

Table 1. Soil amendment effects on mean root mass of seashore paspalum.

Treatment	Root mass (g) in 6 inch pot
Control (USGA Sand)	10.4 a
LSA (90:10 mix with USGA sand)	9.2 a
Zeolite (90:10 mix with USGA sand)	6.6 b

Means followed by same letters are significantly different at the $\alpha = 0.05$ level of significance.

Table 2. Comparison of the effects of 1000 ppm NaCl water and tap water on the mean rooting mass of seashore paspalum.

Treatment	Mean root mass (g) in 6 inch pot
Tap water	9.44 a
1000 ppm NaCl	7.98 b

Means followed by same letters are significantly different at the $\alpha = 0.05$ level of significance.

larger decreases in root mass than did the other soil treatments (Table 3).

It appears that the LSA adsorbs less sodium than the zeolite and its incorporation has less effect on root mass in salty conditions than zeolite. LSA also enhances water holding so treated areas would require less water compared with straight sand.

To gain further insight into the plant growth, the amount of salts held in the pots at the end of the experiment was examined. The grass and pots were dried down and soil samples were taken. The grass roots and rhizomes were extracted from the soils samples by hand. For electrical conductivity (EC) determination 20 grams of soil was mixed with 20 ml of isopure water, stirred and allowed to stand for 30 minutes. The electrical conductivity was measured with a Field Scout conductivity meter (Table 4). The 1:1 soil to water ratio is reported to produce results similar to saturated paste conductivity. No treatment showed an EC value that would affect plant growth of salt tolerant plants.

Table 3. Comparison of all treatment combinations for mean root mass of seashore paspalum.

Treatments	Mean root mass (g) in 6 inch pot
DWP	10.9 a
FCWP	10.9 a
FCWC	10.7 a
DWC	10.5 a
FCSC	10.3 a
DSC	10.1 ab
DSP	7.9 abc
DWZ	7.1 bc
FCSP	6.9 c
FCWZ	6.6 c
DSZ	6.5 c
FCSZ	6.2 c

D = drought, FC = field capacity, W = tap water, S = 1000 ppm NaCl, C = control (USGA sand), P = 90:10 mix of USGA sand and LSA, Z = 90:10 mix of USGA sand and zeolite. Means followed by same letters are significantly different at the $\alpha = 0.05$ level of significance.

Since the LSA held more water at field capacity, it seems logical that when the pot was dried down more salt would be present in that soil and therefore it would have a higher EC value. The sand would have the lowest water-holding capacity and little CEC, therefore its EC readings should be low and they were. It is interesting that the 10 percent LSA pots under drought conditions (watered every 3 days) fell into this group. The 10-percent zeolite pots show identical readings for field capacity and drought treated pots. We think we saw equilibrium with the exchange complex in these pots, and the EC value represents the 1,000 ppm salt solution we were watering with, coming to equilibrium with cation exchange of the zeolite. If the EC of the droughted LSA pots represents equilibrium, then it is at a lower level indicating that LSA does not hold onto salts as strongly as the zeolite amendment.

CONCLUSION. There did not appear to be any drawback to using the Lassenite Soil

Table 4. Electrical conductivity values of various treatments. EC was determined using a 1:1 soil to water ratio.

Treatment	EC reading (mS)
LSA Field Capacity	1.56 a
Zeolite Field Capacity	1.22 b
Zeolite Drought	1.22 b
Control Drought	1.06 bc
LSA Drought	1.00 bc
Control Field Capacity	0.87 bc

Amendment (LSA) under these conditions – a sand fairway watered with 1,000 ppm salts (as NaCl) water. As long as the soil on the site is able to drain away excess water, the seashore paspalum should perform well. If drainage were to be poor and the water began to move upward in the profile rather than downward, a salt accumulation could affect the grass. The LSA increased the water-holding capacity of the soil and that resulted in needing to be watered less frequently than sand-alone pots. The difference was that the sand pots needed water every two days while the LSA- and zeolite-amended pots needed water every three days. In the field these intervals would more likely be three days for sand and four to five days for the LSA. This would be a significant change in the amount of water needed to maintain turf on a yearly basis. **GCI**

Barry Stewart, Ph.D., is associate professor in the Department of Plant and Soil Sciences at Mississippi State University.

Championship cut

Chambers Bay is pleased with the results of its grinders.

BY ALYSE LAMPARYK

For superintendent David Wienecke, the quality of a clean cut is important as he prepares his facility for the U.S. Amateur Championship this August. In turn, the grinder he uses to maintain his mowers' blades is just as critical.

Chambers Bay Golf Course in University Place, Wash., has been open since 2007, but Wienecke purchased the grinders for the public 18-hole course in February 2006.

"We actually looked at three different manufacturers' grinders and tried them out and talked to people that used them and came up with Foley after that experience," Wienecke says, adding he purchased the Foley United ACCU-Master spin grinder and an ACCU-Pro bedknife grinder for just under \$52,000.

Wienecke had used Foley United grinders for 20 years, but he listened to his mechanic and did his due diligence about the product options in the market before making that purchase.

Four years later, Wienecke is still pleased with the grinders and their consistent performance and believes he has received a solid return on his investment.

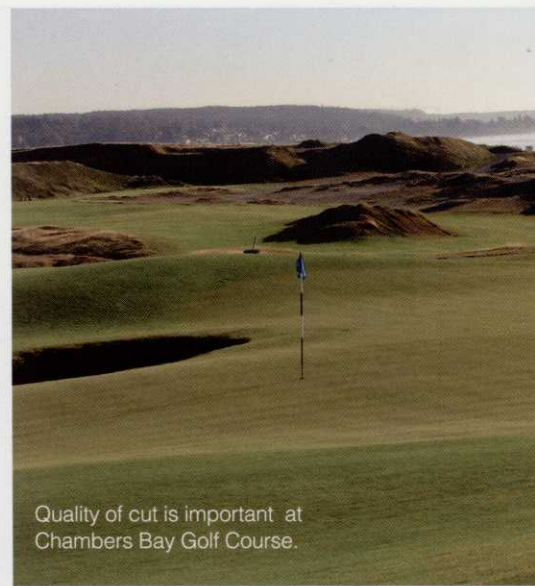
"There's no way that we could produce the quality of cut that we demand and that our golfer's expect and that the championships will need to have without having the quality of cut that we're able to achieve," Wienecke says of his grinders.

Considering it is the first public-access golf course to host a U.S. Amateur, appearance and cut are essential. Along with hosting the 2010 Amateur Championship in August, Chambers Bay Golf Course will be the site of the U.S. Open in 2015.

With about 30 staff members and a \$1.5 million annual maintenance budget, Wienecke does not seem unsettled by the upcoming high-profile events.

"We're really oriented towards a very high-quality of cut and so we use our grinders all the time," Wienecke says. Two of the employees work solely with the grinders, a skill that takes time to acquire.

"In terms of learning the operation of the machine, I think if you know how to use a grinder and how to set up reels then the learning curve is fairly easy, but the process of learning how to set up proper release angles



Quality of cut is important at Chambers Bay Golf Course.

and other things take time," Wienecke says.

In anticipation of the Amateur, Wienecke has asked Foley for a whole new set of grinders to help them continue to keep the course in top condition. Wienecke experienced some problems with the computer-control components. The course's grinders are used at least once a week, year-round, so wear and tear happens.

While at the Golf Industry Show in San Diego last month Wienecke spoke with Foley representatives who assured him they were working on straightening everything out. The only concern Wienecke had with the repair process was on the local level.

When it comes down to it, he is pleased with Foley United products. "I have had no problem, no concerns with the equipment and our service level from the manufacturer has been great. I'm fully satisfied with that," Wienecke says.

For now, the Audubon International Silver-Certified course will prepare for its national debut. As a public course it has high standards to live up to, but Wienecke is not worried.

"We act like and are maintained like a private golf course. So our standards are private, country club level," Wienecke says. **GCI**

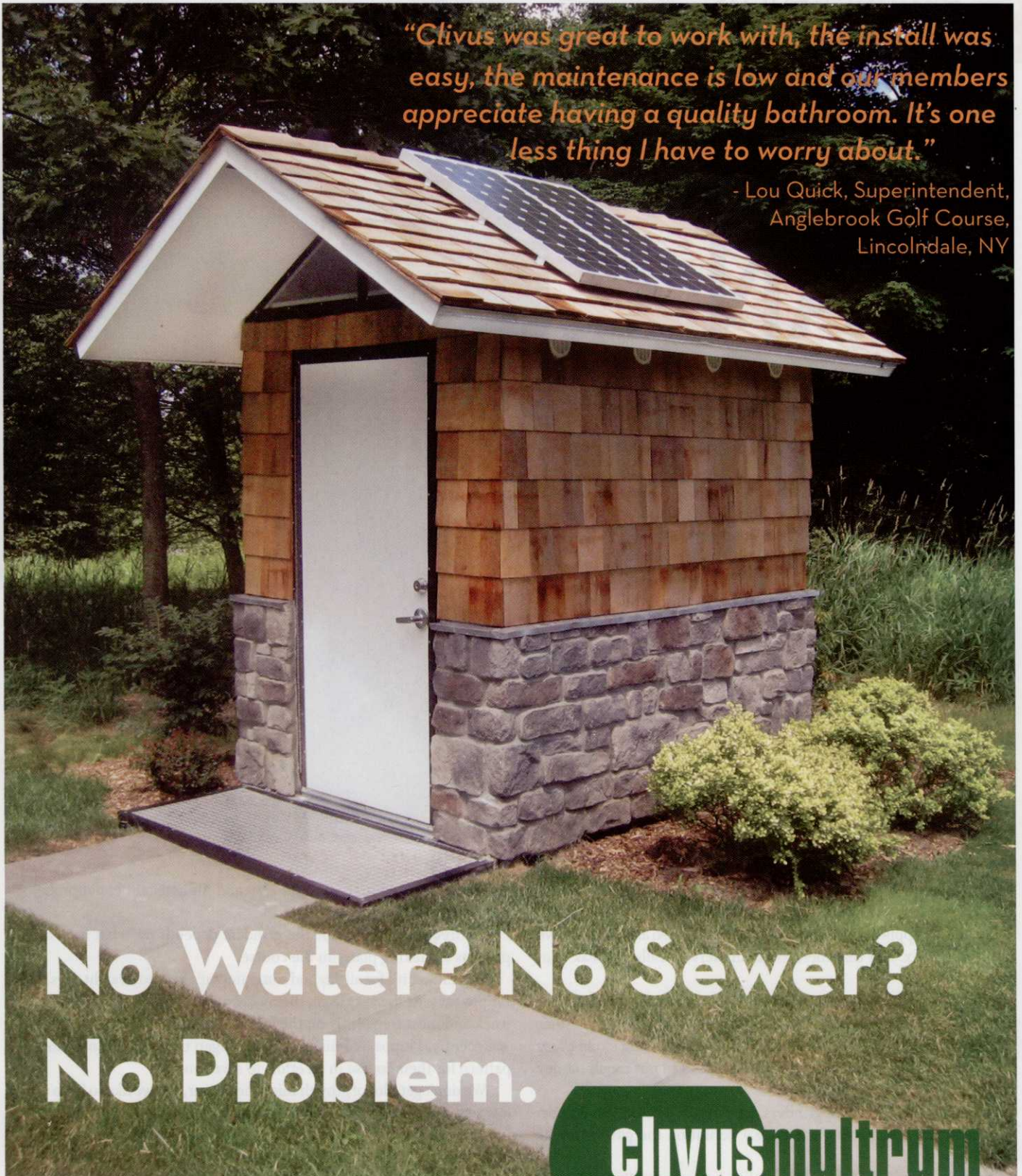
Alyse Lamparyk is a freelance writer based in Athens, Ohio.

The University Place, Wash.-based course is preparing for the U.S. Amateur Championship in August.



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PART OF THE PLAN

A solid set of grinders keeps maintenance costs in check at Stone Creek Golf Club.

BY ALYSE LAMPARYK

It has been a smooth ride for superintendent David Phipps ever since he purchased grinders for his course a decade ago. A 20-year golf industry veteran, Phipps knows how important a clean cut is for his course.

Phipps first encountered Bernhard & Co. grinders while working as an assistant superintendent at Oregon Golf Club. The course hired a new superintendent and with him he brought Bernhard Express Duals to replace another brand of grinders. Interested, Phipps and the course's mechanic fiddled around with the machine and were pleased with its ease and design.

When Phipps was hired as superintendent at Stone Creek Golf Club in Oregon City, Ore., he remembered how pleased he had been with the Bernhard product and purchased the first grinders for Stone Creek from the company. He chose the Express Dual 3000 and Anglemaster 3000 Bedknife Grinder for about \$35,000.

"It's all pros," says Phipps of the tool's versatility and reliability. "I have no problems with it at all."

Bernhard supplies are sold at a nearby location, so any repairs have been a quick fix. Not that there are many service calls to speak of at Stone Creek.

When Phipps was in need of a new vacuum cleaner for the unit, Bernhard sent it for free, as it was covered by the warranty. Other than that, Phipps has simply had to replace the grinding stone every once in a while. In the long run he has not had to put much money into the machinery.

Results of the Bernhard grinders are not just noticed by Phipps. "We're always being told what a great condition the golf course is in," Phipps says.

He attributes much of that to his equipment manager, Steve Mathre, who Phipps says is a fanatic about keeping the reels sharp so they get a quality cut and a good roll on the green. The mechanic takes conditions on the golf course seriously as they reflect his work, something he takes quite personally.

In addition to the equipment manager, Phipps has eight other employees. The annual maintenance budget of about \$627,000, allows for 12 or 13 employees during Stone Creek's peak season. While only the mechanic works with the grinders, Phipps feels that the learning



Equipment manager Steve Mathre takes a lot of pride keeping the mower reels sharp so they get a quality cut and a good roll on the green.

curve for the machinery is quite easy and his assistant could probably easily do it.

The frequency of use for the grinders depends on what type of projects are taking place on the course.

"Sometimes it's for all day and sometimes it's for two straight days," Phipps says. At the very least, the mechanic uses the grinders once a week and most frequently on the fairway or trim mowers.

Recently, Phipps and his employees began trying a new mowing pattern for their course in an effort to save time.

"We don't get a lot of growth this time of year, but we like to keep it low so we're not overtaken with growth during spring," Phipps says. For now the grounds are still working off the slow-release fertilizer and the grass is growing in slowly. Through it all, the grinders are still playing the same role: maintaining a crisp, clean cut.

Phipps acknowledges that a critical part in maintaining a golf course is having sharp reels. He finds it important to keep the turf clean because then less water is necessary, saving money and alleviating a lot of frayed edges.

Ultimately, Phipps says, "Keeping sharp equipment is all part of the plan." **GCI**

Alyse Lamparyk is a freelance writer based in Athens, Ohio.

Tank-mixing tactics

To get the most mileage out of your pesticides and fertilizers, follow these tank-mixing principles.

by Dara Park, Ph.D. and Juang-Horng 'J.C.' Chong, Ph.D.

Tank-mixing pesticides and fertilizers is a convenient and cost effective way to apply two or more chemicals at once. When done appropriately, tank-mixing can reduce labor and equipment cost, and save time and energy. However, chemicals can potentially react with each other and/or change the characteristics of the carrier water. These interactions can change the efficacy of pesticides in both positive and negative ways.

POSITIVE EFFECTS

Enhancement occurs when an additive is mixed with a pesticide to provide a greater response than if the pesticide was applied alone. Adjuvants are common enhancements added to tank-mixes. Adjuvants include spreaders, stickers and other materials.

Additive effects result from the addition from

each chemical added. The additive effect simply equals the sum of the effect if the chemicals would have been applied alone.

Synergism is when the product of two chemicals interacting with each other provides increased efficacy (control). This may allow for lower rates of chemicals to be used.

NEGATIVE EFFECTS

Antagonism is the opposite of synergism. The components react chemically with each other so one or both chemicals are rendered less effective than if they were applied separately. In addition to poor performance, an increase in plant phytotoxicity may occur.

Incompatibilities can occur from chemical reactions as mentioned above, or as the physical product of mixing chemicals. For example, if flocculants form, screens and nozzles may be clogged and the desired rate of chemical may not be applied. Flocculants and precipitants also can leave a residue on leaf surfaces. Other chemical incompatibilities occur from mixing chemical(s) with inadequate carrier water. Also, carrier water that is too low or high in pH and temperature, contain salts, or organic particulate can chemically alter the compound that is to be applied.

Pesticide resistance to two or more chemicals within a tank-mix may develop if the same chemical combination is used repeatedly over a long period of time. Pests may develop resistance faster when the chemicals used in the same tank-mix are of the same mode of action (for example, cyfluthrin and bifenthrin are both synthetic pyrethroids and target the activity site in an insect's nervous system). Resistance also may occur when the chemicals are of different modes of action if they are used frequently.

To make sure that only positive effects occur when tank-mixing, follow these guidelines for developing new tank-mixes:

1 Know the temperature, pH and salinity of your carrier water. Adjust your carrier water temperature and pH to the optimal range of each chemical before mixing in a tank or for a jar test.

2 Read the label of all chemical products considered to be tank-mixed. The product labels will give you information on what type of chemical and carrier to avoid and potential problems that may occur. If you are still unsure about a mix, contact the manufacturer.

3 Perform a jar test following proper mixing procedures (see sidebar). This will determine physical incompatibilities.

4 Many chemicals require constant agitation; be sure to follow all label instructions. Many labels will instruct you in the sequence for adding products to the tank mix.

5 Tank-mix enough to make a test application on part of the target site (preferred) or on a non-target site. Schedule the application to allow enough time for any negative effects (chemical incompatibilities) to be apparent before the actual application is made.

6 When making an actual application, spray as soon as possible. Do not use a spray solution that has been sitting for a long time. Some chemicals may degrade in spray solution after several hours. **GCI**

Dara Park, Ph.D., and Juang-Horng 'J.C.' Chong, Ph.D., are assistant professors at Clemson University's Pee Dee Research and Education Center in Florence, S.C.

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Photos by David Phipps

Superintendent, Stone Creek Golf Club, Oregon City, Oregon.

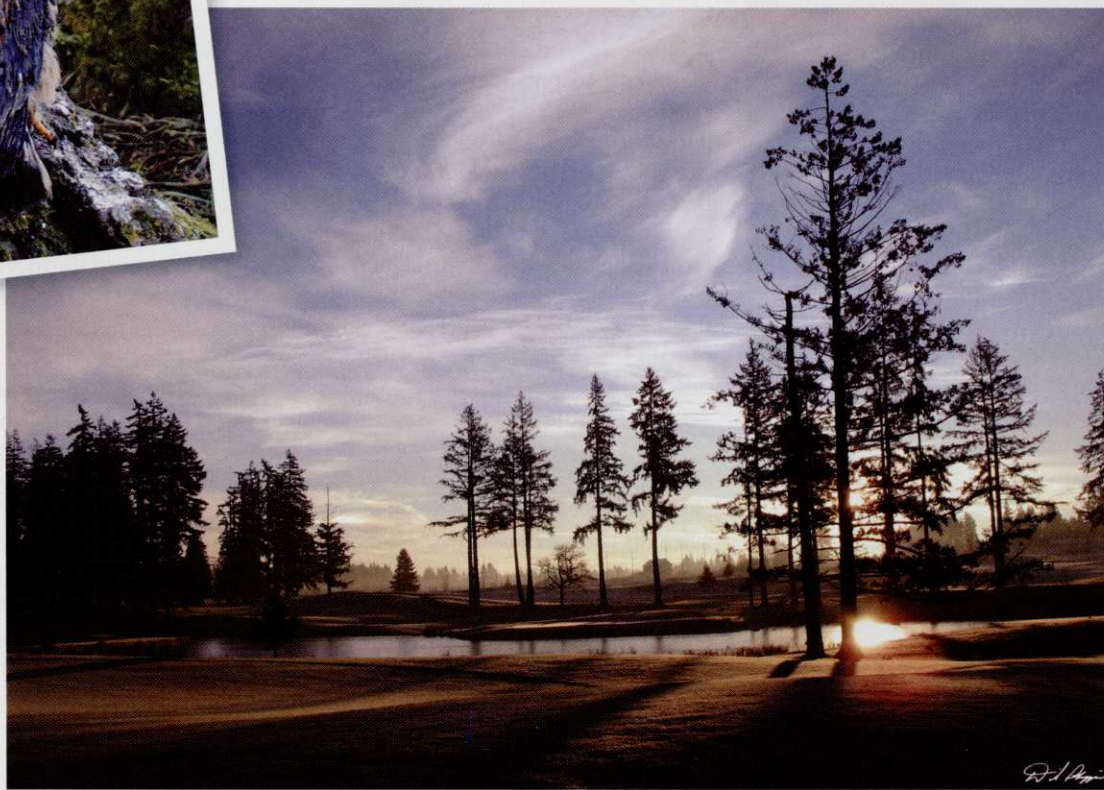
When I started as construction manager at Stone Creek Golf Club I knew it was important to document what was happening. I soon found out that my course was quite photogenic and I started using the pictures for gifts and our Web site.



I photographed these kestrels with my first digital camera. Sometimes shooting a good photo is simply about being in the right place at the right time.



I shot this picture after a snow storm dropped 5 inches of snow one morning. It's an Oregon White Oak and has a real typical shape. These trees were once abundant in the Wilamette Valley, but have been lost to development and farming. When I took the picture it was very foggy, but when I put a little Photoshop to it the haze went away and the branches came out.



I took the sunrise picture on a cold December morning when it was about 25 degrees. There was just enough light fog in the background to give it a misty appearance and the wispy clouds against the blue sky really caught my attention. The sun was reflecting off the pond and gave a nice silhouette of the fir trees.

Photo Tip

It's good to shoot in thirds. Divide your shot in three sections with your subject lining up on the dividing line. I also like to see the shot lead your eye in a certain direction, whether it's a row of trees or a fence line that can give the shot dimension.



Monroe Miller is a retired golf course superintendent. He spent 36 years as superintendent at Blackhawk Country Club in Madison, Wis. Miller can be reached at groots@charter.net.



THE MONROE DOCTRINE

A FRIEND YOU MAY NOT HAVE KNOWN

One of the great pleasures of my career as a golf course superintendent was the fraternal feeling among us. I always felt that if I was a long way from home and had some kind of trouble or problem, help was as close as one of my colleagues was. All it would take would be a phone call.

That extended to Green Section agronomists I knew, land grant faculty whose paths I may have crossed, and some guys who ran the turf equipment manufacturing companies. These warm relationships gave me a sense of security and were a very rewarding part of my working life.

One of those industry men whose friendship was a treasure to me, and to other superintendents all across the country as well, was Ralph Nicotera. He joined the ranks of the retired after the GIS in San Diego last month.

Ralph spent his entire career with Jacobsen, going back to when the company was in Racine, Wis. Jake was founded by a Danish immigrant to Racine, Knud F. Jacobsen, in 1920. It remained in the family for 49 years until Allegheny Ludlum acquired it in 1969. The company was under this ownership when Ralph was hired in the mid-1970s. Ralph was raised in Racine and his parents still live there. He graduated from the University of Wisconsin-Oshkosh, returned to his hometown and started his career in turf equipment manufacturing.

Like most new hires, he started his career on the bottom rung of the corporate ladder, not unlike the way most golf course superintendents learn all of the practical aspects of golf course management – mowing greens and tees, raking bunkers, mowing around trees, repairing irrigation leaks and all the rest. What this gives you, and gave Ralph, is up-close knowledge about how things really work. We grow up

in the business. He knew all the basics of manufacturing and marketing, and by the time of his retirement he was Jacobsen's vice president of sales.

I first got to know Ralph in the 1970s when I would drive from Madison to Racine to participate in the annual college student seminars in early June. He wasn't directly involved, but I quickly figured out that if I needed to use a phone, park a vehicle or whatever, he would help me out. He was friendly, helpful and reliable; he built trust, and after those early years anytime I needed help or information, Ralph was only a call away. As one of his longtime distributors said to me, "His word was golden."

The golf turf business has avoided much of the suspicion about corporate America because there are so many quality people managing the companies we do business with.

Textron bought Jacobsen in 1978, and Ralph worked for lots of different executives over his corporate career. Some may have been excellent bean counters or engineers, but had less than full knowledge about golf turf. I have been told that educating them about our world was a responsibility that fell heavily on Ralph Nicotera.

The most important thing people learned from Ralph was that the customer – you and me – was all important, and his career is replete with instances of his going the extra mile to help out superintendents who

may have needed a critical repair part in an emergency or early delivery of a machine or any of hundreds of other circumstances. Distributors absolutely depended on him. When the company moved from Racine to Charlotte their biggest concern was that the hometown Racine guy wouldn't make the move. There was a collective sigh of relief when he moved, too.

Jacobsen President Dan Wilkinson also knows why so many people respect Ralph. Dan relied on him heavily when he assumed the reins of Jacobsen and was on a steep learning curve. Dan's an early bird and was relieved to see that Ralph was also; when Dan needed him, he was already there. Ralph's unofficial role as company historian was useful, too. Like so many who have worked with Ralph, Dan respected his humility and his complete dedication to golf course superintendents because they were his customers, and has been impressed with his willingness to work behind the scenes and pass credit due on to others.

Conversations I've had with sales staff reporting directly to him were the same – a tough taskmaster who was eminently fair, a total team player who was a professional's professional. His appeal went beyond respect for his skills; he was genuinely well liked and appreciated.

Ralph has seen a lot of change in our business – dramatic change, actually – and he has survived it all with his great attitude and dedication in tact. We are in a period in our country when there is a lot of suspicion about corporate America. I think we have been lucky in the golf/turf business to have avoided much of that suspicion because there are so many quality people managing the companies we do business with. Ralph Nicotera is one of the best of them. GCI



Tim Moraghan is principal of Aspire Golf Consulting in Long Valley, N.J. He can be reached at tmoraghan11@comcast.net or 908-635-7978.

DR. BEARD IS IN

During a recent visit to the Desert Mountain golf complex in Arizona, I had the opportunity to discuss the state of the industry with the eminent turfgrass scientist James B. Beard, PhD., president and chief scientist of the International Sports Turf Institute. His insights and evaluations of our sport's affairs – both at home and abroad – should serve as a primer as the industry slowly emerges from its financial and agronomic woes.

Presently, Dr. Beard is focused on his second love (wife, Harriet, being the first!), which is writing books. He is the author of "Turfgrass Science and Culture" and "Turf Management for Golf Courses." His newest project is a complete examination of turfgrass and soils history at the St. Andrews' golf courses and their maintenance dating back to the 1800s. The Royal & Ancient Golf Club and St. Andrews' library have opened up their archives, Green Committee transcripts, notes and letters, including photo documentation of practices and maintenance dating from 1840 to 1940.

In comparing maintenance of yes-teryear and current cultural practices, Dr. Beard points out several areas that have never changed and should remain a focus for the future:

- 50 percent of the game is contested and played within the putting green. Therefore, 50 percent of maintenance efforts should be placed there.
- Hole maintenance was always key, including proper selection, cutting, flag placement and debris removal from the area adjacent to the primary target. In the early days sweeping of rabbit pellets was practiced much earlier than grass cutting.
- In 1830 Edward Budding introduced the mower, but its use at St. Andrews' Old Course did not occur until the late 1880s. Today, we are

intent on a quality cut for turfgrass health and playing quality.

- Fertility was created from manure composted into organics. Similar to today, the odor was a concern. The use of the first artificial product – ammonium sulfate – occurred in the 1920s.

Traveling the world as a consultant and researcher, Dr. Beard has noticed our foreign brethren are focusing on quality maintenance and agronomics with an emphasis on gathering as much information as is available to enhance quality.

growth and basic maintenance should be the focus.

- The industry should not over-think issues. Instead, we should concentrate on the scientific process of realizing the problem, identifying the cause, researching the control and implementing cultural practices to minimize occurrences.

- Try to produce a healthy plant, relying less on pesticides. Environmental forces have and will restrain use of many products and as we lose these products, turfgrass quality eventually could suffer.

As an industry, we should accept a *less-than-perfect* lie.

Good lessons for us to follow include:

- Be hungry for *science-based information* and proven research to produce a better quality product.
- While turfgrass perfection is a goal, it's seldom achieved. When it is occasionally attained, it's fleeting. The closer to perfection, the more obvious the *imperfections* appear.
- As an industry (on and off the golf course) we should accept a less-than-perfect lie. Most 20-handicap players could not handle a perfect lie anyhow. Why stress our turfgrass and ourselves trying?
- Consider the rising costs of maintenance, environmental pressures, governmental impacts and the need for conservation as a guide for your maintenance plan.
- Water is the next oil. Be wary of governmental interference or future city planning where water may not be available for golf courses.
- Turfgrass research must be ongoing and supported by all within the golf world. Fundamentals of turfgrass

- Implement quality and properly-timed cultural practices to enhance healthy turfgrass and soils.

- Beyond turfgrass science, we all should be open to bringing more people into the game. Endorse programs that encourage growth of the game, especially those that encourage young people to pursue roles in the business of golf.

- There should be a focus on *fun* – whether playing the game or working within the industry.

- We should be careful not to make courses too hard and do our best to make golfers come back again because they enjoyed their day.

- Be cautious of the rising costs that make the game unaffordable and too elitist.

In closing Dr. Beard expressed his gratitude for all he has received from golf, including a remarkable set of friends and associates around the world.

We should offer him a huge thank you, as well. **GCI**



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

Travels With Terry

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

GREENS BLOWER

Chan Yen Hung, golf course manager at the Discovery Bay Golf Club in Hong Kong, China, built a greens blower system for blowing and dragging dry topdressing sand into the cored aerifier holes. A used Rogers Windfoil Sprayer Boom Shroud measuring 80-inches long was modified to 60 inches by cutting 10 inches from both sides. Two-inch high aluminum angle bars (1/4-inch thick, costing \$20) are used to construct the platform frames holding the two Maruyama backpack blowers (along with bungee cords) in place. Two 3-inch diameter holes were drilled in the top of each end of the shroud and two 3-inch diameter PVC 90-degree elbows were installed for each blower discharge hose to fit into. Underneath, four pieces of 1-inch by 55-inch (1/4-inch thick) aluminum angle bar (\$20) were used to install/bolt the two 54-inch Standard Golf Replacement Topdressing Drag Brushes (\$80) after the sprayer wheels had been removed. The two backpack blowers are used for other normal duties when not being used on this implement. About 16 labor hours were used to modify the unit and some of the materials were already in stock. This invention, now called Aerobrush, is being manufactured by Premier Turf of Hong Kong. It was displayed at the Golf Industry Show in San Diego.



CURB APPEAL

At the Chevy Chase Club in Chevy Chase, Md., Dean M. Graves, CGCS, golf course manager, and greenkeepers Kebede Mezmur and Benjamin Torres built these decorative flagstone curbs along their cart paths to control vehicular traffic wear on the turf when making turns. The flagstone pieces are approximately 12 inches by 12 inches by 2 inches, where a 12-inch-deep trench is dug then filled with pea gravel to give support and to prevent winter heaving. Then the flagstone is placed vertically 4 inches in the ground. The cart path is 4-inches thick and it sticks 4 inches above the cart path and both ends are tapered to the ground contours. Topsoil is then placed up against the flagstone and then sodded over the top; a mower deck can mow over the top of the flagstone. If a piece of flagstone breaks from being hit by a vehicle, it can be easily replaced and it will match the surrounding stones. The flagstone looks very



natural next to the concrete cart paths and it blends in nicely.

The flagstone is approximately \$3.75 per foot, the pea gravel is already in stock and it's a nominal cost. It takes two staff members about eight hours to build a 50- to 75-foot curb depending upon the soil conditions and cart path edge. **GCI**