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SEEDLESS

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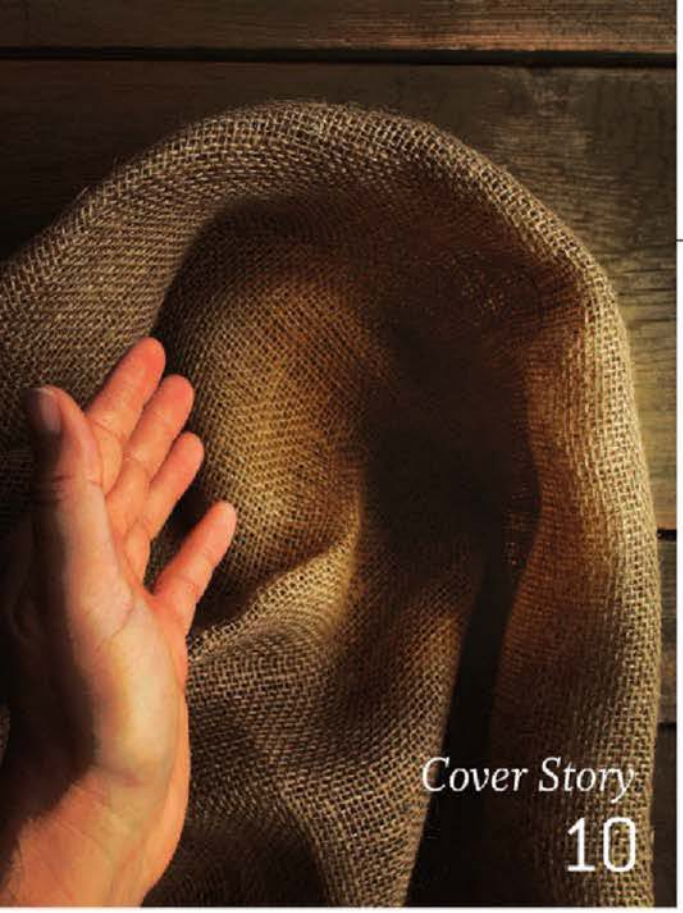

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CONVERGENCE

The crowdsourcers at Wikipedia tell us that "convergence" is the "the tendency for different technological systems to evolve toward performing similar tasks (whereby) previously separate technologies such as voice, data, productivity applications and video that now share resources and interact with each other synergistically."

In simpler terms, convergence is that stupid thing you carry around that lets you talk, text, email, search, watch, navigate, locate and otherwise interact with about 3 billion other wired humans around the planet.

Pat Jones
Editorial director and publisher

We here at GCI's global science lab are always trying to stay one step ahead of the technology convergence wave. We've been online forever. We've been digital and mobile for years without (hopefully) losing track of the fact that nearly all of you still demand the paper edition. And we continue to be the only publication in the industry (and one of the few business magazines nationwide) to offer a native app version of our publication that truly is where convergence happens.

The app has been a remarkable tool for many readers not just because it's cool. It is most definitely cool but it's also very useful. For one thing, it's completely portable. Once you've downloaded the issue, you can read it anyplace at any time on your iPhone or iPad. Many folks tell me they appreciate being able to read the issue on a plane or anywhere else without a connection.

The app also allows us to embed enhancements into the stories you get in the print edition. Videos, Superintendent Radio Network podcasts, downloads, bonus pictures, animations and, of course, links back to our site and others allow you to explore a topic completely without ever leaving the edition.

Now, we're taking that to a new level by offering special content you can ONLY find in the GCI app. We're starting with this month's edition (which should be available about mid-month) and I'm pleased to announce that our very first app exclusive will be ground-breaking instructional video created by our friends at Turf Republic that shows you how to create your own videos using the tools you already have or even a GoPro camera.

If you haven't seen what some of your colleagues are doing with GoPros, make sure to check out the GCI video library on our site or visit Turf Republic. The bottom line is that they are remarkable tools that allow you to tell your story from any point of view. You can mount them on a mower or aerifier, attach them to a tripod for time-lapse shots or even fly one around in a robotic drone if you're really looking to have some fun.

Wait! You don't have a GoPro yet? That's so sad. Here's a crazy idea… maybe you could get one for free! How? Just download the April app edition of GCI, find the exclusive Turf Republic video we've embedded in it and register to win your very own GoPro. That's the grand prize. We also have some slick GCI-logo gear for five more lucky entrants.

Yup… not only is the GCI app the best way to get the most out of the magazine… it also has a prize inside! It's like a digital box of Cracker Jacks. Enjoy the treat! GCI

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The Richly Colored Night

How a new adjuvant is shining a light on course maintenance.

By William Olmstead

In 2011, GCI's Bruce Williams wrote about the benefits of alternative scheduling for course maintenance and the resourcefulness of some forward-thinking superintendents. The principle behind this nighttime grounds-work is simple: superintendents maximize their operational efficiency while minimizing crew interference with players on the course.

"The number of days and hours in which one can golf are limited," said Williams. "People pay a lot of money to either play public golf or belong to private clubs. They have an expectation that they can go out and play without being interrupted."

The daylight hours in which superintendents and their crews can accomplish their maintenance goals are also limited. Being natural problem solvers, industry professionals turned to the night for a solution.

Working under cover of darkness presents some obvious difficulties, from employee safety to low visibility. While equipment lamp mounts and light banks provide some relief, they are often not enough. Mowing fairways and roughs in the dark, for example, is extraordinarily problematic. Floratine Products Group recently released an adjuvant that seeks to solve this dilemma. The new product, called Night-Ops, is revolutionizing the way that superintendents will look at low-light maintenance work. I spoke with Kevin Cavanaugh, executive president at Floratine, about the new release and how superintendents are responding.

How exactly does Night Ops work?

"Night-Ops is a patent-pending, non-toxic adjuvant designed to be safely applied to turf. It has the unique ability to phosphoresce so that when activated with black light it becomes visible to the eye. Under regular daylight conditions or without the use of a black light, it cannot be seen by the naked eye. It works great as an adjuvant in a tank mix. At night, the applicator can work under black light and dial in spray patterns easier than in daytime operations. It literally looks like a million tiny points of light.

How have superintendents responded to the Night Ops?

There was quite a bit of discussion about it at the GIS in Orlando. Some superintendents were initially adverse to the idea saying things like, "I don't need to work anymore than I already do!" However, a lot of superintendents like the idea of using Night-Ops in their spray mixes to be able to track where their sprays (herbicide, pesticide, fungicide or nutritional) actually went down. Remember, the adjuvant doesn't always have to be used at night. As an example, it can be mixed into a pre-emerge herbicide spray and applied during the day, if desired, and the superintendent (or his assistant) can come back to the course in the evening and see exactly where that spray application went down and map where the sprayer may have missed and target that area for corrective measures sooner rather than seeing a flush of weeds later. Of course, if used at night it can be seen immediately by the spray applicator and a very tight spray pattern can be had.

Are there specific turf types that respond best to this product?

No, all turf types work very well with Night-Ops. If it can be sprayed, Night-Ops will show up under the black-light and will be invisible all other times without the lights. The adjuvant will last as long as it remains on the leaf. Dew, irrigation or rain will wash it from the leaf and render it inactive.

Are there any limitations to who can use this product?

No, anyone can utilize Night-Ops. It's safe, easy, effective... and we think it's pretty cool.

William Olmstead is GCI's assistant editor.

CHECK IT OUT ONLINE

For the full version of the Q&A with Kevin Cavanaugh, executive president at Floratine, check out the app version of Whiteboard, or check out the digital edition of this story at golfcourseindsutry.com

From
THE FEED

Across the pond, many superintendents are banning golf shoes that are ruining their courses and putting greens. In the U.S., many turf managers are beginning to do the same, looking to protect the turf that they work so hard to maintain. Check out what industry professionals had to say about Adidas' adizero Tour, the shoe that has caused the most damage.

Alex Nicholls @Golfcornerstone
Brocket Hall Golf Club ban adidas Adizero golf shoes as they allegedly cause 'damage to greens'

Brocket Hall @BrocketHall
So far no arguyments against our decision to band Adidas Adizero Tour golf shoes as they damage turf. What are your thoughts?

Caledonian Golf Tours @CaledonianGolf
@ClearSwing @BrocketHall I love @adidasGolf shoes and I agree that some have overreacted. Possibly an issue with greens drainage?

Darren Gough @clearswing
@Caledoniangolf @BrocketHall @adidasGolf – too many courses including Tour venues banned them – so not a drainage problem

Luke Geoghegan @Lukegeoghegan
@ClearSwing @CaledonianGolf nothing to do with drainage, they make deep indentations on compact greens like ours. Hence the ban.

Darren Gough @clearswing
@CaledonianGolf @Lukegeoghegan – it's the accentuated spike mounts which are the problem unfortunately.

Join the conversation
on Twitter @GCIMagazine!

One step forward, two steps back

Earlier this year, GCI began to receive an enormous amount of feedback from superintendents across the country about new golf shoes that were ruining their putting greens. The new spikes, which boast improved traction and performance for players, dig too deeply into the turf that superintendents work so hard to maintain. In order to find out more we reached out to Dr. Thomas A. Nikolai of Michigan State University and Josh Lewis, chief superintendent at Chambers Bay in University Place, Wash. The results are troubling for superintendents, proving that shoe manufacturers need to start rethinking their research and development strategies.

"We better start speaking up as turf managers now, because this is an obvious trend in shoes. We need to be heard."
–Josh Lewis, Chambers Bay

Treatment	Traffic Ratings Oct. 30, 2013
Nike TW '14	3.4 b
Nike Lunar Control	3.6 b
Adizero Tour	4.3 a
Test 13-144	2.5 c
Ecco Biom	4.2 a
FJ M:Project	2.6 c
FJ DryJoy Tour	2.7 c
Untreated	1.0 d
Probability	0.00

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.

GOLF IN CHINA

In some ways, China's golf's evolution is like stepping into a time machine.

I have been fortunate to secure design commissions in China this year. Given the lull in new course design in the US, it is fun to travel and design new courses there. Since it's on my mind, it seems reasonable to take a break from writing about down to earth, practical matters I usually tackle in this space, and look at golf as it develops in China.

There are similarities to golf in the U.S. now, and to golf as it developed in the U.S. about 120 years ago.

In both cases, the rich found golf to be a pleasant diversion, and are enthusiastic participants. In both cases, most of the early courses are private. Semi-private and public courses are slowly starting to appear, but are small in number. And given it is generally a sport of the wealthy, they want what they perceive to be "the best" and generally can afford it.

slt strikes me that whereas golf (and golf architecture) in America got its start from Scottish golf pros, who adapted the ancient game to American conditions. Not much was known about agriculture and turf in those days, but the Chinese have fewer problems, since they have imported more than a 100 years of US golf technology in design, irrigation, construction and turf science. Golf in China is definitely modeled after the modern U.S. golf industry, and some would say they have imported both the best and worst of American golf.

There are some spectacular successes. They mostly use U.S. architects, including those at the top of their game, like Bill Coore, ASGCA and Ben Crenshaw. On a spectacular ocean-front site at Shankqin Bay, on Hainan Island, they designed a course that deserves early inclusion in several World Top 100 lists.

Of course, not every site can be spectacular, ocean front land. Like Japan, it seems they reserve the gently rolling land for agriculture, meaning many courses are built on mountainous sites we would not consider building in the U.S. On my last trip, I ascended (and descended) almost 900 vertical feet one day – equaling walking to the top of a skyscraper. Typically, they move 1–2 million cubic meters of earth, at least five times more than typical on U.S. courses. Chinese practice areas also more closely resemble those from Japan, with their AstroTurf practice tee mats and covered double-deck structures.

> “Of course, not every site can be spectacular, ocean front land. Like Japan, it seems they reserve the gently rolling land for agriculture, meaning many courses are built on mountainous sites we would not consider building in the U.S.

They also build courses to promote real estate. With their typical high-rise housing, some courses are true "condo canyons." Early development courses were far too tight, but golf acreage is increasing. Recently, landing zones have been made wider (450 feet, when 400 feet is the most I've seen in the U.S.). They have also embraced some of the newer housing trends, as enlightened developers realize that single fairways, loaded with towers on each side may not create the maximum value. Double fairway corridors are more common to give a better green belt effect.

Environmentalism is highly valued, whether cleansing runoff with ponds, or using electric vehicles to reduce the carbon footprint.

It appears they are following U.S. design trends from the 1990-2007 period, when designs were based on the tournament length/quality, cart golf, signature holes, one-upmanship and potential rankings and publicity. Water hazards and heavy bunkering are prevalent, making many courses too tough for average players, especially where a larger percentage are new golfers. However, they seem to like such difficulty, and there is talk of courses being "too easy," which we have moved away from in the US.

Based on wear patterns, it seems most golfers play from the blue tees no matter what the course yardage is. "Tee it Forward" hasn't caught on in China. Speaking of wear patterns, while carts are the norm, each player gets his own cart and a caddie who rides with them. As turf expert Kun Li told me, "Greens and tees are oversized compared to the U.S., because 20,000 rounds equals 40,000 rounds of traffic on a US course."

The clubhouses are also typically oversized, providing excellent amenities and service levels, because they say the "culture" demands it.

(BRAUER *continues on page 64*)

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WINFIELD™

by Rob Thomas

SEEDLESS

Turf seed shortages are a real problem for the golf industry. Economic factors reduce choices and limit your ability to get what you need this season.

While the world is often fueled by the laws of supply and demand, the ever-present need for quality turf seed in the golf industry seems to outweigh what's readily available.

Worse, there may not be a quick end or an easy solution in sight.

Is the golf industry facing a seed drought? It all depends on how you define "drought," says Bruce Jump, product and training manager of turf seed and athletic products at Winfield Solutions.

"If you mean will the industry be facing a shortage of certain varieties/species of seed, the answer is certainly 'yes,'" Jump says. "Specifically, high-quality perennial ryegrasses will be challenging to find in 2014, as well as high-quality fine fescues with hard and chewings fescue especially difficult to find."

Tall Fescue is in better shape, he adds, but the newest varieties will have inventory and availability challenges. Conversely, higher-quality varieties of Kentucky Bluegrass are good from an availability standpoint, but prices are firming and should continue to firm up with new crops late this summer.

"In general, we are in much better shape than 2013," Jump says. "Although specific varieties may have short supply."

MARKET DRIVEN

The current scenario is less of a drought, and more a focus shift by turf seed growers.

"After the housing crash, demand went from artificially high – driven by lots of home building, fueled by cheap money and bad loans – and there was an oversupply of seed, and resulting low prices," says Murray Wingate, turfgrass marketing and sales manager at Lebanon Turf Products. "We may be now finding a 'new normal' for overall seed demand."

The seed market's fickle dynamics play a large role in availability, as well. Unlike grain commodities such as corn, soybeans and wheat that are traded on open exchanges, Jump says turf seed production and pricing is more opportunistic.

"Growers of turf seed have choices and options," Jump says. "For a grower, turf seed production can very easily be converted to other crops like wheat, vegetable and flower seed production, other small grains, and so on. Turf seed growers use these crops in a rotation as part of their regular crop-management plans. A grower's decision to produce a crop is therefore based on the opportunity or spread between the cost and return on investment of producing an acre of one crop or another."

Take wheat as an example. When wheat

was trading for $2/BU, the return on investment (ROI) spread between an acre of wheat and an acre of turf seed was in favor of turf seed and many growers chose to plant turf seed. Today, however, wheat prices are well above $6/BU. When a grower can sell wheat at that price, the ROI for an acre of wheat becomes very attractive compared to turf seed.

"What makes this situation difficult is many growers sell future contracts, locking them into wheat and other crop positions for up to 12 months," Jump says. "If/when wheat prices begin to decline, there will be a lag time before turf seed acre production begins to rise in response."

Because fewer acres are being dedicated to turf seed, growers are in the enviable position to negotiate favorable deals – driving up the price of turf seed.

"After the housing collapse of 2008, demand dropped 50-70 percent over night for all turf grass species, the result being the [seed] trade was caught with a crop in the barn and another one in the ground coming our way," says Jacklin, production manager at J.R. Simplot Co. – Jacklin Seed Division. "Acres of production were throttled back in 2009-10 as fast as was realistically possible. As the trade worked through the inventories and began to get supply in line with consumption, new plantings were difficult to find as growers had switched to other crops during the down turn. Those other competing crops have held their value, resulting in profitable alternatives for growers, making it difficult to compete and get new acres."

Government regulations on fuel – specifically alternative fuels – has also played a large role in the turf seed dilemma. Ethanol, and the federal government requirement that a certain percentage of fuel contain ethanol, has significantly impacted turf seed production, in an indirect fashion.

"Since corn is the preferred ethanol crop, its price has risen, thus moving farmers and ranchers to use more wheat for feeding," says Kevin Morris, executive director of the National Turfgrass Evaluation Program. "Wheat is a crop that can be grown very well in the Pacific Northwest and with prices high, more farmers are opting to grow wheat, an annual crop, over grass seed, which is a perennial crop that has a minimum of three crop years in the field requested by seed companies. Having the crop in for three or more years limits the flexibility of a farmer, hence it makes grass seed less attractive compared to wheat if wheat prices are high."

STICKER SHOCK

Because of light production out of the 2013 crop, seed prices, in general, are higher than they were last year, and Wingate expects them to stay about the same, or increase slightly on some species – like perennial ryegrass.

Perennial ryegrass prices are the highest Jump has ever seen.

"Selling prices have increased over 40 percent since 2009," he says. "Pricing for 2014 is increasing and will probably increase until new crops in August. Yields, along with demand at that time, will help determine pricing."

Hard and chewings fescue pricing will continue to be high to higher with limited availability, Jump says. "Bentgrass pricing will continue to be strong," he says. "Tall fescues and Kentucky Bluegrass – especially elite varieties – are currently somewhat stable, but could firm and get stronger as inventories begin to run low in spring."

Morris believes the seed industry is adapting and there's a turnaround to low seed production coming.

"It may mean producing seed in new areas or more seed acres in other existing production areas like Minnesota," he says. "However, if there is demand, the seed industry will figure a way to supply that demand. There is a significant amount of seed produced in other countries – Europe (Denmark) and other places like New Zealand – however, they generally cannot produce the quality of product we need, or the quantity."

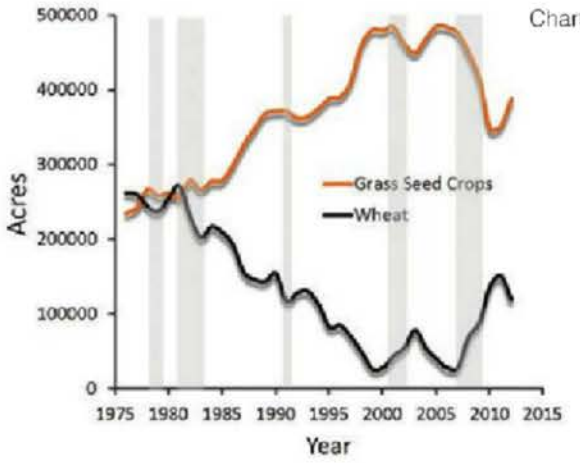
Blame Nutella

Filberts – or hazelnuts – is another crop starting to impact turf seed production, says Kevin Morris, executive director of the National Turfgrass Evaluation Program.

"With the popularity of Nutella, a popular hazelnut/chocolate spread, the demand for hazelnuts is increasing," Morris says. "Hazelnuts are also a great source of protein in the developing world. However, there simply are not enough hazelnuts trees worldwide, therefore farmers are looking to plant them, which take several years to develop and harvest. Obviously, these trees take away from grass seed acres, especially since the trees will be in place for many years."

The filbert phenomenon struck Murray Wingate, turfgrass marketing and sales manager at Lebanon Turf Products, on a recent trip.

"I was in Oregon a couple weeks ago and was amazed at how many new hazelnut acres have been planted on prime grass seed growing acres," Wingate says. "This essentially takes those acres out of seed production for 30-50 years."



Jump looks to Oregon's Willamette Valley – the world's largest production area for cool-season turf seed species – for a possible industry forecast.

"The number of production acres are not unlimited," he said. "There will always be competition for acres. Also, higher-quality production acres tend to be in the central and northern part of the valley where bents, perennial ryegrasses and tall fescues are located. In the southern valley, more annual ryegrass is produced ... meaning all production acres are not equal."

Jump circles back to growers having a choice to plant other crops. What will they choose and why? Citing a report from Oregon State University, Jump points out that wheat and grass acres mirror each other (see Chart 1).

"Turf seed acres decline during periods of recession – housing/construction demand falls; grass seed prices fall; wheat is the crop of choice," he says. "As the economy recovers and building continues to improve, grass seed acres are expected to recover. Look at the 1980s and 1990s ... excellent years for turf seed production."

Like Morris, Jump isn't keen on European turf seed as a substitute, specifically perennial ryegrass, which tends to be lighter in genetic color and has different disease traits than its American counterpart.

"There will always be seed available to support the industry," Jump says. "What may not be available – or be short in supply – is high-quality seed, along with high-quality varieties. Anytime there is a shortage, available quality begins to decline. Buyers take the high-purity, Poa free, certified seed first. Then the substitutions begin. Uncertified for certified. A 'trace of *Poa*' for *Poa* free. And so on.

Morris adds he's not seeing this in the perennial ryegrass market. "I'm buying all the elite varieties, certified, *Poa* free perennial ryegrass I can get my hands on. It is not easy as suppliers and inventories are extremely tight," he says.

If all goes according to plan, Jacklin believes supplies will be much improved by summer. "We are in good shape coming into spring 2014 ... the crops in most of the production areas went

Consolidation

Given the flux in the turf seed industry, consolidation of companies has been an ongoing process -- and not always to the betterment of the whole. Whether looking to access new clients and geographies, or to share technology and finances, bigger isn't always better.

Murray Wingate, turfgrass marketing and sales manager at Lebanon Turf Products, has seen the bad side of this business model.

"The seed industry went through a major consolidation in the early 2000s when Agri Biotech rolled up 35 companies and then went bankrupt," Wingate says. "That really hurt the industry for several years."

Bruce Jump isn't ready to make assumptions based upon recent activity.

"Scotts exited the professional business a couple of years ago, selling most of their inventory and varieties to other seed companies," says Jump, product and training manager of turf seed and athletic products at Winfield Solutions. "We just saw the DLF acquisition of Pickseed/Seed Research of Oregon deal this past summer. It's hard to tell if this will continue or if this is even a trend.

"Seed companies must find valid reasons to acquire like: buying companies with under-performing assets, getting better negotiating power with turf seed producers, access to new geographies or customers, or acquiring new technologies like proprietary varieties with unique traits," he adds. "Although individual cases could be made for acquisition, I'm not sure if enough of those factors are present in the current state of our industry to see any kind of major consolidation in the next year or two like we saw back in the late 1990s."

Overall, the seed industry is difficult to consolidate.

"Since the seed industry is a business based on contacts, personal relationships, etc., it is fairly common for a few employees to leave one of the larger companies and start a new company," says Kevin Morris, executive director of the National Turfgrass Evaluation Program. "I don't see that changing anytime soon."

in to the winter in good shape and appear to be coming out of winter in good shape," he says. "We experienced some winter damage to baby fields, but for the most part, we are set up for good crops to come off in 2014. That can all change in 90 days if we miss out on rains or have poor pollination conditions, but at the time ... things look fine."

The next five months will be tight, though, but new crops will begin to hit the shelf by mid-July to early August, Jacklin says. "If crop predictions are accurate and yields come off normal, this fall we will be in good shape to meet the consumption." GCI

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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.

ZEITGEBER

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zeit•ge•ber (TSYT-ge-buhr) **n.** An environmental cue, such as light, that helps to regulate the biological clock in organisms to keep them functioning on a regular schedule.

Zeitgebers are nature's alarm clocks. For humans, the schedule of the work or school day and regular mealtimes, are zeitgebers. Superintendents, owners and operators recognize zeitgebers in the form of warmer soil temperatures and spring rains, which stimulate new root growth and signal the return of their customers.

But there are other zeitgebers you should heed, particularly weather and consumer confidence, which are impactful influences on golf participation and overall facility success. The first step in dealing with these zeitgebers is to understand them.

No factor influences the volume and frequency of rounds more than weather. Every owner and operator should understand weather patterns and take them into account for budgeting, planning the deployment of resources and, ultimately, cash flow.

In a business like golf, where success often straddles a fine line that divides good and bad decisions, knowing whether the forecast is for warm and dry or cool and wet is essential for effective planning. Whether you rely on the old-school Farmers' Almanac or current state-of-the-art capabilities provided by companies such as WeatherBug, owners and operators today have easy access to highly reliable weather trends to aid their business planning.

If all signs point to a wetter-than-normal season, you should be more aggressive in capturing and retaining golfers. Seasonal programs that reward frequency and customer loyalty should take priority in a rainy season, when every good day must be maximized. On the other hand, if the long-range forecast is for great weather, with an abundance of playable hours, you want to make sure your operation is running at peak efficiency so you maximize tee times. That means examining your pace-of-play guidelines and making sure your pricing reflects the anticipated demand.

> "As sure as daffodils and dandelions are poking their heads above ground in many parts of the country, business signals are also there for the eye to see."

Consumer confidence is another zeitgeber to heed. The Conference Board – a highly reliable reference point for consumer confidence – highlights three primary influences on consumer confidence: unemployment, housing and access to capital. Course operators should pay attention to all three.

- Unemployment rates are trending downward in many (but not all) markets. This zeitgeber signals participation levels and what should be expected when pricing the services of the club or course. Every club should have a current understanding and up-to-date market knowledge of employment in its area. Levels of education achieved, annual household income and other census-driven metrics also signal favorable market conditions.
- The housing economy directly impacts the stability and growth of most major metro markets. Housing influences the flow of families into a community, which in turn, affects membership at many golf facilities. This flow of new families and school-age children is the lifeblood of demand for most courses. In addition, the housing sector – and the thousands of jobs that go along with it – improves employment statistics and the willingness to spend on discretionary items such as rounds of golf and memberships.

Home sales historically are at their highest in the spring and early summer. So that's the time for courses to be aggressive in capturing members and conducting family-oriented programs. Home sales slow around Labor Day as families want to be settled before the start of the school year.

- Access to capital and the ability for prospective homeowners to qualify for bank-finance mortgages also affects the health of clubs and facilities. Debt that supports and increases homeowner occupancy is currently constrained. New policy at the Federal Housing Administration makes it difficult to qualify for a home mortgage. Golf owners and operators can benefit from monitoring this indicator of consumer confidence. This factor influences lifestyle choices for golfers and prospective members at middle-market clubs.

As sure as daffodils are poking their heads above ground, business signals are also there to see. Pay attention and take action. **GCI**

Take a good look. You may never see them again.

{fig. w-42}
Digitaria sanguinalis

{fig. w-76}
Eleusine indica

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THE BIG MELT

Winter's record cold, snow and ice are behind us. Now it's time to get your turf into shape.

by Steve Trusty

What kind of a winter did you have? Are you in an area that received record cold? How long was your course covered with snow and/or ice? How is the turf going to respond as the weather warms up? Is disease pressure going to be higher than usual? We asked people around the country these and related questions. The nearly universal answer was, "It depends." When asked what superintendents should be doing to prevent potential problems, the most common paraphrased responses were, "*Don't rush things.*" "*Be patient.*" "*Don't pay attention to the calendar, watch the weather, soil temperatures and how your turf is responding. Then act accordingly.*"

Snow mold is probably the first thing that comes to mind for those areas that experienced excessive snow cover. Jim Skorulski, senior agronomist with the USGA office in Massachusetts, says, "We are anticipating heavier than usual snow mold pressure due to the persistent snow cover this winter." Massachusetts was one of the northeastern states that still had most of the ground covered with snow on the first full day of spring.

Darin Bevard, director, Mid-Atlantic Green Section, USGA from the Pennsylvania office, says, "Overall, what we have seen has been positive. Disease pressure has primarily been from pink snow mold (*Microdochium nivale*) with a little gray snow mold (*Typhula incarnate* and *T. ishikariensis*) here and there." Dr. Lee Miller, extension turfgrass pathologist, University of Missouri, reported finding pink snow mold in central Missouri on March 14 after a big snowmelt.

Dr. Joe Vargas, professor of botany and plant pathology at Michigan State University, is more concerned about the potential damage from the ice cover. Greens in parts of Michigan were

covered with ice for over 60 days. While snow provides a blanket that protects the turf from desiccation, ice smothers the turf. Toxic gases build up under the ice and suffocate the crown. Vargas says, "Another problem that occurs is when the ice and snow melts and then refreezes. The crowns are crushed by the formation of the ice." Vargas also says, "The longer the ice and snow holds on, the less time there is for the grass to rejuvenate before people want to play on it."

Desiccation is another problem that superintendents may have to deal with this spring. Desiccation occurs when the amount of water lost by foliage exceeds that picked up by the roots. Miller says, "During a cold winter, uptake of water by turfgrass roots is minimal due to dormancy, yet high wind and low dew points can continue to suck water out of the foliage." He reports, "We had sustained periods of both in Missouri this past January and we may be seeing damage from that time frame when insulating snow cover was not present."

Dan Maddox, superintendent at Oak Hills Country Club in Omaha, Neb., which had practically no snow cover most of the winter, reports his biggest concern is desiccation and the onset of warm weather too quickly.

"Because the winter was so open and we had record cold, I am finding frost much deeper than usual and it is hanging on later," Maddox says. "It is going to be a while before I can charge my irrigation system, but the turf could use some water."

What should you do? Patience and observation were the common suggestions by respondents to our questions. A University of Nebraska newsletter published on February 14 had several suggestions for assessing winterkill. The key suggestion was to bring grass samples inside and force them to green-up. This gives the superintendent a much better idea of what to expect when the turf in the field warms up. The more time you have to prepare, the better chance you have of making sound decisions.

Maddox says he followed these recommendations. "I was pleasantly surprised in

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Pink snow mold is probably the most common disease present after a winter of snow or ice cover. Depending on overall turf health and weather forecasts, fungicide applications may or may not be warranted.

some areas, the grass is greening up fine," he says. "In other areas, I know the turf didn't survive and I can map out my re-grassing program."

Vargas expects some of the greens in Michigan that were covered with ice for extended periods will have to be resodded. Bringing samples in for testing will confirm or refute that necessity.

Bevard says patience is the key element in helping the recuperating process. "We cannot make the grass grow if we don't have proper environmental conditions," he says.

The process is dependent on weather conditions, Skorulski says. It requires warmer temperatures to dry things out and warm up the soils.

"I recommend charging the irrigation systems as soon as possible," Skorulski says. "I expect the turf to be weak so it will be vulnerable to desiccation." UMass Turf Extension recommends raking to relieve matted turf after the stand dries to speed recovery. They go on to state overseeding may be warranted in severe instances.

Patience is also a key offered by Carmen Magro, CGCS, MBA, professional agronomist and vice president, business development for Stevens Water Monitoring Services.

"Once it [the grass] gets

Pink snow mold under the microscope.

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Lessons learned

What have we learned from this and other tough winters?

"Mother Nature is always in charge, and sometimes we try to do everything right and wind up being wrong," Says Darin Bevard, director, Mid-Atlantic Green Section, USGA from the Pennsylvania office. "When the weather goes against you, there isn't much you can do."

Jim Skorulski, senior agronomist with the USGA office in Massachusetts says, "Some portion of the NE region will experience some difficult winter weather and cold temperature injury on a fairly regular basis. This year's winter weather is more extreme or seems to be impacting a much wider portion of the region and country. There have been records broken for cold temperature and for snowfall totals in many areas, and winter seems to be holding on hard." He adds, "Mother Nature is boss. She flexed some muscle to let us know that."

"Learn that what we do throughout the year will have an impact on what happens when the turf is dormant," says Carmen Magro, CGCS, MBA, professional agronomist and vice president, business development for Stevens Water Monitoring Services. "The turf system's performance level is highly dependent on what we do throughout the year, from year to year. It is why tournament courses begin to prepare for major tournaments years in advance."

Magro adds, "We can only achieve great success by learning to manage all the things that are manageable to the best of our ability...these include soil management, irrigation management and nutritional management in no particular order, but of equal importance."

going, there will be no stopping it," Magro says. "It will surely depend on how well the superintendent addresses the turf's needs as it breaks dormancy, and it will also depend on the practices put in place prior to dormancy.

"If the turf survived the ice/snow damage in the North, then it will green up perfectly if we allow it to transition properly," Magro adds. "If we are delayed in the south by extended cooler temperatures, then the cool season grasses (or painted warm season turf) will hang around a little longer than usual, but be assured once the soils begin to warm ever so slightly, the deep green turf will be on us quickly."

As soon as the grass can be vented or allowed to be exposed to sun and air, do it, Magro says. Do not aerify the turf too soon. Gradually, over a period of 7-10 days of sun and warmth exposure, mow off the dead material and begin your nutritional and IPM management program. "Focus on the fundamental needs of the turf...stimulate growth down through the roots, manage the soil/moisture relationships, air out the turf any way possible to get the gas exchange moving well," he says. "Only in the case where there are active fungi growing and thriving would I make a fungicide application my first priority."

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> "Once it [the grass] gets going, there will be no stopping it… If the turf survived the ice/snow damage in the North, then it will green up perfectly if we allow it to transition properly. If we are delayed in the south by extended cooler temperatures, then the cool season grasses (or painted warm season turf) will hang around a little longer than usual, but be assured that once the soils begin to warm ever so slightly, the deep green turf will be on us quickly."
>
> —*Carmen Magro, CGCS, MBA, Stevens Water Monitoring Services*

with maintenance practices when the grass isn't growing, Bevard says. Also, monitor the weather and grass closely. "It may be possible to skip fungicide applications to control a disease such as Microdochium patch if, for example, the weather is going to turn dry, warm and sunny," Bevard says. "The disease will no longer be active under these conditions."

If you find out that you have experienced winterkill in certain areas, you'll need to determine your next course of action.

There are a number of factors to take into consideration. Depending on the size and location of the areas you have the option of seeding or sodding.

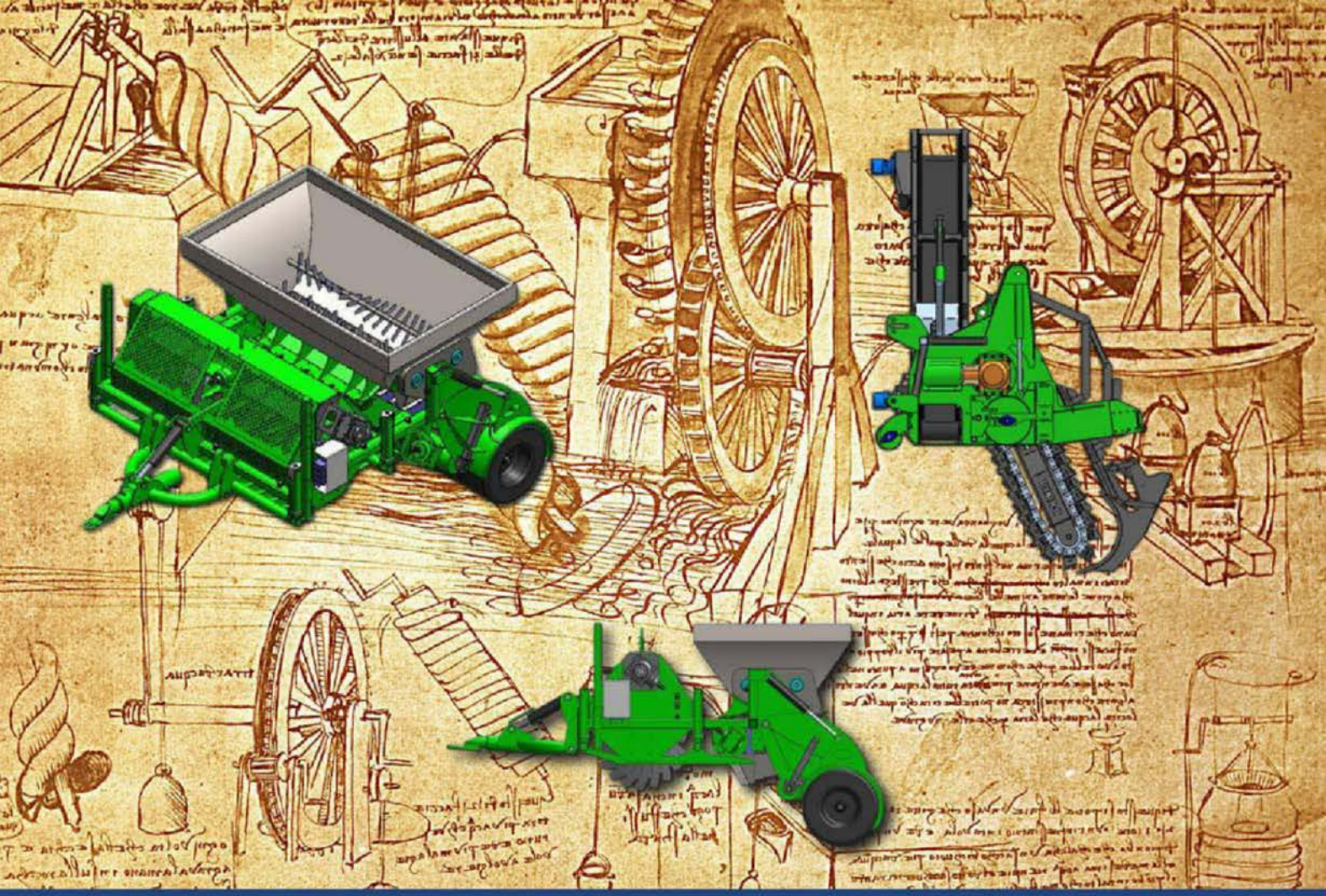
Budget also certainly comes into play here. Availability of the preferred sod is also a question.

If seeding you need to decide what seed to use. Will the seed that matches the primary stand in the affected areas germinate in time to be effective?

If not, what can you use that will establish itself quick enough but not contaminate your stand? What kind of combination can you use that will provide maximum results? What can be done to speed up the germination process?

If any kind of pre- or post-emergent weed control is needed, how do you time it with seeding for optimum control and seed establishment? How do you need to adjust your fertility program?

Keep in mind that the seedlings will not develop a good root system for some time so low rates of fertilizer applied more frequently will be more effective. You will



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When turf doesn't have any snow cover desiccation can be a major problem. It can thin the turf by affecting some of the plants or wipe out an area by drying out all the crowns.

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also need to water the seeded areas more frequently until the plants become established. Mow as soon as the first seedlings reach the mowing height for the area.

To encourage the seedlings to spread mow early and frequently. If hot and humid weather is in the forecast, you may need to apply a fungicide to prevent damping off, Pythium, and/or brown patch.

Last, but certainly not least, manage moisture and salts together on a regular basis.

"Monitoring those is simple with today's technology," Magro says. "Monitoring will prevent leaching of nutrients from the turf, allow for the most air exchange to take place, allow for the most extensive rooting to take place and simply help to setup the turf to withstand this year's stress and future stresses yet to be encountered." **GCI**

Steve Trusty is a Council Bluffs, Iowa, based writer and frequent GCI contributor.

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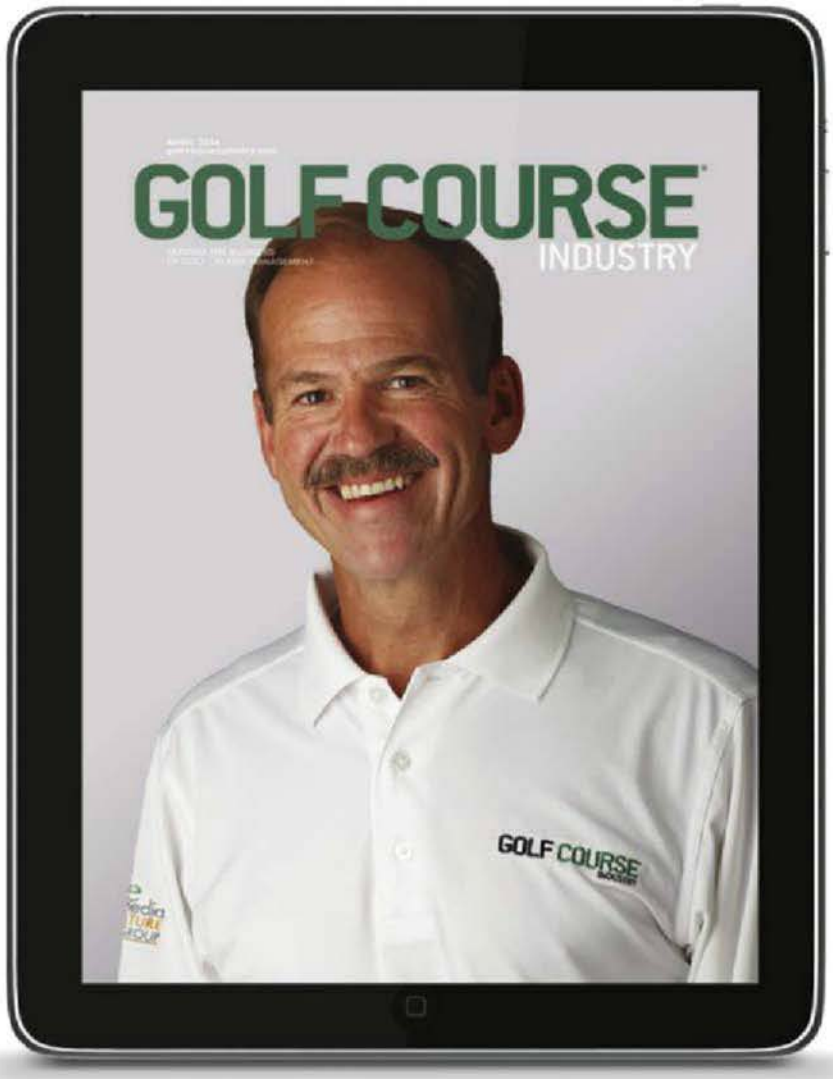

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Brian Vinchesi, the 2009 EPA WaterSense Irrigation Partner of the Year, is president of Irrigation Consulting Inc., a golf course irrigation design and consulting firm headquartered in Pepperell, Mass., that designs irrigation systems throughout the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

THE LITTLE THINGS

Low- to no-cost additions to make your system easier to operate.

Many times the little things make the difference in separating good from average or great from superior. Irrigation design and installation is no different. The little design and installation nuances that make the irrigation system better have always impressed me. When designing, renovating or installing a system, the following are some of the little things that will make your system easier to manage and troubleshoot.

VALVE BOX COVERS

Today's irrigation systems have lots of valve boxes installed for isolation valves, drain valves, air release valves, quick couplers, wire splices and electric valves. When you walk up to a group of valve boxes it would be nice to know what is housed in which box without having to pop them all open, especially if you're in a hurry due to a pipe or fitting break. Valve box covers are available in a variety of colors. Pick one each type of valve, keeping in mind what they'll look like in their installed environment and let your crew know what each color represents.

Tired of not being able to find valve boxes? Here's a hint: attach a #10 stainless-steel washer with a stainless-steel screw on the underside of the cover. This makes the valve box easy to locate with a metal detector. Some manufacturers will even supply the covers with the detection already installed. You can also easily add them to your system's existing boxes.

IDENTIFICATION TAGS

Identifying cables and valves helps tremendously with troubleshooting. With the popularity of today's decoder systems, identifying where a communication cable is coming from along with where it is going should be labeled at the time of installation. For example: "from," "to," "volts," "amps" and "output" at each junction should be put on the tag. Lastly, on conventional systems tagging the communication cable path and all electric valves with controller and zone number is also very helpful.

BALL VALVES

Tired of getting wet when quick couplers are engaged or the key removed? Put a ball valve on the outlet between the key and the swivel using two brass nipples. Now you can keep the water flow off when engaging and disengaging the key, keeping you and your crew drier.

WIRE COLOR

Wire comes in many different colors, for #12 and #14 AWG valve and sprinkler wires, decoder cable and some manufacturer's communication cables. Color coding also helps identify what color operates which communication path or what area of the golf course. For example, greens and tees purple control wires, fairway and rough orange control wires; path A communication blue and path B communication yellow.

However, the most beneficial part with different colors is distinguishing between old and new wires. When you install new irrigation the new wires should not be any of the same colors as the old wires, so you immediately know which wires you need to deal with.

CASE ALIGNMENT

Ins and outs for greens have been popular for many years, and ins and outs on fairway edges are becoming more popular with today's systems. When you look down on these pairs of back-to-back sprinklers on greens and fairways it would be nice to know which is the in and which the is the out. This is accomplished by placing the selector valve on the opposite side of the sprinkler nozzle. So the "in" sprinklers would have the selector switches on the back side of the sprinkler and the "out" sprinklers on the inside edge against the fairway cut of the green collar.

GRAVEL

Tired of opening a valve box and finding it full of water? Many tines this is due to the way the valve box was installed and its inability to drain. If the box is installed on a gravel base, in most cases it will drain. Unfortunately, in most installations, the valve box is installed and gravel is simply poured into the box. This does not help in draining the box at all. Make sure that the box is installed on the gravel, 4 inches is preferred, for it to drain. GCI

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Show plenty of patience and "TLC" with your turf because the last thing you want to do is put it under more stress.

BY JASON STAHL

COMING IN FOR THE KILL?

Winter's severe cold and snow could heighten anthracnose's impact in 2014, but so could spring weather conditions, experts debate. One thing is certain: stress – whether from dry-and-hot or wet-and-cold conditions – is the key.

Key points

- Bottom line: Turf stress is the main influence on anthracnose.
- Winter's polar votex, extensive ice buildup and resulting winterkill may place Midwest courses at the most risk for an anthracnose outbreak.
- Warm, dry spring conditions could also herald an anthracnose outbreak.
- Consider a preventative fungicide program soon after the spring thaw.
- Nitrogen deficient turf predisposes turf to anthracnose and compromises its ability to recuperate from disease damage.

It's no secret the key with anthracnose is stress. If turf is stressed, it opens the door for the disease to come in and go for the kill. It's exactly for this reason that Frank Wong says his "pathological spidey sense" is telling him this year is going to be a bad one for anthracnose.

"If you look at this last winter, there's a lot of environmental stress on those plants," says Wong, technical service specialist for Bayer Environmental Science. "Anthracnose is particularly hard on annual bluegrass, and a lot of it has taken a heavy beating this winter. If your annual bluegrass is 'farkakte,' it may be at high risk for anthracnose to come in and finish it off."

The region Wong believes is most at risk is the Midwest, based on the "polar vortex" and ice damage and winter kill. And he goes one step further to say the form of anthracnose that will likely be seen this spring is basal rot, which tends to come in on plants with damaged crowns and stems and is considered more virulent than foliar anthracnose.

"Crown infections tend to occur in cold, wet conditions, leading to basal rot," Wong says. "Once you get basal rot, the changes of recovery are low."

Anthracnose is a stress disease and develops under "extreme" environmental conditions. On the flip side, dry, hot weather can induce stress as well and make plans susceptible to anthracnose. Wong cites the example of California this year. While it has received some rain, it is still experiencing severe drought conditions which will probably open the door for anthracnose.

As superintendents go into winter dormancy, they undoubtedly cross their fingers and hope to have a mild winter. With that out the window this year, there's not much that can be done when a course is buried under 6 inches of snow and ice. It's a waiting game until, temperatures rise, everything thaws out and plant growth resumes.

After a stressful winter, Wong recommends embarking on an early preventative fungicide program.

"You should go on this program as early as possible, especially in winter-damaged areas," he says. "Also, make sure you apply adequate fertilizer in the spring to promote active plant growth and recovery."

Research from the Rutgers School of Environmental and Biological Sciences and the New Jersey Agricultural Experiment Station seems to support Wong's assertion about nitrogen, at least on annual bluegrass putting greens. Its current findings indicate that nitrogen fertilization is "the most influential cultural practice affecting anthracnose severity in annual bluegrass putting green turf. Nitrogen deficient turf predisposes turf to anthracnose and compromises its ability to recuperate from disease damage. Other practices that we have studied such as mowing height, topdressing, foot traffic, irrigation, lightweight rolling and the application of plant growth regulators can also affect this disease."

Wong's other recommendation is to show plenty of patience and "TLC" with your turf because the last thing you want to do is put it under more stress.

"If you want summer U.S. Open conditions right out of the gate in the late-winter or early spring, and put that stress on your turf, you may be setting yourself up for anthracnose," he says. "Have patience, show your turf TLC, and let it recover and get reestablished and then put stress on it later when it's ready for it."

Matt Giese, regional technical manager for the Midwest for Syngenta, has kept a close eye on the United States Drought Monitor and feels that temperatures have been the most significant characteristic of this winter. There have been areas on the East Coast that have received significant amounts of precipitation, whether it be rain or snow, but the story has been entirely different in other parts of the country.

"Yes, it has been a harsh winter, but in some areas it has been a dry winter. A lot of areas may not have recovered from previous summer moisture conditions," he says. "So as we move into the spring months, that can be a key factor as to what level of severity anthracnose and ultimately some other diseases that also require moisture manifest themselves."

Predicting anthracnose pressure based on winter conditions as a crystal ball question.

"It's difficult to answer, but there is research that says cold temperatures will affect disease pathogens such dollar spot, anthracnose, et cetera," Giese says. "It might reduce maybe the number of pathogens that might be isolated out of a particular area, but does it reduce the severity going into spring? It's hard to answer. Once you have disease in an area, it resides in that plant debris, maybe even the thatch area. And so, at least with anthrac-

DON'T RULE OUT

Bayer's Frank Wong also cautions to not forget about other diseases like Pythium root rot. Microdochium patch are worse in the Spring on winter-injured turf.

In addition, pay attention to air and soil temperatures rather than a calendar-based program as they are more reliable indicators of when to enact disease management strategies.

"If you base your management programs strictly on a calendar instead of environmental conditions, you can miss a critical disease control window and be behind the 8-ball for a long time," he says.

Anthracnose severity is more dependent on spring conditions and whether there is continued moisture and what sort of stressful events might occur.

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nose, it requires some sort of stress in the plant to manifest or activate its symptoms. There is a germination or incubation period for overwintering structures, so once it detects the stress in the plant we see the symptoms on leaves, roots or in the crown."

According to Giese, anthracnose severity is more dependent on spring conditions and whether there is continued moisture and what sort of stressful events might occur.

"Clearly, there are some cultural practices that can beat up the turf a little, and that's a normal part of the turf life cycle, but it's more dependent on spring conditions – if it continues to stay wet, how long the leaf stays wet during the day, if we have cold conditions, etc."

Giese says that if the spring is cool and wet and you have poor drainage areas, it will be those areas you want to check first as they are hot spots where you might see anthracnose initially. But he admits that sometimes anthracnose is not temperature-related.

"I have seen where even in February we saw anthracnose active on putting greens, so it certainly isn't waiting for 70-degree temperatures," he says. "The key factor is moisture, especially in poorly drained areas or areas that have compaction because they weren't aerified. Or maybe it didn't receive the last round of fertilization so there are nutritional deficiencies as well. It's all of those things working together and creating this mutual stress on the plant, and that's where we see anthracnose survive and continue to cause problems."

Basal rot anthracnose is more likely to occur when the soil is saturated with moisture. If you have drier conditions on the surface then you have less leaf wetness, so foliar anthracnose is less likely in that scenario but not exclusive. But Giese admits you could also have both foliar and basal rot

anthracnose at the same time.

"You could have wet conditions above and below the surface that could make the plant more susceptible to infection, especially if it's under stress," Giese says.

If you have a well-drained soil profile but have continuous dew or leaf moisture and this situation occurs for a long time, it's possible you could only get foliar anthracnose.

"Sometimes it will stay foliar and sometimes it will turn into basal," says Giese. "It depends on what environmental conditions and parameters might be occurring."

For treatment, Giese prefers AI combo fungicides like Headway, Concert or Strata. Snow mold applications contain three different AI that can also be used against anthracnose in spring. In the Central Plains and Great Lakes, snow mold apps made in the fall can sometimes carry over into spring.

"It's one application and done, but it sort of helps set the stage to be a bit more ready to start those spring applications and allows you to be one step ahead of the disease curve," Geise says. "It ends up being a more preventative approach if you can get ahead of the turf. And then it also gives you broad spectrum activity against a plethora of other diseases in that early spring timeframe."

For more

Looking for more info on anthracnose? Enter bit.ly/1gKk120 into your browser to hear Dr. Karl Danneberger talk about how to spot anthracnose in the wild and control it with cultural practices in this Ohio State University Turfgrass series.

Many pathologists, Giese says, recommend applications at least a month prior to when you expect to see symptoms. For example, if you typically see symptoms in late June, then you would apply in mid- to late-May.

"Be prepared. If you have areas historically were hit with anthracnose, have a spray program ready. Be prepared to make the first application even if it seems it may be earlier than the previous year. The reason is it's much easier to be on a preventative program and get better control with that approach than waiting till you see symptoms and then use rescue treatments to manage the disease." **GCI**

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

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.

HARD WORK AND GRIT

What paves the road to success hasn't or will ever change.

A lot has been said lately that Obamacare would allow some people to quit working (or work fewer hours) and still receive health care. This was viewed by many as a good thing because it allowed those same people to "do what they really wanted to do." In many cases, that was essentially nothing.

18 year old who sued her parents for money to finish her private high school and for college.

What is going on here? I still contend, as I have my whole life, that hard work is our country's key to success. It isn't always a guarantee, but it is more important than anything else. That is true in our

> "Grit is that passionate commitment to a single notion. It's a constant that wavers little, if at all. It is perseverance to the max."

Really? Are you kidding me? I thought the whole program was to help people. Instead, abuse like this is pathetic and counter-productive and is a negative approach to life and success. It essentially condemns hard work in lieu of a freebie from Uncle Sam. Whoever advocates such an approach should be ashamed.

And then there were stories about dumbing down the SAT exam. Fewer students were taking it, scores were going down, and rather than encourage more study and college prep, they made the exam easier. Like Kathleen Parker said, "when the going gets tough, just make the going easier." Even more appalling was the profession as much as it is in any other. In my travels to golf course around our state, hard work is indeed valued and practiced. I see it everywhere.

During the last GIS, I made a quick stop at our shop (I know it isn't my shop anymore, but I am lucky my successor gave me a key). Chad and Pat were in Florida, but the guys all had their noses to the grindstone, working hard. Dave had a chainsaw in a million pieces, and Omar was tangled up in the rough mower making a repair. Chris had the Foley grinder humming along, proud of his lineup of sharp walking greensmowers. Angel was in a cloud of steam and mist, cleaning the decks of the rough mower Omar was repairing. They looked up long enough to trade some banter and insults, and then I left. I felt a sense of pride. I had hired them all, pretty much based on the belief that they would work hard and probably enjoy it. Hindsight says I was right.

Back in the early 70s I made a conscious effort to hire farm kids. Some of it was prejudice – I was a former farm kid. My thinking was that they worked hard and cheerfully. From the time you were big enough to feed chickens or calves, kids were part of what made a successful farming operation. The virtues of working hard were ingrained at an early age, and the opportunities to see the results of your efforts were endless. It turns out the same principles are true for golf course management.

I've noticed in my career, which covers almost five decades, that really successful people work really hard. Effort counts. The Greatest Generation got this right. I saw it in my parents and grandparents and aunts and uncles.

Bookstores have hundreds of titles on the business, economics, psychology, education and the steps to success. And I agree there are other factors involved – from education and intelligence to discipline and conscientiousness and everything between. If I were to write a book on this topic, it would be a very slender volume. Hard work is first. A close second in success predictors is grit. I have witnessed this up close many times, too.

Grit is a passionate commitment to a single notion. It's a constant that wavers little, if at all. It is perseverance to the max. I think about a new superintendent charged with fairway improvement but no equipment to get the job done. He put ¾-inch tines on his four Ryan Greensaires and slowly moved up and down a fairway at a time. It was time consuming, boring and aggravating, but incredibly effective. His grit got the job done for several years, and the fairways improved dramatically. They were healthier and tolerated closer mowing now that the surface was smoother. There are endless examples of such grit in our golf turf profession.

So, there you have it. Tom Edison famouslyl said success is "1 percent inspiration and 99 percent perspiration." There is no need to set your standards lower to make it appear that you have accomplished more. Just apply hard work and grit; they'll get that job done. **GCI**

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THE AGE OF WETTING AGENTS

Once considered "snake oil," wetting agents have emerged as a key tool in healthy turf.

There was a time when wetting agents, or surfactants, were considered snake oil. Something you might buy from a street corner huckster who would claim that they were the miracle cure for diseased turf. Rodney Tocco admits as much. The researcher at Michigan State University's Plant and Soil Sciences Department, says this reputation was still alive and well in 2003 unless your course was located in an arid region and you had seen firsthand the benefits from salinity flushes.

"Why did people need them when they had plenty of water to use?" he says. "But now, restrictions are coming out of the Great Lakes region and Ontario, requiring the need to monitor water usage. Also, a river got run dry in Connecticut – all of which was not caused by the golf industry. But they're now looking at these water reserves going down because of too much pressure from growing populations. So it has been an eye opener that we can put surfactants in there and reduce water input."

Colleen M. Tocci, marketing manager at Engage Agro USA, adds that wetting agents aren't just for water conservation, and more and more courses are seeing the multiple other benefits they offer.

"With the formulations we have today, there are so many other benefits beyond water savings," she says. "You get into chemical efficiency, irrigation efficiency and playability because you're creating healthier turf and roots and those help fight off disease and insect pressure. You're just creating a healthier environment in the soil profile."

Still, Tocci admits that one of the most common reasons to use injectable surfactants is to increase the efficiency of your irrigation system.

"A lot of money has been spent over years upgrading and improving overall irrigation systems on golf courses," says Tocci. "However, you can modify your irrigation system as much as you want, but if the water you're applying through that system and whatever other chemical you're applying through that system doesn't get down to the rootzone, it doesn't much matter that you've spent all this money on upgrades."

On a greens or tees program, Tocci says, you're typically looking to alleviate water repellency issues in USGA sand profiles managing hot spots or localized dry spots that can pop up on the course.

Water repellency, you say? Yes. This is probably the perfect place to explain how wetting agents work. According to Tocci, soil

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particles can become hydrophobic or water repellent after years of typical cultural practices (ie. Breakdown of fertilizer and buildup of some topdressing products) and natural processes such as decaying plant roots, certain fungal species, surface waxes from plant leaves, and decomposing soil organic material that create a water repellent, organic coating on the particles.

"Surfactants help create sites on those particles making them water receptive or hydrophilic," she says. "Surfactant molecules help the soil particles accept the water and allow hydration."

Turning soil into a "water lover" versus a "water hater" is something MSU and Winfield's Rodney Tocco has seen firsthand. He conducted a study with wetting agents over a three-year period, where the first year was mild, the second year was wet and the third year was the hottest, driest season in Michigan in 100 years. And that's when surfactants really wowed.

"They really stood out for what I was doing in the environment to help sustain turfgrass, particularly on putting greens," he says. "We received no rain for two months, and wetting agents kept things alive."

Tocco believes wetting agents have really ramped up in popularity especially over the last couple years with the lack of moisture and rainfall.

"One of the things surfactants do is help modify the environment so we get the benefit from those peaks we see and keeping them more moderated."

It's important to note, however, that all surfactants are not the same. There are multiple classifications, and new ones are constantly being introduced to the market. Ones you would use on your greens would not be ones you would use on your fairways because you're dealing with different soil types and different cultural practices. That's where you get into different formulations and classifications of chemistries.

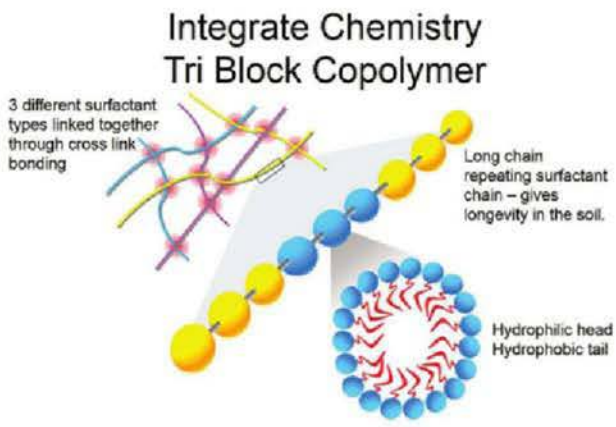
"If you're looking for something that will help water to penetrate, there are products just for that," says Engage Agro USA's Tocci. "Then there are products that will help water to penetrate but will also have a residual in the soil profile and help facilitate continued hydration."

Some wetting agents are meant to be used preventively to prepare the soil for what's coming, but others, both liquid and pellet formulations, can be used for spot treatments. Gasparilla Golf Club in Boca Grande, Fla., has been injecting the surfactant Integrate on its course for about a year and a half.

Tocci says there are also products that go beyond that and are long-term and don't break down as quickly in the soil, holding on longer and helping hydration and rehydration in wet/dry cycles. "Some people want a long term product so they don't have to apply as frequently, but others are just put through your fertigation system, which makes it a no-brainer if you're treating your fairways because you don't have to monitor the application closely."

Wetting agents have been around since the 1950s, but Tocci says today's formulations are definitely better. With block copolymers, triblock copolymers and multi-block copolymers, modern wetting agents have three different components that can battle the different soil particles and what is causing water repellency.

Some wetting agents are meant to be used preventatively to prepare the soil for what's coming, but others, both liquid and pellet formulations, can



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be used for spot treatments, including a pellet by Engage. This pellet is comprised of 10 percent seaweed, which provides some beneficial kickbacks to the turf. They can also be used as tank additives.

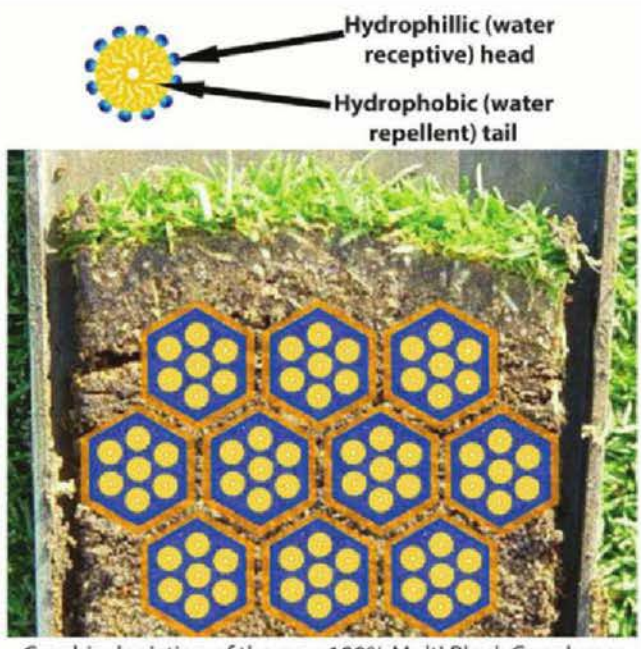
"If your soil is receptive to water, it will also be receptive to whatever chemicals you apply," Tocci says. "Most surfactants can be applied with fertilizer with no problem. However, there are a lot of requirements, especially in California, where they won't allow you to mix it with another chemical. Many foliar adjuvants are labeled for tank mixing but soil surfactants really focus on the soil. However, if your soil is receptive to water, and two days later you go out with either a fungicide or herbicide application, you're adding benefits to those chemicals because you have gotten your soil particles ready to accept them, more so than when they were repellent. It definitely helps aid your other cultural practices."

Wetting agents can do a lot of things, but one thing Tocci says they can't do, at least alone, is alleviate soil compaction.

"I've been in the industry for 20-plus years and I can say that soil compaction will not be alleviated solely by a soil surfactant. Compaction gets into more of a physical issue, so you'll need to verticut, core aerate and perform other practices in conjunction with surfactants. Once those other things are done, then surfactants can help aid the movement of the water and chemicals through the soil."

Another benefit is they present no negative impact to the environment – something the European market has taken advantage of, says Tocco.

"With the ones I've worked with, I saw no negative to microbes, no increase in them," Tocco says. "This was a huge thing I saw as a positive, especially in the European market where they're locking down their pesticide storage facilities or taking them totally offline. So they're using surfactants, which are safe and not designated as pesticides. They give you an opportunity to optimize the turf from a health standpoint, giving it the ability to combat diseases and insect pressure."



Graphic depiction of the new 100% Multi Block Copolymer Surfactant, Pisces™ EA. Ratios of surfactants were selected that give rise to long rod micelles structures that combine to form hexagon shaped rods. The hexagon structure covers larger surface area in the soil profile.

Tocco believes another reason for wetting agents' surge in popularity is that people are starting to see an economic return on them. Now that a greater premium has been placed on water resources, the tables are turning a little. There's no longer just an environmental reason to use them, but monetary as well.

"People are now seeing there can be an economic value to using them," Tocco says. "People weren't looking at wetting agents a while ago because there was no economic impact. In fact, there probably would have been an upcharge. You would have been spending more to use a wetting agent than you would have needed. Now, economics is playing a big role. It's good to be a good environmental steward because you're using less water, but the economics needed to catch up."

In a nutshell, wetting agents help level the playing field between courses that have too little water and courses that have plenty of water.

"But they also help move water through profiles that have been plugged up," Winfield's Tocco says. "With research and a gain in popularity due to economics, we've seen them getting used in more places we ever thought of. I know of some courses using them from tee to green, and smaller ones that are trying them out or don't have the budget for them still because they're still expensive for the 'Cadillac' products. Even areas in Michigan that have been known to have plenty of water and have never considered a water shortage are using them."

Colleen Clifford, marketing manager at Aquatrols, also makes the important point that wetting agents are not meant to be a "cure-all," but one tool in the toolbox for superintendents to combat turf issues.

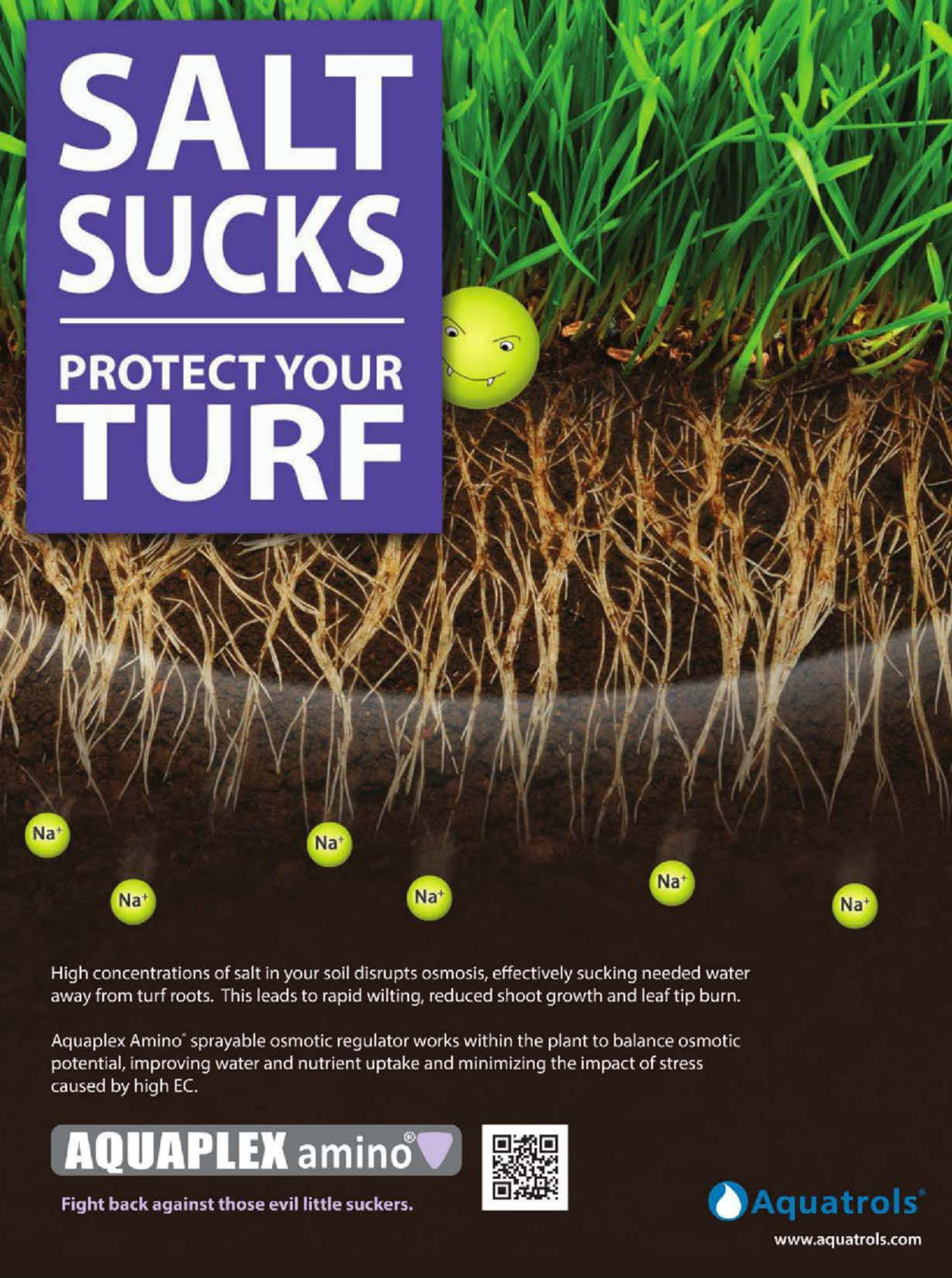
"There is a lot of documentation on their ability to reduce your volume of water and irrigation frequency. As long as you can irrigate, they're helping."

But Clifford is careful to dispel the notion that, if it's not dry and you don't have water conservation issues and have gotten copious amounts of water and reservoirs are overflowing, you don't need surfactants.

"Formulations today allow for increased drainage and movement of water, so surfactants will also benefit you if you have too much water or rain. It's still a good thing to be on a surfactant program because you can help move moisture through, make greens drier and firmer, and improve playability. It's not just a question of water savings." **GCI**

SUPERINTENDENT RADIO NETWORK

Looking for more information about how to employ surfactants at your course? Drainage is paramount for golf courses that see a lot of precipitation, and soil surfactants can keep help keep that water moving. Check out this podcast with Kevin Collins, territory manager for Aquatrols. Enter **bit.ly/1gHFsp2** into your browser to access and listen.



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ART OR SCIENCE?

Has science killed the art of growing grass?

Is science taking the art out of growing quality turf grass?

I've been mulling that question as my travels have made it obvious that superintendents are relying more and more on data, research, and high-technology while losing the feel and connection to the golf course.

Being somewhat old fashioned — I came of age in the white shoe, hard-collar, plaid-pants era — I'm concerned that the next generation of superintendents doesn't know the art of greenkeeping. They are so wrapped up in the bells and whistles, so glued to their screens, that they neglect to look up (and down) and are unable to take in, touch and feel the very real world around them.

Please don't think that I'm anti-science, some sort of technophobe who wants to return to sheep as mowers and the wind as seed-spreader. There was science when I was starting out in the business. But it wasn't nearly as developed or all-encompassing, and as a result we were forced to view our golf courses from a true "grassroots" perspective. My most important tools 30 years ago were a soil probe, a knife and pair of Ray-Ban sunglasses.

Yes, there are more and better tools available today, without question. However, I strongly suggest that superintendents and others who want to succeed need to learn how to manage by touch as well as by tech, and have a real feel for the environment rather than automatically referencing a computerized graph or a smartphone app to explain where, when and how to apply water or chemicals.

Because only with this feel can you make the best use of the tools and technologies available.

One of golf's fundamental tenets is that it's a touchy-feely business and sport: Architects and builders touch the ground, feel the dirt; superintendents have a close relationship with the turf; and golf professionals place their hands on the shoulders of students when teaching the game. Science has made many inroads the last few years, from equipment technology to apparel that wicks and warms, GPS devices and lightweight shoes.

But as always throughout history — not just golf history but world history — even the most dramatic breakthroughs in science only work as adjuncts to our human senses.

> "I've used this column for years to advocate more out-of-the-box thinking in agronomy. I fear that a science-only approach puts us back in the box, a box that is now a computer or a smartphone."

I asked a number of prominent people in our business their thoughts on the art vs. science debate to see if my view made sense. I received a range of responses. A noted superintendent in my age bracket echoed my sentiments when he asked, "Are these young guys looking at their golf courses and knowing what they are seeing? Are they really thinking about what is in the best interest of their golf course?"

Another looked at the landscape of our industry today and said, "Science versus art is actually a trick question because you need both. But if I had to pick one, I would take science over art because it's nice to have paint on a ripped canvas."

I agree that we need both, and I see the logic — if not quite agreeing — with placing science first. But the fault in that logic is that you can only put science first if you also understand and have art in your arsenal. I'm worried that art has all but disappeared. Echoing an argument often used when talking about how golf is played, I'm fine with the new equipment until it takes the golfer's skill out of the game.

When I was moving up in the industry three decades ago, the practice of agronomy varied with each superintendent, who practiced his trade any way he wanted. The science was new and not very widespread, so each superintendent made his course as a personal laboratory. Today, with the science blanketing the industry, we're all doing the same thing pretty much the same way, often without regard to whether it's right for our courses.

Talking early one morning to a very successful superintendent, I asked what his game plan was for the day ahead. His answer sums up my feelings exactly: "I don't know," he said. "I need to walk around and see what my golf course needs."

Is that your first thought every day? It should be.

Here are some thoughts from others in our business regarding art vs. science.

From a prominent turfgrass management Ph.D.: "Golf turf management has evolved over the past

(MORAGHAN *continues on page 64)*

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Rough life

Roughs populated with native species are not maintenance-free. Key problems to be aware of to keep your native areas from going wild.

By John Torsiello

The pros and cons of the native – or naturalized – roughs is pretty simple. "The pros are that native rough areas are aesthetically pleasing to the eye, easier to maintain and are good for wildlife," says Tim Moraghan, founder of Aspire Golf Consulting in New Jersey. "The cons are they are a pain in the ass when you hit your $5 Pro V into them and can't find it due to density."

Moraghan's assessment is intentionally glib, but it strikes a chord. A $5 hit in the wallet for the paying customer notwithstanding, more and more owners and superintendents are turning to a wide variety of grasses to naturalize rough areas on their courses.

"Converting mowed, irrigated rough areas to native grasses can reduce water, fertilizer, and pesticide inputs and may reduce mowing," says Dr. Anthony Koski, extension turfgrass specialist, Colorado State University Department of Horticulture and Landscape Architecture. "However, it is important to understand native areas will not be maintenance-free. In fact, if they are neglected they can quickly become weedy and unsightly."

Older areas must also be maintained to prevent the invasion of shrubs, brambles and trees, Koski says. Grass species – especially if a mix of grasses – will change over time. "The species of weeds, and you will have weeds to deal with, will change over time, as well."

Major advances in breeding of turf type tall fescues since the early 1980's has encouraged more use of tall fescue as primary or secondary rough, says Zenon Lis, vice president of sales at Ohio's Birmingham Seeds. In traditional cool-season grass growing climates and the transition zone of the U.S., interest in less maintenance has driven the use of tall fescue.

"Tall fescue is used now in areas where there are limits placed on annual fertility and chemical applications," Lis says. "The turf quality in high performing NTEP-rated tall fescues is excellent, mimicking a wide bladed bluegrass. They can be cut at 1.5 inches or higher, up to natural plant heights non-mowed."

Another group of species that has garnered more interest in golf rough use, are fine fescues. These species consist of hard, sheeps, creeping red and chewings fescues. The hard, chewings and sheeps fescues have been used more as "no mow" grasses in far roughs and out of bounds areas. They can grow to 8 to 18 inches high and cascade over themselves if left in a natural state.

Fine fescues have an interesting ornamental look, Says Lis says. "In warm-season grass areas in the lower transition zone and further south in the U.S., weeping lovegrass performs similarly as the fine fescue 'no mow' grasses above. These all have the potential to be left alone with literally no maintenance when established, except for occasional weed control and spot seeding for fill in."

A similar scenario occurs regarding mowing height adjustments for roughs further south where Bermudagrass is the prevailing fairway grass. The roughs are also defined as primary and secondary by height of cut. So, the cut gets higher the further away from the fairway.

Out of bounds or far rough areas may be near or around sensitive waterways, so "no mow" grasses can be used here, says Lis. Native grasses such as buffalograss, little and big bluestem, switch grass, wildrye and other species are being used to define extreme far rough and out of bounds areas of play. Some native grasses take a year or longer to show their "true potential," and weed control can be difficult in the establishment year. Some of native grasses above have a far reaching geographic potential for usage, in both cool- and warm-season grass areas.

Traditional cool-season grasses for golf roughs are the normal species used in fairways, including Kentucky bluegrass, perennial ryegrass, fine and tall fescues.

"Generally, the roughs start as a higher cut area from normal fairway heights," Lis says. "So superintendents mow at 1.5 inches for a primary rough, and a further out secondary rough would be mowed at a 3-inch or higher height of cut."

An easy way of transforming mowed rough to native is to simply stop mowing and irrigating the grass, Koski says. Unmowed bluegrass and fescues (both tall and fine fescues) can make for an attractive rough. Similarly, unmowed Bermudagrass in the south can provide a native look as well. This can be a good test to see what the native rough will look like in certain areas of the course. If the look isn't a good one, the grass can be mowed back to down to turf height.

While grasses are generally the plant of choice for native areas, wildflowers are an option. The advantage of using grasses is they are familiar to the superintendent when it comes to management. Further, weed control is easier with grass roughs; selective weed management in wildflowers is complicated (for some mixes) to impossible. An added plus of going native, says Dr. Koski, is that, "Conversion to the native look – and especially if using true native species – can be attractive for many forms of wildlife on golf course: birds, butterflies, and bees and native pollinators.

Depending on the grasses established, the native area will require some sort of vegetation/biomass management. This might entail mowing in the fall or spring and clipping collection. Burning every other year is an effective biomass management tool, where practical and allowed. Dr. Koski says weed management is essential during the establishment years one to three. When established successfully, weed management can be done on a spot basis. He adds, "Fertilization of native areas should not be

necessary. Fertilization often encourages weed growth and provides little benefit to the establishing grasses. However, on some very poor soils, including those low in organic matter, some starter fertilizer might be warranted."

The most common mistake made in the establishment and ongoing maintenance of native grass areas is excessive irrigation – especially once the grass has become established, lading to weed problems in native areas. Excess irrigation creates a stand that is so dense that it is impossible to find a lost ball – much less give the golfer an opportunity to attempt a shot.

Depending on whether grasses are warm- or cool-season species, there are specific windows of time when they can be planted in rough areas for optimal success. While combinations of cool- and warm-season species are "natural" and commonly sold by seed companies for native conversions, weed management is complicated with a cool/warm mixture. Herbicides safe for use on warm-season species (imazapic; Plateau, for example) are often not safe on cool-season grass, and vice-versa. If burning is desired as a biomass management tool, then warm-season grasses are a better choice, since they burn more easily. If true natives are preferred, it is important to do your homework to find the best-adapted natives for your area – and a good source of seed for those grasses.

One true native grass that seems well-adapted for use throughout the U.S. is little bluestem, Koski says.

"This is a native, warm-season, shorter-growing species that has a remarkably broad native range, from the Northeast to California, and fairly far south into the humid Southeast," he says. "A couple of other widely-adapted natives, though taller than little bluestem, are indiangrass and switchgrass. The grama grasses, particularly blue and side-oats, can also be used throughout a broad range of the U.S."

> "Converting mowed, irrigated rough areas to native grasses can reduce water, fertilizer, and pesticide inputs and may reduce mowing. However, it is important to understand that native areas will not be maintenance-free. In fact, if they are neglected they can quickly become weedy and unsightly."
>
> — *Dr. Anthony Koski, Colorado State University*

While not native, the fine fescues (hard, chewings, sheeps) can provide a native look and will do well everywhere except the deep Southeast.

Dr. Fred Yelverton, co-director of the Center for Turfgrass Environmental Research and Education at North Carolina State University, cites studies that show a wide variety of plants are used in naturalized rough areas. "The main thing people need to know about these naturalized areas is that they are not low maintenance. Superintendents who have these areas on the golf course will tell you they are pretty high maintenance."

He says plant species sometimes best for naturalized areas are Andropogons, but probably the most common species used are fescues. "Fine fescue is very common but many of these areas have other plants (Andropogons) planted in the naturalized areas. The more species you put in these areas, the greater the difficulty in managing them. Weed management is typically the most important part of maintaining naturalized areas."

Choose a pant that performs well in your area. If not, you will be in constant re-establishment mode, says Yelverton. The most common symptom of poorly adapted plants is weed invasion. "For instance, fine fescue typically gives the desired look for most of the country, but in the warmest climates or the desert, fine fescue will not work."

If unsuitable plants are used in a region, they may not survive, leading to the cost of replanting something else, says Chris Hartwiger, a USGA senior agronomist.

"If the proper plant is used in the wrong location, extra maintenance may be required to facilitate less searching for lost golf balls," he says. "If expectations are not communicated clearly to management and staff, the finished product may be disappointing to some, leading to a change in species or different management."

Plants suited for native areas run the gamut and should be researched and selected based on the region a course is located in," Moraghan says. "I constantly preach do not force a square agronomic peg into a round hole."

Fescues, broom sedges, and red top bent grass may work well in cool-season arenas," he adds. Tall fescues for "way out of the way" areas can work. Wildflowers "look great" but are time consuming to establish and can end up with weed patches. Warm-season golf courses may have a limit to fine fescues, but the further south the less successful you will be, Moraghan adds. **GCI**

John Torsiello is a Torrington, Conn.-based writer and frequent GCI contributor.

For more...

Looking for more info about what to plant in your roughs? Just enter the following link into your browser to check out the following articles.

- The Fescue of Your Dreams. If you want it wispy...it must be crispy! By Bob Vavrek **http://bit.ly/1pwibr5**
- The Use of Non-Mowed Fine-Leaf Fescue Grasses on Golf Courses. Fine-leaf fescue is a versatile candidate for use in many areas around the golf course. By M. Alihari Vandi and Kevin N. Morris **http://bit.ly/1m3V0E9**
- Fine Fescue Roughs and Fairways. Green alternative or niche grass? By Robert Vavrek **http://bit.ly/1dKnuxS**
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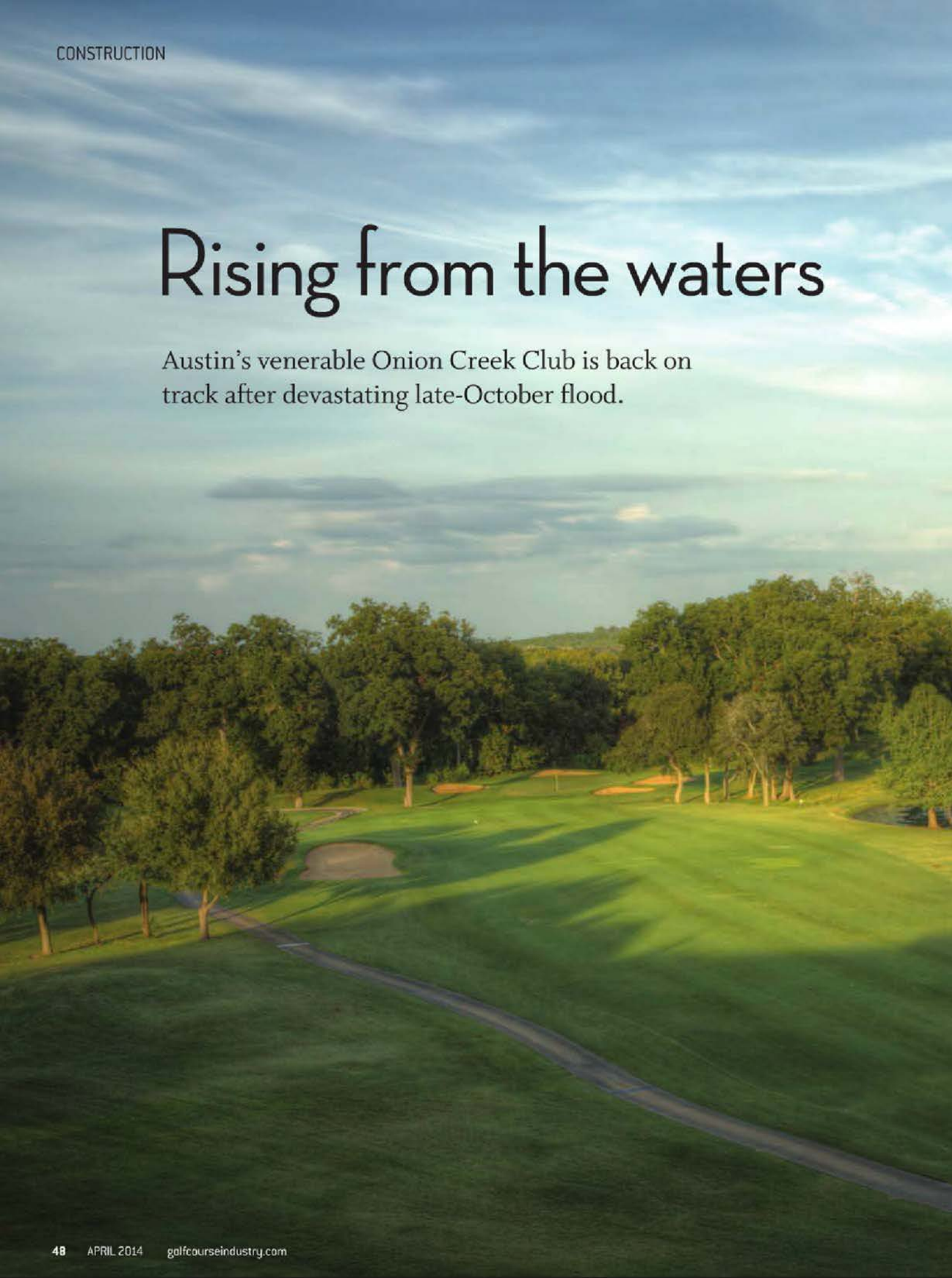
Rising from the waters

Austin's venerable Onion Creek Club is back on track after devastating late-October flood.



ONION CREEK CLUB

By Steve Habel

After enduring several years of drought conditions, October of 2013 was the wettest October on record in Austin, the capital of the Texas and one of the country's most desirable places to live. In fact, a small flash flood on Oct. 12 ripped up several of the greens at the venerable Onion Creek Club, and knocked down some trees and destroyed all the bunkers on the course's low-lying holes.

The original venue for the Liberty Mutual Legends of Golf Tournament and the birthplace of the Senior (now Champions) Tour, Onion Creek Club was designed by Jimmy Demaret in 1974. An additional nine holes, fashioned by Ben Crenshaw and Bill Coore, were put into play on higher ground in 1996. It is considered of the state's finest courses but was suffering from the same drier-than-dry conditions as most courses in the region. Through the years, Onion Creek Club also battled an overgrowth of trees and a reduction of the size of its greens after a series of floods and the passing of time had compacted the soil underneath and around the putting surfaces.

Onion Creek Club's original 18 holes were built in the flood plain of the burgeoning neighborhood some 15 minutes southeast of Austin's downtown. The club and the community have endured floods in the past, most notably in 1998 and 2001 when the creek overflowed and destroyed parts of the course.

None of the previous floods came close to reaching the homes that border the course's low-lying holes, many of which are set 150 yards and 20 feet above the usual edges of the creek.

Thusly, no one could have been prepared for the cruel surprise Mother Nature had in store for Onion Creek Club or the residents of the community that surrounds the course. When the rains came on the night of Oct. 30, conditions combined for a recipe for disaster.

PRAYING FOR RAIN

The American Southwest – and especially Texas – has been shackled over the past several years by a continuing drought, and when Ryan Crump decided to move from the Carolinas to the Lone Star State in 2012 to take a position as the golf course superintendent at the Dominion County Club in San Antonio, his first impression of the course he had signed up to care for was that it was dead.

"It wasn't, but things were just a lighter shade of green," says Crump, who'd worked at Wade Hampton Golf Club and Colleton River Plantation Club. "Having things green as possible was the expected condition of the course I had just left, so the reality of the situation here hit me really hard."

By the following year, Crump moved from the Alamo City to Austin and Onion Creek Club, which is celebrating its 40th anniversary in 2014. For 11 years, beginning in 1978, Onion Creek Club conducted the celebrated Legends tournament, as the course more than held its own before the great golfers of the black-and-white television days, players that eventually brought the sport into the modern world with a dash of charm and savoir-faire.

"My main job was to try to find enough water to keep the course's greens alive," Crump says. "With the water rationing that was put in place here in central Texas because of the drought, even the reclaimed water we were allowed from the neighborhood was not enough. It was a constant battle."

Rain was predicted for overnight on Oct. 30-31 but when the storms came they moved to and then stalled over the southeast corner of the Austin city limits and Hays County, a bit further to the south. From 11 p.m. on Oct. 30 to 6 a.m. on Halloween, 18 inches of rain fell in the already saturated region, making a flash flood a certainty.

At one point during the morning, Onion Creek rose 11 feet in 15 minutes and by a few

hours before sunrise on Oct. 31 the creek's flow rate was 120,000-cubic feet per second. That's nearly double the average flow rate over Niagara Falls.

"I immediately went down to the corner of the original course where the third green and the fourth tee are set," Crump says. "The water there was already about two feet from a security light on the back wall of a home 10 feet above ground level and 20 feet above the golf courses."

The water would go even higher, completely flooding all the homes on the golf-course side of the street that separates the first hole from the third and finally cresting in the middle of the No. 1 fairway, across that street and into another line of houses some 30 feet above the course and 45 feet from the bottom of the creek bed.

"We were just worried about getting as many people to safety as we could – that was our focus," Crump says.

Onion Creek crested at the highest it has been in 92 years and reached into scores of homes in the neighborhood, including a line of houses across the street from the creek and 80 yards across the fairway of the third hole.

"I was called to the club at about 6:30 (a.m.) and when I got here the water was over some of the road bridges," says Justin Jafarian, Onion Creek Club's general manager. "Some houses had four feet of water in them and people just didn't know what to do or how that happened."

Those families that lived in the houses bordering the course are still not back in their homes, some five months later.

But the amount of water that flowed into the valley that forms the course's signature hole – the downhill par-4 third hole on the North course, with a drop of 50 feet from tee to fairway – was almost incomprehensible. Looking out from the tee box of the par-3 17th, which also rests high above the valley that forms the third, all one could see was a lake of water; the green of the third hole was covered by at least 20 feet of floodwater.

Once the water subsided, a better accounting of the damages could be taken. It was not a pretty picture.

A cement and shell barrier encased in chicken wire and weighing tons that was built to protect the tee box on the fourth hole was twisted and rolled like a wet dishrag – but it did its job, the fourth tee box remains intact.

> "When I got on site, I could feel the ground moving under me and hear the water like it was moving through rapids. It was still pitch dark, but when lightning struck – and it did frequently – I could see the whitecaps as the creek rose toward me."
>
> – *Ryan Crump, Onion Creek Club*

A cement dam between the creek and pond that fronts the par-3 second hole on the North course was breeched and left with a huge sinkhole.

A dozen putting surfaces were scraped down to sub-turf level, exposing irrigation pipes and electrical wires. Trees were felled and were swept away – a 70-foot tall oak that once stood to the left of the green at the par-3 sixth hole in the original course was uprooted and rolled down the fairway of the adjacent par-5 seventh hole, tumbling some 700 yards before becoming lodged against another huge oak.

Yes, Mother Nature had provided the club with water, but there were consequences aplenty. Damages, to the course were estimated at about $7 million. The club also lost its course-maintenance equipment when the building where it is housed was swamped with four feet of water; to get to that building, the rising creek had to cross a huge grass berm constructed to keep water away after the flood of 2001.

ONE STEP AT A TIME

After the water subsided, Crump and his crew spent the next few days evaluating

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Above: Devastating flood damage to Onion Creek Club's golf course. Left: Onion Creek Club's grounds crew. Their hard work and dedication got the course cleaned up and back into shape.

where to start putting the courses back together.

He borrowed some equipment from Onion Creek Club's sister clubs – three of which are within an hour and half's drive from south Austin – and, because all his equipment and tools had been washed away, spent about $1,000 at the home improvement store up the street for shovels and rakes and anything to help with the cleanup.

"We started out just moving debris so we could just get around the golf course," Crump says. His crew then worked to clear some of the trash and material that was left in the course's trees by the raging water. The debris pile eventually grew to a massive mound some 15 feet high.

The initial goal was to get at least some of the course ready for play, both to bring some money into the club and to help rebuild the pride and psyche of the battered neighborhood.

"Only three holes on the high side of the course's Crenshaw nine had been affected," Crump says. "We tackled the issues with those holes first because we were determined to get that nine open as soon as we could to show some tangible evidence of recovery."

The crew worked 10 hour days, through wind and rain and ice and the short days of winter, to get the course back into shape. The Crenshaw nine was open for play by Thanksgiving, just four weeks after the floods.

Then the real work began, with the goal of having all 18 holes on the North course open by the end of the year. Backhoes and grapples were brought in and the crew focused on cleaning up, puling debris away, re-grading, shaping and trying the smooth out the course as much as was possible.

The putting surfaces were seeded with rye in nine days and got a little break from the weather that allowed the grass to grow in relatively fast.

"We had to play off a temporary green on the 16th hole because the actual green was pretty ripped up by the floods," Crump says. "We used some sod from our nursery green that was hung up in the trees and recovered to form the temporary green. It took about 800 pounds of seed to tack the temp green because the only thing to seed it in was the silt and mud from the flood."

Crump's crew also reworked all 55 bunkers on the north course in two months after all the drainage was ripped out of them by the floods. "We thought if the bunkers and greens are good then it would help deflect some of the problems on the edges of the course that we are still working on," he says.

The North course reopened by Christmas Day. Yes, there were some bare lies and some bumps on the greens, and some plastic bags and tires and trash still hung from trees 40 feet above the level of the now docile creek, but golf was being played.

"The staff and crew took the bull by the horns and went to work, showing their pride for the golf course and their desire to get it back to where it once was," Crump says. He carries a crew of 10-12 workers in the non-growing season and 18 in the spring, summer and early fall. He used as many as 25 workers during the first two months of course cleanup.

Another hurdle had been crossed but there is still plenty of work to be done. Since December, the crew has been focused on general upkeep and maintenance of the 18 holes that are open while continuing

ONION CREEK CLUB

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the cleanup of the most damaged parts – the low-lying areas of the original nine.

LIKE A PHOENIX

The club announced in March that reconstruction of the original nine had begun and set a goal on July 1 for there to be golf played on those nine holes again. The plans include rebuilding some greens and reshaping others, sanding and sprigging the grass with Tif Eagle and to replace the Tif-Dwarf Bermuda that has been on the putting surfaces since the course was founded.

When play begins on the reworked holes, the golf experience will be quite different. All the underbrush that insulated the course from noise is gone, making some of the original course's holes that were once tree-lined look nearly links-like and hundreds of trees were uprooted and have not been replaced.

After the original nine is finished the attention will turn to the course that's currently open, shutting down nine holes at a time to assure there is always 18 holes in play.

To help pay for the renovation, the club, which has about 410 golfers among its membership of just more than 800, is offering a special drive for members. Every current member has been given two certificates, each with a value of $5,000 towards the purchase of a new golf membership, to pass along to a friend, neighbor or business associate. The certificate covers the entire initiation fee, allowing the referrals to join Onion Creek Club for free.

The Dominion Golf Group, which operates six clubs including Onion Creek Club, is known for its innovative membership offerings. Its focus is on signing dues-paying members rather than assigning expensive initiation fees. More members paying dues means more money for the clubs for the long haul, and that tack will surely be put to use.

The ultimate goal for Crump and his crew at Onion Creek Club is to put the course back to where it was and even going a step further by returning the course's putting surfaces returning to their original edges as designed by Demaret and, later, by Crenshaw.

"If there is an upside to what's happened it's that we are going to be able to restore the course to the way it is really supposed to be," Crump says. "Now that the trees have been thinned out it will help us get sunlight to the places where we were having trouble before the flood. Everything that was the golf course at Onion Creek will be the golf course at Onion Creek again." GCI

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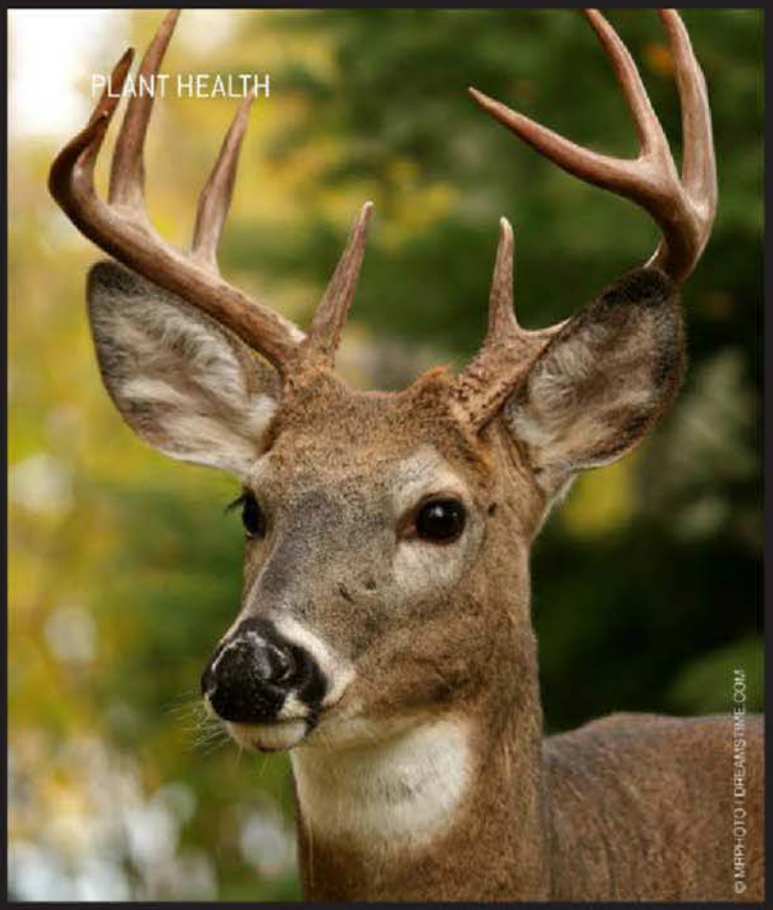


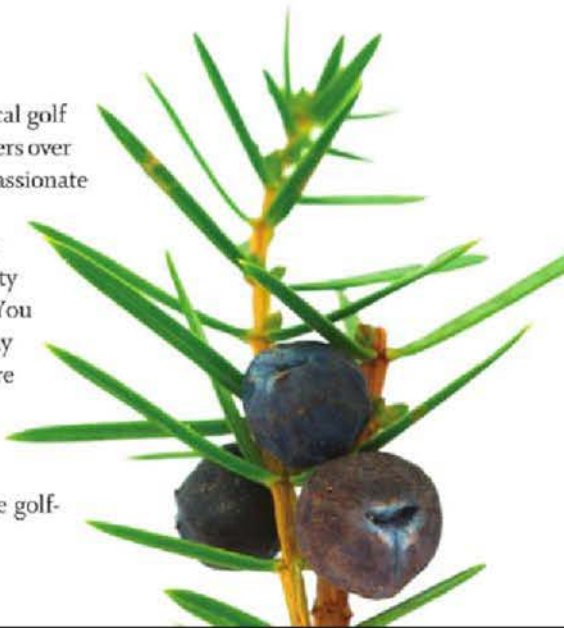
FIRST LINE OF DEFENSE

Maintained ornamentals add just as much to the overall experience at your course as manicured greens and fairways. Pest control expert Joe Cea outlines how to protect that landscaped beauty from varmints looking to make it their lunch.

by Joe Cea

While maintaining the grounds and greens of a local golf course there is one thing I have learned about golfers over the better part of the last decade – they are very passionate about their sport and how they play.

In spite of this zealousness for the game and always striving for personal "bests" even bad play can be augmented by the beauty of the course itself. Every golfer has had "one of those days". You know "Not my day today but you know what: it's a beautiful day on a beautiful course..." Even in passing I've heard this quote more than a few times while meandering around the course carrying out my responsibilities. As part of the grounds crew I always key in on the last part about the grounds being beautiful. Indeed, I have first-hand familiarity that when it comes to the golf-



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ing experience, a well-designed and maintained landscape plays an integral part.

Sculpting that landscape obviously has several purposes and objectives. Visual appeal, especially driving up to and around the clubhouse area, is first and foremost. Specific ornamentals and perennials help guide golfers through the course and/or provide challenges as well as shield certain supplemental areas, such as a pool, tennis court or mid-course bathroom from common view. The challenge not only lies with matching your landscape to the particulars of your course – such as taking into account shade tolerance or having weeping willow trees near ponds – but also taking into account the various wildlife species that typically inhabit a golf course that may damage your hard work.

Obviously, keeping the very character of the course intact and beautiful is paramount to enhance a round of golf. But from a cost standpoint, every superintendent knows it's easy to drop big dollars on ornamental plants only to have them completely destroyed by deer, rabbits and other native wildlife the very next day.

Realistically, if the majority of your ornamentals live behind netting, burlap or individual wire/wooden coverings to prevent wildlife damage, then not only does it look awful but it suggests a different approach is required.

The first line of defense is to find specific plants that not only bloom brilliantly, but are not palatable for some wildlife species. This is mostly in reference to whitetail deer as there are many lists from both private and public wildlife management agencies, as well as university cooperative extension offices, that specify plants that deer don't like.

Let's first draw a distinction between the terms "resistant" and "repel." Plants that repel deer will usually keep them at a distance. Many plants that fall into this category have a strong odor, such as lilac or sage. Deer resistant plants are ones deer typically won't eat. Even when eaten, they will still retain their character showing little effects of browsing. Common examples include barberry, holly and juniper. Other more colorful examples would be snapdragons, alyssum, iris and marigolds.

"Chipmunks are notorious for digging and eating the bulbs of many ornamental flowers, thereby costing golf courses not only for annual flowers but also perennials that you wouldn't normally have to buy year after year."

Other protections against deer include fencing, but the trick is to place them not only to protect, but also to allow your flower arrangements to be seen and admired. Most recommendations for deer fencing include having one 7 foot or higher. However, fencing of this nature is usually in reference to preventing deer from invading the perimeter of a property which you will never be able to do on a golf course consisting of several hundred acres. That said deer can browse some plants such as arborvitae up to six feet and perimeter fencing on some areas may help protect – at least on a limited basis – in this endeavor. Our main goal, though, is simply to protect some flower beds. In doing so we just have to keep the flowers far enough away from the outstretched browsing reach of a whitetail. Angling a fence pointing outward – at 45 degrees – from a flower bed does just this because deer have a difficult time judging angles, i.e. jumping high and over distance therefore avoid fencing when not up right at 90 degrees. Decorative fencing can be set up in this manner, but I suggest some kind of blunted point at the top that will come right up under the neck of deer to prevent them from advancing. Also elevate flower beds about three feet in conjunction with angled fenc-

Grow your own

To cut down on costs of consistently replacing wildlife damaged plants you may wish to consider a greenhouse to grow your own flowers.

While the start-up costs may prove high, this is definitely an investment where costs will be defrayed over time. Also, if individual gardens and flower beds scattered throughout the course prove too tough with multiple attempts, then you may wish to consider an arboretum with a nature trail. This not only shows off your plants, but can be more easily protected with everything in one area. This can be a fantastic feature to a course.

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Spray away

There are dozens of sprays and other repellents that can be applied to ornamentals to prevent various species of wildlife from destroying your expensive plants.

Some work and others don't. The good thing about using any chemical repellents is that on a golf course the superintendent, or another employee, will generally have a pesticide applicators permit to handle the product.

Ultimately, experimenting with plant repellents may cost you more than replacing the plant itself. So you're better off with more long-term solutions. While spraying pesticides to reduce insect damage – which should be done in conjunction to reduce stress on plants to keep them blooming and beautiful – you may stumble on one that helps with other critters. It's important to keep a journal or some other notations until you find a combination that works in more than one maintenance area.

ing prohibit deer from reaching or jumping to the bed.

Elevated flower beds also prevent damage from our next contestant – rabbits.

Rabbits are endowed with an amazing jumping ability. Even elevated flower beds will not prevent access. So the goal with an animal that is typically more numerous than deer is to reduce damage because 100 percent prevention is next to impossible. If you have flower beds on the ground a smaller fence (maybe 2-3 feet high) can limit rabbit damage.

Reinforce this by attaching either ½ inch x ½ inch or ¼ inch x ¼ inch galvanized hardware cloth to the fence and buried in the ground three to four inches and then folded outward another 3 inches or so to prevent digging underneath. This should cut down drastically on rabbits chewing the tops off your expensive flowers.

Recognition of which species is nibbling is important. Flowers with a clean cut and lower to the ground are usually rabbits because they are smaller and because their lower and upper incisors leave a perfect shear on plant stems. Deer, on the other hand, only have lower incisors and their cut is only sheared from the lower side leaving a ragged edge on top from tearing off the rest of the flower.

Other uses for hardware cloth are to aid in the war on chipmunks. Chipmunks are notorious for digging and eating the bulbs of many ornamental flowers, thereby costing golf courses not only for annual flowers but also perennials.

Chipmunk holes are about 2 inches in diameter and are frequented throughout the day. Obviously, these critters can be trapped. However, dead chipmunks in snap traps may not be something golfers want to see. A better, long-term solution is to prevent them from taking up residence. The trick here is to prevent them from digging and that's where the hardware cloth comes in.

In each flower bed, in addition to a weed barrier, cut out a section of hardware cloth and steak it down. Holes can be cut with heavy-duty scissors or metal shears to plant seeds or potted plants. The galvanized wire will allow for the plants to grow while preventing chipmunks from digging at and accessing any roots and bulbs. This same strategy will also work for other diggers such as voles that have a tendency to dig shallow tunnels through mulch and other soft soil.

Moles also dig tunnels, but are usually much deeper. So a shallow wire barrier would be ineffective. While moles, unlike voles, are carnivorous they usually aren't too much of a threat to ornamental flowers. However, it's their tunnels that become an issue for a course. **GCI**

Joseph Cea owns C&C Wildlife Management, Delmar, N.Y. (www.ccwildlife.com). With two degrees in wildlife management and 19 years of experience he has been assisting residences and business, including local golf courses, with nuisance wildlife issues with safe, humane and practical techniques.

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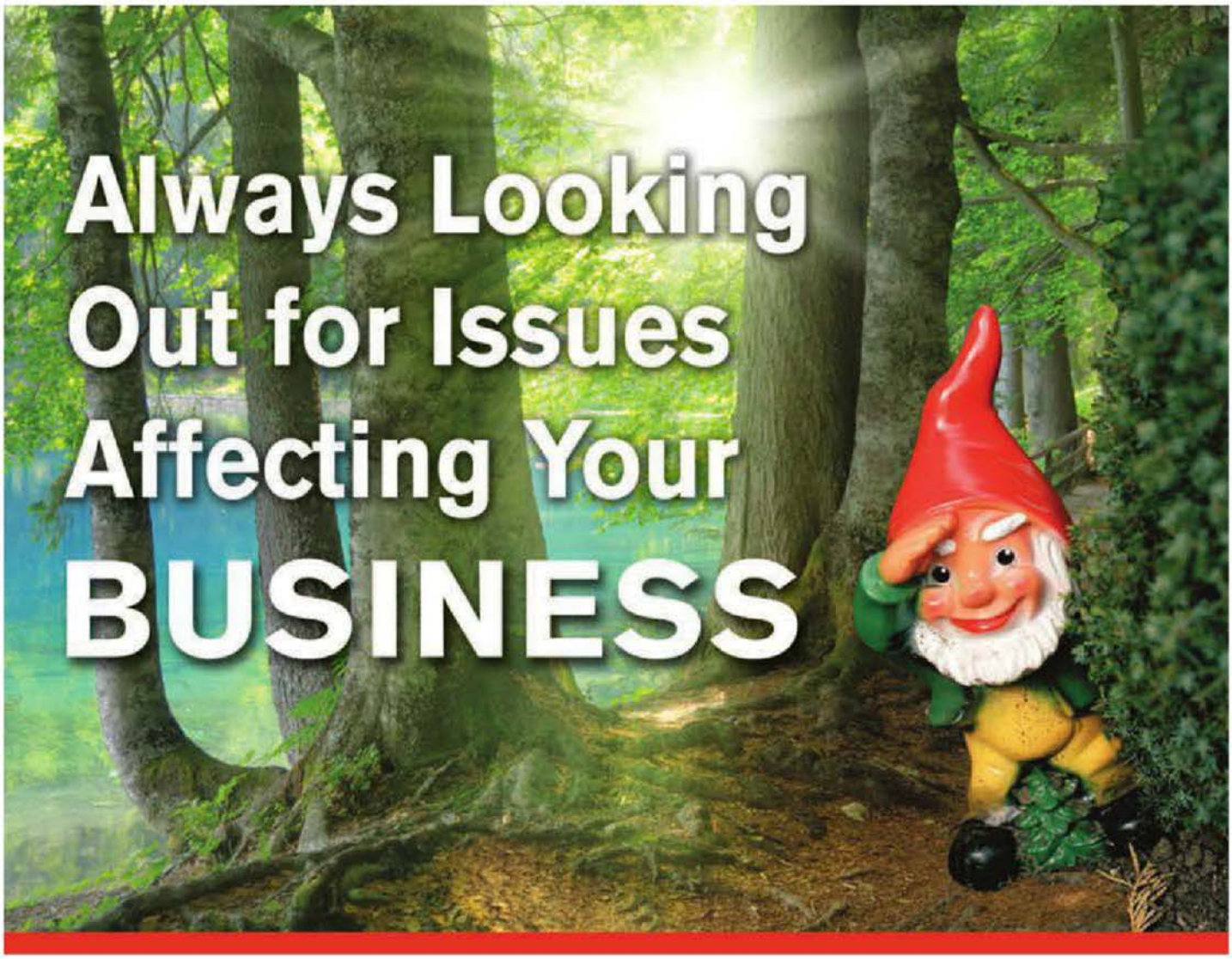
"Even elevated flower beds will not totally prevent [rabbit] access, but the goal with an animal that is typically more numerous than deer is to reduce damage. One hundred percent prevention is next to impossible."



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Preventative measures taken by the team at The Greenbrier reduces the risk of hydraulic hose failure.

The Greenbrier staff uses mowers and rollers to maintain its immaculate greens early in the Sulphur Springs, W. Va., morning while it is still dark and the bentgrass turf is covered in dew.

However, the early hours and light conditions make it a challenge to notice a hydraulic hose failure, leaving the course open to potential damage.

Turf equipment is outfitted with many hydraulic hoses in hard-to-see places – all critical to smooth operation and operator ease. Yet if one of the hoses fails unexpectedly during a course's turf care routine and goes unnoticed, it can disrupt the operation and create significant costs.

The resulting fluid spill can cause extensive turf damage, including the possibility of a course having to replace a green and close for repair – a costly consequence. To avoid unexpected hose failure, superintendents frequently change hydraulic hoses on equipment before it is necessary.

As part of The Greenbrier's preventive maintenance program, it conducted a comprehensive monthly review of its turf care equipment, including hydraulic hose inspection.

Staff visually checked individual hoses for signs of failure. When a potential problem was identified, the hoses would be replaced. Even with this regimen, The Greenbrier was not 100 percent certain it was catching every problematic hose.

SOLUTION

To help The Greenbrier achieve its goal of more efficient course maintenance and ensure ideal playing conditions, Eaton recommended its LifeSense hydraulic hose condition monitoring system for the resort's greens rollers. LifeSense intelligently monitors hydraulic hose conditions and detects failure-related events to provide advance notification that a hose is approaching the end of its useful life.

During the winter of 2013, each of The Greenbrier's three greens rollers had select hydraulic hoses replaced with LifeSense. Each hose is equipped with a sensor that monitors hose conditions via electrical signals. These signals then transmit to a diagnostic unit that interprets the data. If the system identifies a compromised hose, an alert is generated to warn greens keepers.

"This is one of those solutions you hope you never have to use, much like an insurance policy," says Kelly Shumate, director of golf course maintenance at The Greenbrier. "LifeSense provides a total sense of security that even with our strict and regular maintenance on the rollers, if we miss something, it will alert us before we have a big problem on our hands."

RESULTS

The Greenbrier's course managers have been satisfied with Eaton's LifeSense system, which reinforces its sound maintenance practices and gives them enhanced confidence that greens will remain pristine just as its players have come to expect.

"With LifeSense, course superintendents gain peace of mind knowing their hydraulic hoses are constantly monitored, providing assurance that they are taking steps to avoid turf damage and unexpected and expensive repairs," says Kelly Moore-Floyd, Eaton product manager. "We are pleased The Greenbrier is happy with LifeSense thus a win for them and for Eaton." **GCI**

EATON

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.

HOMEMADE CHIPPER BOX

This 2008 Ford F350 dump truck was fitted with a homemade "chipper box" that is easily removed when switching from tree work to snow plowing. It measures 8½ feet in length by 82 feet by 6 feet and is built with pressure treated 2x4 secured together with 3-inch deck screws. Four-inch and 6½-inch carriage bolts with flat and lock washers are used at the four corners to attach the frame together and the box to the truck bed. Nineteen-gauge PVC coated hardware cloth was attached on the sides and top (with overlaps in the corners and on top secured with zip-ties) with ¾-inch-by-1-inch fence staples, to keep the wood chips from scattering outside the chipper box. Two additional 2x4 were installed perpendicular to the three top braces on top so the box can be removed with a fork lift or it is light enough that 2-3 employees can lift it on and off. A ⅝-inch thick 29-inch-by-79-inch plywood sheet was fitted in the front inside of the box to keep the wood chips from damaging the truck cab. A red-colored Rust-Oleum oil-based paint was used to match the truck color. The tailgate can be fully closed with the box in place and the dump body can be fully extended when dumping the wood chips. The materials cost about $220 and it took about 20 labor hours to build. Kyle DeNuys, assistant superintendent, at the North Jersey Country Club in Wayne, N.J., designed and built the box. Tyler Otero is the superintendent and Simon Quinoa is the equipment technician.

MODIFIED HITCH PIN

The hitches were modified on the mower trailers because the pins were being lost. A ¼-inch thick piece of 2-inch-by-8-inch steel, bent in two places, was welded to the existing trailer hitch frame. A 6-inch by ⅝-inch diameter lynch pin was installed with a spring and flat washer and is held in place with a cotter pin and the flat piece of steel. An employee simply lifts the pin and hooks the trailer to the tow vehicle and the pin falls securely in place with the spring. Materials cost about $16 and it took about 30 minutes to build and paint. Bill Brousseau is the director of golf course maintenance, Steve Judd, superintendent of the Golf Village, and Blair Kirby, superintendent of the East Course, John Lombardi is the equipment manager and Clay Bormuth is the assistant technician of The Club at Admirals Cove in Jupiter, Fla., a 45-hole venue. **GCI**

(BRAUER *continued from page 8*)

On many days, staff outnumbers players. Like some U.S. clubs, they are run by smart business executives who meet budgets at work, but overspend on their club. Chinese are known to be practical, so how long will that trend continue? As you can tell, I wish they would learn some of lessons more quickly.

This is the first time a country is undertaking new golf development based on the U.S. golf model, which has evolved from its Scottish roots over the last 120 years. Some worry that there is too much disconnect from golf's origins and roots in the U.S. model. In my opinion, golf's adaptability to different climates and cultures proves that the essence of the game remains powerful enough to thrive and endure as strongly in the next 500 years, as it has in the last 500. Overall, golf will thrive in China, and they will be good stewards of the game's many traditions, even while adapting them to their unique conditions. **GCI**

(MORAGHAN *continued from page 42*)

three decades from a discipline where success was often dependent on art and experience to one where new, young superintendents are better trained in the sciences and quickly embrace technological advances. As such, the discipline has moved to a much more science-based effort. Of course, golf course supers are also required now to be much more well-rounded in communications, personnel management, and business skills to be successful."

From a soil physicist: "Science and technology will never replace the real masters and artisans. Rather, we're talking art, or a natural world that just to happens to be labeled 'golf course.' It's unfortunate more golf course superintendents don't understand their role or have the passion to understand the artisan's role in these natural settings. In my mind, it's a natural palette of bio-mass that has been refined and in many cases, a lot like a work of art."

A turf grass specialist: "For most modern-day superintendents, it is mostly science. But, when you get to the best conditions and the best superintendents, it becomes more of an art."

In all of those quotations, even the ones that give a nod to science, it is the ability to understand the artistic side that separates the best from the rest. Even if art is knowing how to evaluate the science and choose what's best for your course.

I've used this column for years to advocate more out-of-the-box thinking in agronomy. I fear that a science-only approach puts us back in the box, a box that is now a computer or a smartphone.

Learn the science, use the science. But never forget that at its best, agronomy is first and foremost an art because every golf course – like every other masterpiece – is unique. **GCI**

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SEEDS OF TROUBLE

Let's take a little trip in Mr. Peabody's WABAC machine and go back a quarter-century to the halcyon days of 1989.

Mikhail Gorbachev took the reins of the Soviet Union and the Berlin Wall soon fell. A few brave Chinese students faced down tanks in Tiananmen Square. People had big hair.

In our happy little business, new facility construction was zipping right along despite little setbacks like the fact the "Savings & Loan Crisis" briefly made Uncle Sam the largest course owner in the world. (Every new housing development had to have a golf course to anchor it, right?) Even attacks by the legendary but slightly loony broadcaster Paul Harvey couldn't dim the prospects of development. New courses sprung up because, as one of the year's best movies, "Field of Dreams," told us, "if you build it, they will come."

Many aspects of the turf business were flying high, but none more so than seed production. New courses, expansions, remodeling and the growth of overseeding drove seed sales and fueled a boom in research and development.

At the time, I served on the USGA Research Committee and we saw endless proposals for breeding studies to develop drought-tolerant, salt-tolerant, cold-tolerant, endophytically-enhanced, glyphosate-resistant, low-grow, no-mow, glow-in-the-dark turf species. If you could dream it, some PhD up in Oregon was figuring out how to splice and dice genetic material together to create it. New species poured out of a dozen or more big, profitable seed companies in the Willamette Valley and universities around the nation. Times were good and most folks were fat and happy.

Just 25 years later, the picture is very different. We overbuilt. We overdesigned. We overmaintained. Now we're in an era when new construction is rarer than a pink unicorn, minimalism and naturalism are crowding out the manicured look, pigments are the new overseeding and maintained acreage nationally goes down a little every day.

On top of that, as our cover story details, the seed business has its own set of issues created by other factors, notably the spectacularly successful corn/ethanol lobby. What, you ask, does ethanol have to do with why it's going to be tough and expensive to find seed this spring? Read the story, but the short answer is: Everything.

Other factors like consolidation, competition in the global market from overseas growers and slashed research budgets at universities are also cramping the style of the once-booming turf seed market. Times have most definitely changed.

Yet, despite those challenges, there is great opportunity within the seed market in the future. The single largest threat to the future of golf is the cost and availability of water. Without action on many fronts, it's entirely possible that many thirsty areas of the country will eventually decide that golf courses don't deserve to use fresh water.

Think I'm exaggerating? Think again. Yes, we can show that courses benefit the environment, create jobs and help communities and that's important to our future as regulated water users. Yes, golfer attitudes might gradually become more accepting of a different standard. Maybe the big show down in Pinehurst this June will move the dial back toward a center-line maintenance philosophy utilizing fewer heads and irrigating less turf. And yes, the Coore/Crenshaw/Doak/Hanse/Kidd design trend of "less is more" will continue and that will help.

But none of that will matter if we don't have turf types that allow us to use less water or be able to grow more turf using non-potable water. Drought-resistant and salt-tolerant species must be developed to ensure that golf continues to be played on natural grass in the days ahead when courses everywhere – South and North – will be irrigated with wastewater or they won't be irrigated at all.

The Holy Grail for golf's future might be something akin to a cool-season *Paspalum*. Is it possible to develop bent or *Poa* that can withstand the salts and metals in wastewater? Can we somehow stimulate chlorophyll to maintain a green appearance without all the H_2O? Could hybrids that intersplice natural grass into a synthetic base be acceptable for fairways? Can roughs simply become, er, roughs, with little maintenance other than the occasional mow?

I honestly believe that turf science holds the answers to those questions. The problem is whether we can fund their development and figure how to make it profitable for farmers to once again grow turf instead of the corn or soybeans that have crowded it out up in the fertile fields of the Northwest.

I hope in 2039 we can look back and find that 2014 was the beginning of a new golden era of turf breeding when solutions were created to protect and preserve our game and our business. We need to start now… because the clock is ticking. GCI

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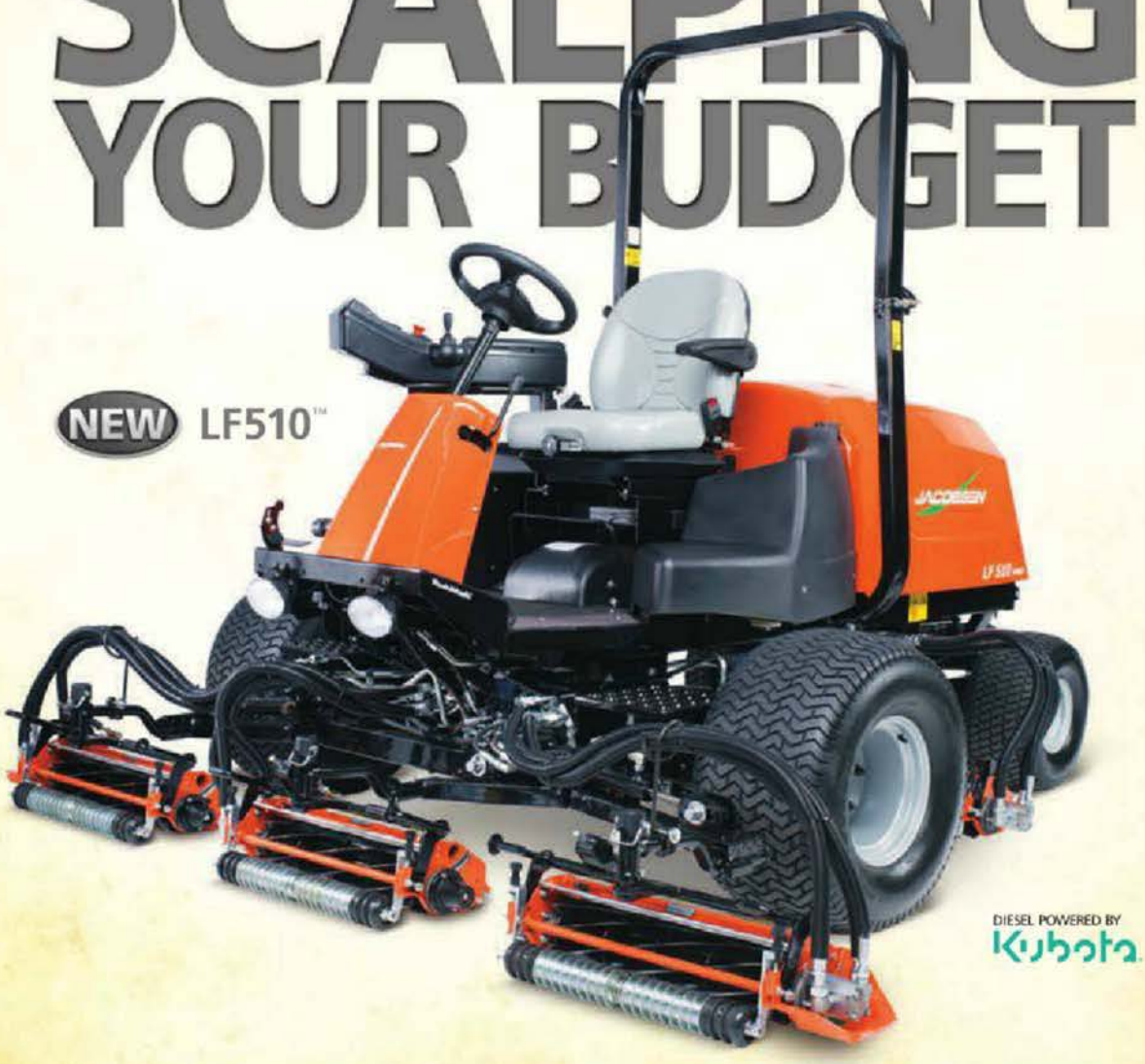

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