more than 50 new courses and more than 100 renovations. A member and past president of the American Society of Golf Course Architects, he is president of Jeffrey D. Brauer/GolfScapes in Arlington, Texas. Reach him at jeff@jeffreydbrauer.com.

BUILDING A REBUILDING CASE

Great master plans with no "buy in" from your members or city council have the same value as no plan at all. Here are a few ideas we presented to circumvent this.

INITIATE FROM THE TOP. When a new superintendent/GM/Pro tells me "I'm new here, and I am pushing some big changes," the end result is usually a master plan that goes nowhere. If the president or greens chair (or mayor/park director) isn't interested enough to call me, he/she probably isn't interested in a rebuilding program.

Most failures to sell a renovation program stem from either selling the wrong people, or selling the wrong project. A committee selling total renovation to their clubs that don't want it, or can't afford it, rarely works. Architects attempting to spend club millions for what appears to be a career-making project never does.

The club – not their staff or architect – must decide it needs a total image makeover to reposition it in the market, restore lost luster or recapture course rankings. You and your architect must present information on problems and options for correction, but the final direction must come from the decision makers.

PICK A "FLAG BEARER." Every project needs a connected, respected and energetic "flag bearer" to lead the troops into battle. Without good leadership, the project will likely fail.

YES, IT'S SELLING. Most folks hate the concept of "Selling your master plan," and I prefer to call it "building a case for renovation," but make no mistake – it's selling. Even with top brass behind the project, the task of convincing members to move forward requires real sales, diplomacy and marketing skills. There are numerous good books on the subject, so, go read a book to brush up on all those old clichés. "Sell benefits, not features," "Sell the sizzle, not the steak," "Hit their 'hot buttons,'" all apply here.

Some tips, as they apply to renovations:

OVERCOME FEAR. The biggest cause of inaction is fear – of change and of wasting money. Fear is greater if there were some previous renovation flops. Perhaps the best method to allay fear is to acknowledge it, and clearly demonstrate you have picked solid projects and people to implement them.

> I have found the simplicity works over complexity. I prefer graphic boards and plans to a power point presentation in a darkened room.

TALK THEIR LANGUAGE. We tend to talk in our own lingo, which doesn't impress others. Superintendents wax eloquently about the features of a state-of-the-art irrigation system, but it's more convincing to show (in simple case studies or examples) how golfers benefit. They are more likely to be interested in the benefits of water conservation to either water more roughs and give them better conditions; or lower their water bills, and hopefully, dues.

Similarly, they don't care about the sand particle size of your proposed USGA greens, but they are interested in smoother greens, making more putts or impressing their guests.

PICK THE RIGHT ISSUES. Selling/Case building isn't catchy slogans or slick presentations. It's doing your homework ahead of time to find out what changes are necessary (in fact and opinion) and providing those improvements to your golfers.

At most courses, there are greens, holes, areas or conditions that everyone agrees need improvement. Those have to be part of the plan, of course. Then, it may be possible to demonstrate the added value of other work, especially if it saves time, money or hassle to do now.

REHEARSE THAT PRESENTATION! While it is best to be confident of the vote before the big meeting, that doesn't always happen. For the best chance of success, plan on doing a great presentation. Like sales, there are many books devoted to making great presentations that are a good investment.

I have found that simplicity works over complexity. I prefer graphic boards and plans to a PowerPoint presentation in a darkened room. It's better to talk with them than at them. In addition, I find presentations that focus on the most important one to three points are more convincing than ones that promise dozens of project benefits, which tend to run together.

CROSS THE "I'S," DOT THOSE "T'S." If you have ever hired someone, you know that you quickly dismiss candidates with obvious flaws. The same is true when considering renovation projects. I have seen good presentations derailed by simple questions that the committee doesn't seem to have considered and can't answer. This usually instills fear (see above) leading to rejection. GCI

Want to learn more? Check out the "Selling Your Master Plan" webinar. Enter bit.ly/Vwka5x into your browser.

Down with PRD

The mysterious pythium root dysfunction scares superintendents, but there are preventative measures they can take to make sure their roots stay healthy and PRD-free. BY JASON STAHL

Pythium root dysfunction (PRD) got its name because it doesn't kill the roots, it just impairs their function. It's difficult, if not impossible, to see without a microscope.

ALL IMAGES: FORESTRY.ORG

"Mysterious" is a scary term to describe any turf disease, but that's exactly the word Jim Kerns uses when talking about pythium root dysfunction (PRD)

Caused by the root pathogen *Pythium volutum* and impacting creeping bentgrass greens, Kern, a turfgrass pathologist at North Carolina State University, says it doesn't act the way most superintendents expect. There are other reasons why it's shrouded in mystery, too.

"If you actually look at the root system, it doesn't look that bad," says Kern. "The pathogen infects during spring and fall when the soil temperature is between 55 and 75 degrees Fahrenheit. And the symptoms don't show up till you enter a stressful period (soil temperature increase to greater than 90 degrees Fahrenheit). So by the time you see the symptoms, going out and treating for it can be very challenging."

But before you talk about managing PRD, you must be able to distinguish it from pythium blight and pythium root rot – two completely different diseases. According to Kerns, pythium blight occurs when pythium species attack the foliage of the plant. Pythium root rot is easy to detect because, if you pulled up a sample, the roots would be rotten, black and stinky. PRD is not as easy to determine.

"PRD got its name because it doesn't kill the roots, it just impairs their function somehow, whether it's nutrient uptake or water uptake," says Kern. "We tried to figure out which one of these functions it impairs through studies, but we couldn't distinguish between the two. But we did determine that the pathogen impairs root hair development, and that would imply that the turf is having trouble getting water and nutrients up to the foliage."

The kicker is that it's also extremely difficult to diagnose. First, because it affects the root system, it can be hard to see. Second, it can also be found on healthy roots, so just seeing it doesn't necessarily mean you have the disease. Finally, the symptoms can be confused with take-all patch.

"So really, the only surefire way to diagnose the disease is to send it to a diagnostic clinic," says Kern, who recommends North Carolina State, Rutgers, Purdue or the University of Wisconsin – labs he personally knows have stayed abreast of the disease and know what to look for.

PRD is difficult if not impossible to see without a microscope, which is one of the reasons Kern recommends sending a sample to a clinic. He especially emphasizes the clinic route for those superintendents who haven't had it diagnosed in the past.

"One of the biggest issues I've found is that many vendors will say you need to treat for this particular disease, and then you have people treating for it who have never had previous experience with it or anything remotely similar to it," says Kern. "Not to say it couldn't hurt, but what I like to say is if you're going to do that, you need to pick the right fungicide where you're getting the most bang for your buck."

Kerns emphasizes that superintendents will not be able to see PRD with the naked eye. He says it does not create any real defining feature in the foliage.

"From what we've seen, the pathogen never gets into the foliage, so you basically just see a decline when it initially starts," he says. "It would look like an area suffering from heat or drought stress, a small little patch that might be drying out that then, over time, gets progressively worse."

So how do you manage it? The experts, including Kern, all promote a preventative approach. But Kern doesn't necessarily believe it's a lost cause if you haven't managed it preventatively and it surprises you.

"You can do something about it once it appears because it's primarily a stress-induced disease," he says. "Doing simple things like raising your mowing height, adding more fertilizer and anything to limp the plant through the summer months can help you manage it – it's just a lot more challenging than if you managed it preventatively. If you continue to manage your greens at extremely low mowing heights and limit fertilizers, then the tissue can collapse pretty quickly."

Some experts have said that superintendents will typically scout wet, low-lying spots on their courses and then make preventative applications during hot, humid weather conditions. Those conditions may be the best time to try to stave PRD off, but as far as weather having anything to do with PRD rearing its ugly head, Kern says he has not seen any pattern. He has not seen an increase in it over the last couple years of unseasonably warm winters and hot, dry summers, only that it has lingered on. But one interesting characteristic has been determined.

"Back in the early '80s when Clint Hodges was studying PRD at Iowa State, we found that this disease was most problematic on

If they're not seeing results from their traditional fungicide programs, superintendents should have turf samples diagnosed for PRD.

Key points

- The pythium root dysfunction (PRD) pathogen infects during spring and fall when the soil temperature is between 55 and 75 degrees Fahrenheit.
- PRD symptoms don't show up until you enter a stressful period, such as high temperatures.
- PRD doesn't kill the roots, it just impairs their function.
- It's also extremely difficult to diagnose, and nearly impossible to see without a microscope.
- While PRD has been seen throughout the U.S., it's most active on Mid-Atlantic and Southeastern courses.

MAXIMIZING ROOT HEALTH

BEING THAT PRD is a root disease, measures that promote healthy root production are key to managing it. One measure is to not limit nitrogen fertility.

Root cultivation such as core or solid tine aerification followed by topdressing in the spring and fall is also key, says Maria Tomaso-Peterson, Ph.D., associate research professor, plant pathology, Mississippi State University.

"Root cultivation promotes an increased root mass that can better withstand PRD," says Tomaso-Peterson. "A weakened root system, due to a lack of root cultivation, may be a contributing factor to the overall decline during the stressful summer months. Spent cores should always be removed prior to topdressing. Core removal reduces the level of *P. volutum* and other associated root pathogens by physically removing the pathogens and any associated infected roots."

Monitoring for nematodes is also critical to keeping creeping bentgrass roots healthy in that they may be a factor that weaken them, making them more vulnerable to PRD. Their feeding sites, says Tomaso-Peterson, can serve as a point of entry for PRD.

"And that may increase infection and overall foliar dieback," she says. "Monitor the nematode populations and treat if populations are above the threshold."

newer putting greens less than 10 years old," says Kern. "I think the reason we haven't seen either increases or decreases in the disease is because we haven't had a lot of new construction or renovations."

As far as why new greens would be more susceptible to PRD than older greens, the experts simply don't know. A valid hypothesis, Kerns believes, is that maybe the roots on new greens aren't as developed. Or, as greens age and develop more organic material, perhaps the microbial environment is less conducive to the pythium species' survival.

PRD has been spotted throughout the U.S., but, according to Kerns, it seems to be predominant in the Mid-Atlantic and Southeast states where there are prolonged periods of stress during the summer. Recommendations for those areas include two applications one month apart of Insignia, Segway or Signature tank mix when soil temperatures are around 55 to 60 degrees at a two-inch depth.

"This method has stood up outside of the Southeast, but it has not been documented with research," Kerns says. "But in my experience, PRD hasn't been a major disease outside of the Southeast and has been fairly limited in other areas around the country."

But he admits that the weather patterns of the last few years give other regions reason to be concerned.

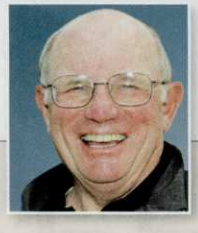
"Over the last couple summers, that stress has moved into other areas, for example Ohio, Wisconsin and maybe the Northeast, so I advise superintendents to be on the lookout for PRD but also to not be scared of it. It used to be a hot button issue when it was a new disease and was a one-hit wonder for a long time, but I think things are starting to calm down a little now."

Kerns recommends that superintendents send in samples of their turf to be diagnosed for PRD if they're not seeing results from their traditional fungicide programs.

"For example, in Ohio, a lot of superintendents are probably treating for take-all patch, and then they'll see symptoms in the summer and wonder why their application didn't work," he says. "If that's the case, send samples to a diagnostic lab or local extension to figure out if the problem is caused by take-all or PRD."

Kern offers another observation: "We have only ever seen it on creeping bentgrass. Some people have claimed they've seen it on annual bluegrass, but I personally have never diagnosed it on that." **GCI**

The PRD pathogen infects during spring and fall when the soil temperature is between 55 and 75 degrees Fahrenheit. The symptoms, though, don't emerge until the turf enters a stressful period.



Monroe Miller retired after 36 years as superintendent at Blackhawk CC in Madison, Wis. He is a recipient of the 2004 USGA Green Section Award, the 2009 GCSAA Col. John Morley DSA Award, and is the only superintendent in the Wisconsin Golf Hall of Fame. Reach him at groots@charter.net.

DOES BRAND LOYALTY EXIST ANYMORE?

When I was growing up in Wisconsin, "brands" identified you and your neighbors. The Bohls were a John Deere farm, the Baumgartners had Case, and we were Ford and Oliver. Dairy cattle breeds were sort of a brand. You had Holstein farms, Guernsey or Jersey farms and even a few Brown Swiss herds could be found. There was fierce loyalty to the breed of cattle your dad liked.

And so it went with cars and trucks and even seed corn varieties. That brand loyalty that was so evident and important in my youth is with me yet today, and dictates many personal choices. It is still important to me. I like Case pocketknives, Red Wing boots, Carhart jeans, Pendleton shirts and Stormy Kromer winter hats. I drive only Ford and I'm partial to Snap-On hand tools. I even have a preference for the wooden pencils I write with – Ticonderoga No. 2s.

A 2010 survey stated for two thirds of Midwest farmers, brand loyalty influences their decisions on equipment purchases. I was surprised, expecting brand loyalty would have gone by the wayside in the sweeping changes in agriculture in the past 50 years.

Not so. The same survey reported that less than 20 percent responded that they were less loyal to equipment brands than five years previous, while more than 25 percent had become more equipment brand loyal.

This got me to thinking about superintendents and the shops I have visited in the last 40 to 50 years. There are shops that heavily favored one brand of turf machinery over others. It wasn't hard to tell – either they were orange or red. Jacobsen and Toro dominated the golf machinery market until the past couple of decades, when John Deere entered the turf care market. Some shops are now green.

How much influence can brand loyalty have for most superintendents? It is one thing when a farmer who owns his own business can use his own money to buy whatever brand he wants. It is another thing entirely when you are spending someone else's money, whether it is an owner, a municipality or a private club.

A lot of what appears to be brand loyalty to a color or logo is really salesman loyalty. We count on them for so much – information, demonstrations, communications – that there is a natural tendency to want to deal with one who is dutiful, reliable and honest.

Blind loyalty is a rare commodity among the ranks of superintendents. The fact is for almost all of us the choices we make in selecting equipment is based more on things like distributor reputation, the salesmen involved, and the fit of a particular machine to our turf and individual course features. Price is also obviously a very important consideration.

The distributor's role in service is critical and almost every superintendent I know puts high value on parts availability and delivery. Anymore, with the high cost of turf equipment, no one wants it sitting in a corner of the shop for a week, waiting for a part.

A lot of what appears to be brand loyalty to a color or logo is really salesman loyalty. We count on them for so much – information, demonstrations, communications – that there is a natural tendency to want to deal with one who is dutiful, reliable and honest. I will never forget the salesman who left a family reunion to chase down to the distributor shop on a Sunday afternoon to get a part for us so we could keep a Greensaire operating. And as generous as that action was, I love the story of a sales person snagging a needed part from the assembly line for a desperate superintendent. Boy, do heroic efforts like these ever build brand loyalty.

Location of a distributor plays into loyalty, too. If a distributor is relatively close by, then that proximity can influence what appears to be brand loyalty in a big way.

What it comes down to is less brand loyalty and more the distributor/superintendent relationship. Obviously, there has to be satisfaction with the product he sells, but it may be less of a machinery loyalty factor than the comfort and the trust offered and nurtured by the seller. When brand loyalty exists, it is almost always because it's good business. Honestly, orange and red and green all do a great job and help courses all over the world prepare for major tournaments as well as daily play.

I was thinking back to last spring when I was mowing fairways while wearing my Jacobsen hat, a Deere sweatshirt and operating a Toro fairway mower. Apparently I spread my brand loyalty around. That is, except when it comes to Ford trucks. **GCI**

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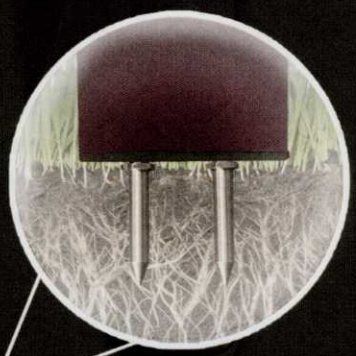

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BY RENÉE RIOUX AND JIM KERNS


Rioux


Kerns

Water volume doesn't matter…or does it?

Research examines the effect of different water carrier volumes on fungicide efficacy for dollar spot control.

As a turfgrass pathology PhD student under Dr. Jim Kerns, I study virtually all aspects of dollar spot, from where the pathogen is coming from to how it infects its hosts, and even the molecular mechanisms governing host resistance. This summer, we added another project to my research: evaluating the effect of different water carrier volumes on fungicide efficacy for dollar spot control. This has become an increasingly popular subject in recent years because many view carrier volume as a variable that can be manipulated to optimize disease control. With the many issues complicating dollar spot management, getting the most out of available fungicides is no trivial matter.

Editor's Note

This article first appeared in the November/December issue of The Grass Roots, the official publication of the Wisconsin Golf Course Superintendents Association. It is reprinted with permission.

Our goal with this study is to determine if altering carrier volume enhances the efficacy or expands the duration of dollar spot suppression provided by Chipco26GT and two relative newcomers to the market, Secure and Daconil Action.

THE STUDY. This study commenced this past summer and was performed on a creeping bentgrass (cultivar 'Alpha') fairway maintained at a height of 0.5 inches at the O.J. Noer Turfgrass Research Center. All possible combinations of four water carrier volumes and six fungicide regimes were utilized as treatments and were replicated four times in a randomized complete block design (Table 1). An initial spray was put out on June 14, 2012, at which time no active dollar spot infection centers were present. Dollar spot severity ratings were made weekly by counting the number of active infection centers present in each plot.

Fungicide reapplications were made based on a 1% spray threshold; thus, when infection centers covered greater than 1% of the area in a single plot, the treatment in that plot was reapplied to all four replicate plots for the treatment. This allowed us to determine not just fungicide efficacy, but also differences in duration of control for our different treatment regimes. Based on our 1% threshold, two reapplications were made for treatments 5 and 20, but only one reapplication was needed for all other treatments (Table 1). At the end of the trial, severity data was con-

Table 1. Treatments for trial on the effects of carrier volume for dollar spot control

Treatment	Fungicide(s)	Carrier Volume (gal/1000ft²)	Rate
1	Nontreated control	0.5	
2	Nontreated control	1.0	
3	Nontreated control	1.5	
4	Nontreated control	2.0	
5	Daconil Action	0.5	2 FL OZ/1000FT²
6	Daconil Action	1.0	2 FL OZ/1000FT²
7	Daconil Action	1.5	2 FL OZ/1000FT²
8	Daconil Action	2.0	2 FL OZ/1000FT²
9	Chipco26GT	0.5	4 FL OZ/1000FT²
10	Chipco26GT	1.0	4 FL OZ/1000FT²
11	Chipco26GT	1.5	4 FL OZ/1000FT²
12	Chipco26GT	2.0	4 FL OZ/1000FT²
13	Secure	0.5	0.96 FL OZ/1000FT²
14	Secure	1.0	0.96 FL OZ/1000FT²
15	Secure	1.5	0.96 FL OZ/1000FT²
16	Secure	2.0	0.96 FL OZ/1000FT²
17	Daconil Action Chipco26GT	0.5	2 FL OZ/1000FT² 4 FL OZ/1000FT²
18	Daconil Action Chipco26GT	1.0	2 FL OZ/1000FT² 4 FL OZ/1000FT²
19	Daconil Action Chipco26GT	1.5	2 FL OZ/1000FT² 4 FL OZ/1000FT²
20	Daconil Action Chipco26GT	2.0	2 FL OZ/1000FT² 4 FL OZ/1000FT²
21	Daconil Action Secure	0.5	2 FL OZ/1000FT² 0.96 FL OZ/1000FT²
22	Daconil Action Secure	1.0	2 FL OZ/1000FT² 0.96 FL OZ/1000FT²
23	Daconil Action Secure	1.5	2 FL OZ/1000FT² 0.96 FL OZ/1000FT²
24	Daconil Action Secure	2.0	2 FL OZ/1000FT² 0.96 FL OZ/1000FT²

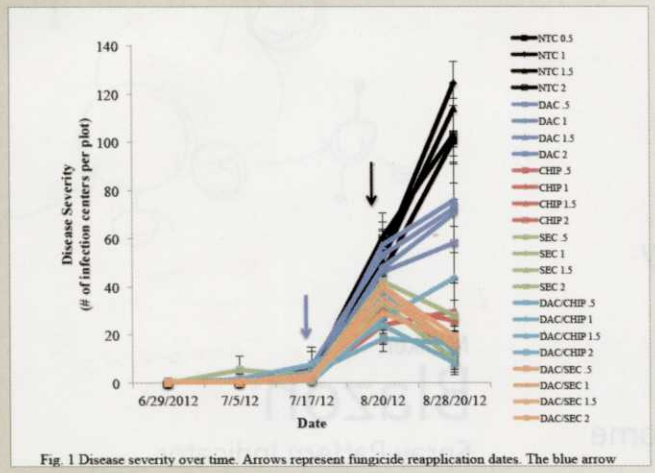

Fig. 1. Disease severity over time. Arrows represent fungicide reapplication dates. The blue arrow represents reapplication of treatments 5 and 20 only. The black arrow represents reapplication of all fungicide treatments.

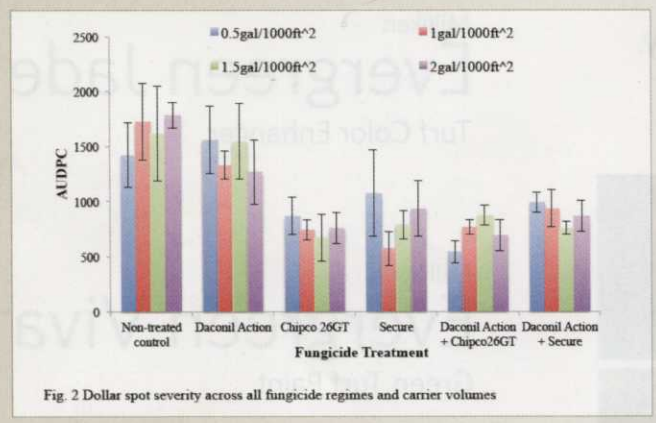

Fig. 2. Dollar spot severity across all fungicide regimes and carrier volumes

verted to area under the disease progress curve (AUDPC), which gives a single value for disease progress over time, and means were separated using the Waller Duncan test. We looked for effects of fungicide treatment, carrier volume and interaction between fungicide treatment and carrier volume.

THE RESULTS. Unfortunately the hot dry conditions we experienced this summer were not particularly conducive for dollar spot and much of this trial went without significant symptom development (Fig. 1). Around mid-July, we experienced moderate disease pressure and this resulted in the extra reapplication mentioned before for treatments 5 and 20. Following this outbreak, another hot stretch limited disease development until mid-August. Conditions around this time were highly conducive for dollar spot and all the plots got hammered, resulting in reapplication of all treatments (Fig. 1).

Based on our disease severity over time, the combination of Daconil Action and Chipco26GT or Secure provided the best suppression of dollar spot (Table 2). All other treatments, with the exception of Daconil Action alone, provided disease suppression similar to that of the Daconil Action/Chipco26GT mix. Daconil Action by itself provided poor dollar spot control across all water volumes and its performance was not statistically different from that of the non-treated controls. This was not a surprise, as the hot, dry conditions in Madison this summer prevented application of the fungicide until it was likely too late to truly prevent dollar spot development. It does, however, reaffirm the need to mix different active ingredients when dollar spot development is extreme. This was evident from both Chipco26GT/Daconil Action and Secure/Daconil Action performing well in our trial. When applied alone, the newest fungicide in our treatment list, Secure, also performed reasonably well when compared to the non-treated control, though not as well as when applied in combination with Daconil Action.

In this year of the study, water carrier volume had very little effect across all of our fungicide treatments (Table 3). Consequently, no difference was detected for carrier volume or the interaction between fungicide regime and carrier volume. These results are reinforced by a comparison across all treatments and carrier volumes (Fig. 2). In general, those fungicide regimes that performed well did so across all carrier volumes and those fungicide regimes that did not perform so well also did so regardless of carrier volume.

SUMMARY. With a single year of data and less than ideal conditions for both dollar spot development and fungicide application, we are unable to make any conclusions about the influence of carrier volume on fungicide efficacy for dollar spot suppression. Though results from this year indicate a minimal influence of carrier volume, we may see a different trend next summer. Another year of data will improve our understanding of the role of carrier volume on dollar spot suppression. This will allow for the selection of carrier volumes that optimize the efficacy and longevity of fungicide applications for dollar spot management. **GCI**

Jim Kerns is an assistant professor, plant pathology, and Renee A. Rioux is a graduate research assistant, plant pathology, at the University of Wisconsin-Madison.

Table 2. Dollar spot severity over time as affected by fungicide

Treatment	AUDPC[1]
Nontreated Control	1638.4 a
Daconil Action	1427.1 a
Chipco26GT	884.4 b
Secure	859.0 b
Daconil Action Chipco26GT	758.4 b
Daconil Action Secure	715.5 b

[1]AUDPC values followed by the same letter do not differ significantly (Waller Duncan test, p=0.05)

Table 3. Dollar spot severity over time as affected by carrier volume

Carrier Volume	AUDPC[1]
0.5gal/100ft²	1075.2 a
1.0gal/100ft²	1048.3 a
1.5gal/100ft²	1042.4 a
2.0gal/100ft²	1029.8 a

[1]AUDPC values followed by the same letter do not differ significantly (Waller Duncan test, p=0.05)

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(MORGAHAN *continued from page 26*)

435/ 797-6650

Research Interest: Water conservation, Ornamental Horticulture and Extension. Work focuses on turf grass water use efficiency, water-wise landscaping principles, water and nutrient management in turf grass. Working closely with Utah state agencies for best water management practices.

Comment: No matter where we live and work, we need to develop best-management practices for water use as well as pesticide and nutrient run-off and management. Water is a valuable resource everywhere.

Dr. Scott McElroy – *Auburn University, College of Agriculture, Agronomy and Soils*

Jsm0010@auburn.edu

334/ 844-3992

Research Interest: Evaluation of herbicides for use in turf grass management and development of new sustainable organic and non-synthetic pesticide weed management practice for use in turf management.

Comment: Reduced pesticide use, alternative practices, and pesticide development will lead to cleaner, safer and weed-free golf courses.

Dr. Brian Horgan – *University of Minnesota, Department of Horticulture Science*

bphorgan@umn.edu

612/ 624-0782

Research Interest: Work revolves around nutrient fate and general turf grass management. In addition, research focuses on salt tolerance in cool season grass, water use and distribution practices.

Comment: You would think the "Land of Ten Thousand Lakes" wouldn't have water concerns. But it does and water is very valuable to Minnesota's economic development.

Dr. Alec Kowalewski – *Oregon State University, Department of Turf Grass Science*

Email not available

541/ 737-3695

Research Interest: On getting settled at Oregon State, his research will focus on maintaining quality turf grass conditions within operating budget restrictions, reducing the impact to the environment through proper turf grass practices, researching various turf grass varieties for those species which use less fertility and water.

Comment: Effective management of turf grass resources is essential if we are going to continue to produce quality playing conditions.

Dr. Doug Karcher – *University of Arkansas, Department of Horticulture*

karcher@uark.edu

479/ 575-5723

Research Interest: Research program to improve the functional and aesthetic quality of turf grass through the refinement of cultural practices, especially those pertaining to soil management. Developed digital image analysis techniques to quantify turf grass cover and turf grass color.

Comment: If we can improve what turf looks like, the consumer will be more open to the various practices we employ.

As this "Not So Dirty Dozen" proves, there is no shortage of important agronomic ideas to study in this industry. But their success relies on our support. We can't let funding be allocated to the same participants year after year after year. Be a voice for progress and get involved with local, regional and national groups encouraging research that will help make our lives better and safer.

Be on the lookout for new and better ideas and when you see them, let everyone else know. **GCI**

(TRAINING *continued from page 25*)

Training should be conducted by management and not fellow workers with longevity.

At the point of orientation, I suggest explaining some of the following items:

- What is a golf course?
- What are our objectives?
- What are the standard work rules including items like tardiness, absenteeism and anything else that would be included in an employee manual?
- Pesticides, their storage and usage, location of MSDS sheets
- Hazards in the workplace
- Emergency evacuation information including fire exits and also location of extinguishers, etc.
- Disaster Plan if applicable that might be for tornados, hurricanes, earthquakes, tsunamis, etc.

It could easily take a few days to cover these items for new hires. For those superintendents that choose to delay this, you are really putting yourself and your club at great risk. If something happens to an employee in those first days of employment without this type of training, then the facility will likely be liable.

In recent years, it is fairly standard to receive either a training video or an operator manual for most of the equipment used on a golf course. Each employee must read or view these training and safety manuals so that they understand how the equipment works and how to use it in a safe manner. Should an accident ever occur this will be one of the first things an investigator or the injured parties will look into. "Was the employee properly trained?" If not, it is hard to defend safe usage of any piece of equipment. Be sure that employees view or read this material and then sign off on their understanding of the information and keep that on file.

OUTCOMES. Imagine a well-trained team of employees that operates in a precision manner to accomplish the goals and objectives of your facility. Imagine a team that understands what spells success for the golf course facility. Imagine a team that all knows how to execute daily the plan that you have for them. If this sounds like a fantasy it may be because you have never worked in an operation that holds training as one of the fundamentals for success. I suggest you visit a facility that utilizes formal training and see what their efficiencies are and their ease of management.

Cross training of employees will lead to several things. Not only are people checked off to do a variety of tasks, but they also are inspired to take on more training that could lead to more responsibility and potential pay increases. The more an employee knows and can do for the facility then the more value he has to the employer. Employees that are learning and growing are happy employees and this will lead to longer tenure with up to date skills. **GCI**

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Terry Buchen, CGCS, MG, is president of Golf Agronomy International. He's a 41-year, life member of the GCSAA. He can be reached at 757-561-7777 or terrybuchen@earthlink.net.

Travels With Terry

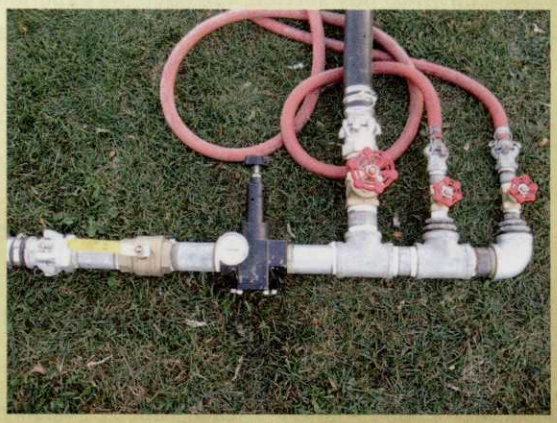
Globetrotting consulting agronomist Terry Buchen visits many golf courses annually with his digital camera in hand. He shares helpful ideas relating to maintenance equipment from the golf course superintendents he visits – as well as a few ideas of his own – with timely photos and captions that explore the changing world of golf course management.

PORTABLE SPRINKLER

Brad Twidwell has the distinction of being the general manager and superintendent at the Cape Girardeau (Mo.) Country Club. He designed and his staff built this unique portable sprinkler that has been used during recent drought conditions. An old 1989 Toro GM 3000 triplex greens mower frame was recycled and used as the base, where a 1970's vintage Toro model 405 full-circle brass sprinkler head was attached to the frame where the steel reducer portion was welded to it. A 1-inch galvanized coupling is connected to the sprinkler head and to a 1-inch-diameter 90-degree elbow that has a male slip connection where the 1-inch-diameter hose is attached with hose clamps. Each 1-inch-diameter hose is 100 feet long that is attached to a quick coupler valve. It will not tip over and it covers approximately a 100-foot-diameter circle. It took about 45 minutes to assemble mostly from used parts and spray paint cans already in stock and extra irrigation parts cost about $20.

THE BAZOOKA

Rob Foster, director of golf and park maintenance, at the Lake Bluff (Ill.) Park District, likes to be prepared well in advance for the annual blowing-out of the irrigation system at the Lake Bluff Golf Club. "The Bazooka" is an adapter for hooking-up two air compressors simultaneously to the pump station's 12-inch-diameter discharge pipe that is "ready to go" every fall. It was designed and built by Foster and his staff. "The Bazooka" is made mostly of 2-inch-diameter galvanized pipes, with multiple shut-off valves, hook-ups for a 2-inch and two ¾-inch diameter hoses from the 210 and 375 CFM air compressors, respectively, set at about 550 total CFM, where the regulator is set at 55 PSI. The irrigation system is blown-out two complete times and it takes about 1½ days to do a really good job. It took about two hours to assemble the parts that cost about $500 and it is stored in the pump house.



(**WATER QUALITY** *continued from page 22*)

Water quality is one of the most misunderstood parts of any golf course management program.

dividing the ppm values by the milliequivalent weights of each ion. The weights of key elements are Ca = 20 mg/meq, Mg = 12 mg/meq and Sodium (Na) = 23 mg/meq. For example, analysis shows 62 ppm Ca. 62/20 = 3.1 meq/l for calcium.

RSC is a key indicator as to whether Sodium (Na+) may build up or not. Sodium is the weakest held ion in the soil system so if beneficial ions are in abundance, sodium will not build up. This is dependent on the ability of the soil solution to drain adequately. If drainage is absent, then the presence of any salt will build up over time. If after completing the RSC calculation, or from reading a water test, if RSC is a negative value, then Sodium is likely not going to build up as it indicates that there are more beneficial Calcium and Magnesium ions than sodium ions. If a positive value is present, then sodium buildup is possible.

The tolerance levels for RSC are:

- **0 – 1.25 meq/l:** low Na hazard with some Ca and Mg removal
- **1.25 – 2.5 meq/l:** moderate Na hazard with appreciable Ca and Mg removal
- **> 2.5 meq/l:** unsuitable irrigation source, sodium will accumulate

SODIUM ABSORPTION RATIO (SAR). SAR is a measurement of sodium against calcium and magnesium. Its calculation is: SAR = Na / ((Ca + Mg)/2)½ in meq/l. SAR alone, as many of the variables on a water test, will not tell us all we need to know about water quality. For instance, we may have a low SAR (< 6.0) but an appreciable EC (> 0.5) but have an acceptable water source since the salts causing the EC do not include much sodium compared to other beneficial salts. As SAR rises above 6.0, even with a low EC (low salt content), we have a problem developing in relation to sodium. As SAR rises above 9.0, we have a sodium problem for sure and this must be addressed by adding free calcium, magnesium, potassium or other beneficial salts to offset the more weakly held Na+ ions.

pH. pH is a logarithmic measurement of free hydrogen (H+) ions. The more hydrogen ions, the more acidic the water is. The absence of hydrogen ions and the abundance of hydroxide ions (OH-) raise pH and causes alkaline conditions. In most cases, when a water test report shows a high pH, it is an indicator that we may have precipitation problems with calcium and magnesium. Acidifying the water source will lead to improved conditions. But only after reviewing all of the key water test values as indicated in this article can we determine exactly what the problem is and how to address it. Ideally, if we have a pH of 6.0 to 6.9, we have a healthy water source, but again, knowing other values from the water test will tell us if we have sodium or some other metal present that may not be impacting pH but will certainly impact turf health. Topical soluble applications of key elemental products on the turf can offset the negative effects of a not so healthy water source, but before you waste your money, understand what your water test is truly telling you.

The most significant problem we typically see in water quality includes the relationship of 'bad' salt ions to good ones. Remember that having a salt problem does not necessarily mean having a sodium problem. And if we have sodium present in the water, we can address it with adding key beneficial elements. In all cases, having the ability to move water through the soil profile by implementing drainage and fundamental cultural practices is always a best management practice to follow. **GCI**

Carmen Magro, CGCS, MBA, is chief agronomist and owner of Agronomy Management Solutions and a frequent GCI contributor.

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YOU GOTTA BELIEVE

My oldest son is now a college sophomore. He's like most college kids: partly focused on classes, mostly enjoying life on campus. And, like most, he really doesn't have a specific career in mind yet. He's trying different classes and seeing what appeals to him and hoping to find that one thing he's really passionate about. As long as he doesn't plan to hang around in college for seven years, I'm totally cool with him being a bit directionless. How many 20-year-olds legitimately know what they want to do with their life?

Last summer, the nice folks at the Cleveland Metroparks Golf Division were desperate enough for extra labor that they hired him to work at their cluster of courses on the west side of town. He actually took to it like a pig to slop. They had him mowing greens on a triplex a week after he started (which I told him would have been highly unlikely up the street at one of the local private clubs). He loved the outdoors aspect of it and seemed to really enjoy the responsibility and solitude of setting up the little executive course they operate all by himself. Hmmm…maybe this is his passion.

I tried to ignore the fact that he might be heading into a career in his dad's business but when I finally asked him how it was going, he sent a chill down my spine: "I really like it Dad. It's so beautiful being out there by myself and watching the sun rise and seeing the deer out on the course. It's very cool."

(I gulped hard when he said that because I've heard those same words a hundred times from superintendents when I asked them how they got hooked on this crazy business.)

I tried to be casual but I was already scheming and thinking if I could pull some strings and get him into OSU's turf program down the road from us. "Do you think you'd want to do this as a career?"

Maybe, he said. (I gulped again.)

It turned out that by the end of summer he had concluded he didn't much like waking up at 4:30 a.m. in exchange for $8.55 an hour. Could his passion be re-ignited this spring and he'll give it another try? Who knows?

But the whole episode got me thinking about what advice I'd give him – or any young person flirting with the idea of pursuing a career as a superintendent. Here's what I think I'd say:

> "Do I love this so much that I'm willing to live this lifestyle forever?"

You are about to undertake a journey that is difficult, risky and ultimately won't make you rich. It is not an easy path. The days of getting a turf degree from a state school, landing an assistant position and quickly advancing are over. Plan to spend 10 years making $35,000 or so and putting in 60 hours a week before you get your first "career" position.

Once you do, you'll be doing battle every day with a fickle bitch called Mother Nature. You will live and die based on what the Weather Channel says. Your employers will likely not really understand what you do or why you spend so much of their money doing it. Your GM might be your best friend or your worst enemy. Your work will constantly be compared to the Disneyland conditions people see on TV. You will largely be behind the scenes and get scant recognition for what you do.

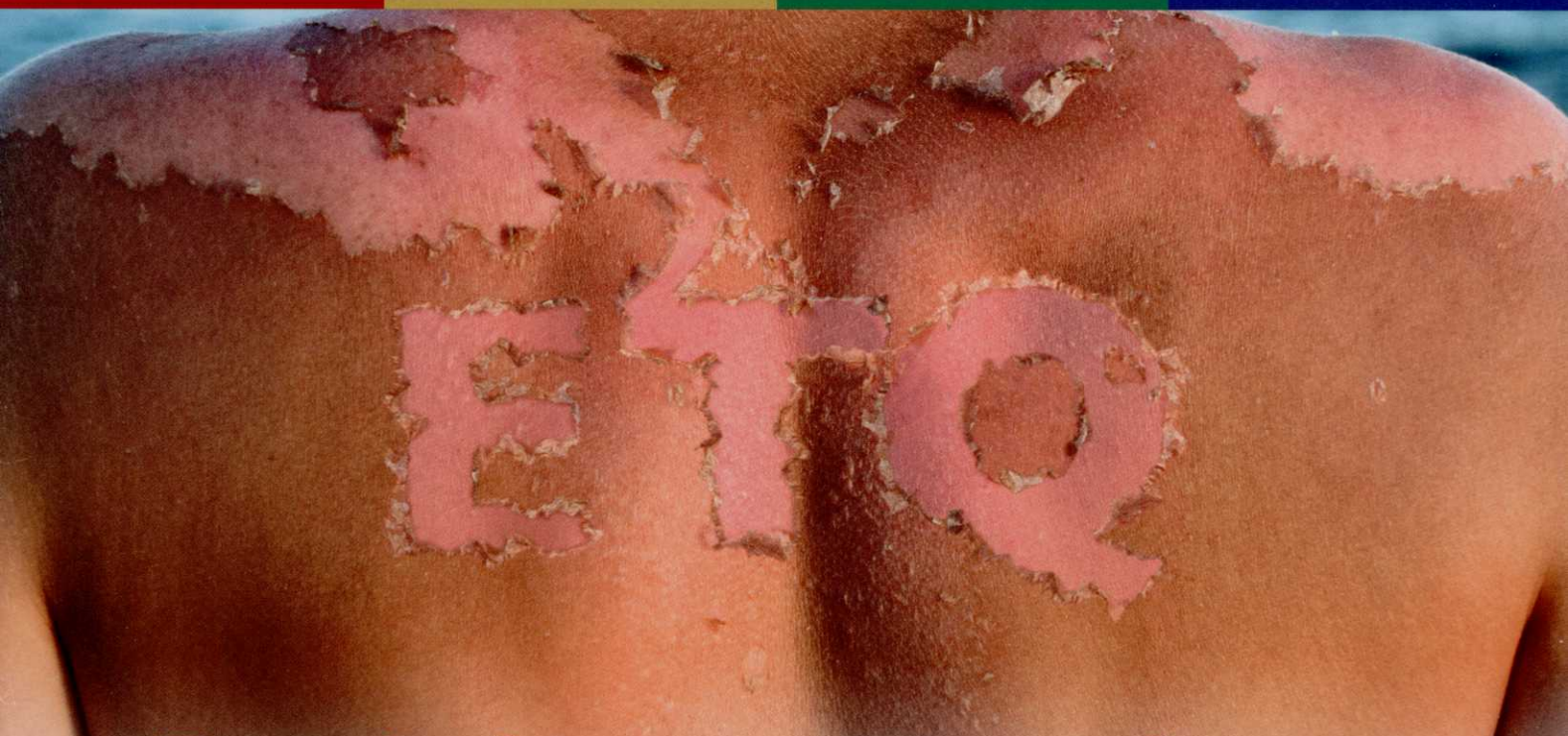
It is sort of a society of mad monks who live and breathe turf and golf operations. When you join the monastery, you agree to forego some earthly pleasures like sleep, a "normal" family life and casual conversations that don't involve words like "weevil" or "foliar uptake" or "pythium." Your wife/significant other and/or dog better buy into this whole thing, too!

There will be lots of stress. And, just when you think you've made it, your boss might decide you've done your job so well they don't need a superintendent as good as you and you could get screwed. At that point, your prospects for re-employment at the same level suck pretty bad and you may have a tough time continuing on as a super.

But…and it's a huge, enormous, massive "but"…if you are truly PASSIONATE about protecting, preserving and enhancing these wonderful playing fields and you wake up every day excited about the prospect of making your course a little better, you should absolutely do it. It's a lifestyle that has many rewards: a sense of accomplishment every day, beauty all around you, a feeling that you're giving enjoyment to others and an amazing spirit of camaraderie with thousands of other superintendents around the world who feel just like you do.

So, my advice to my son – or any young person thinking about jumping on this wild merry-go-round of a business – would be to look deep inside yourself and ask, "Do I love this so much that I'm willing to live this lifestyle forever?" Unless you absolutely believe that, don't do it.

But if you do believe – down to the very core of your soul – welcome to the best profession in the world. GCI



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