

USGA GREEN
SECTION

RECORD

A publication on Turfgrass Management May-June 2002



George B. Thompson
2002 USGA Green Section
Award Recipient

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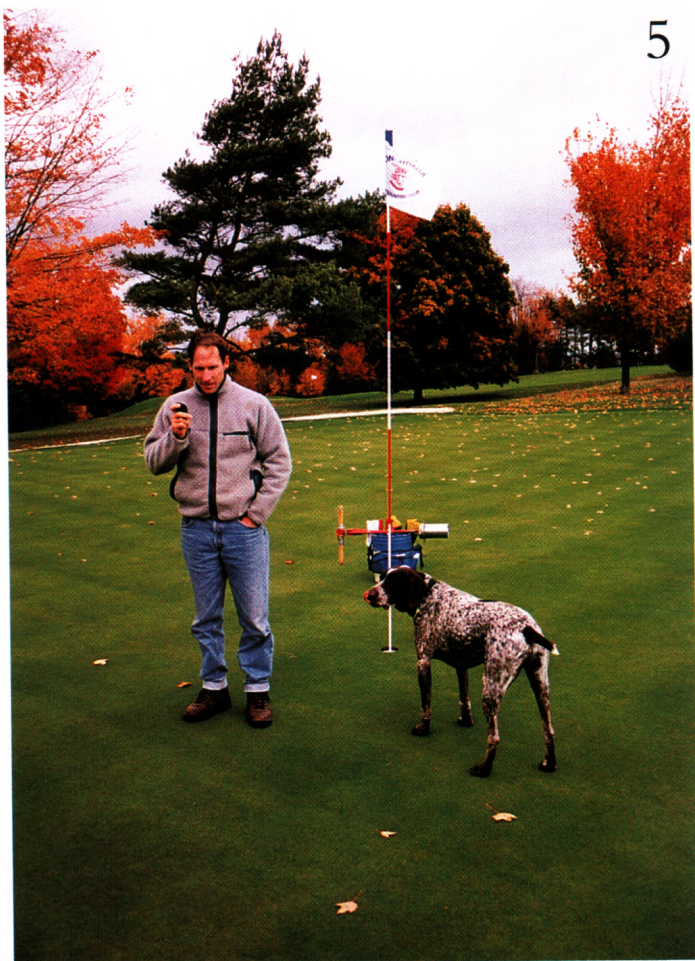
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2002 GREEN SECTION EDUCATION CONFERENCE

Making Accommodations for Golfers and the Environment

February 9, 2002 • Orlando, Florida

For the 21st consecutive year the annual Green Section Education Conference was held in conjunction with the Golf Course Superintendents Association of America International Turfgrass Conference and Show. This year more than 800 people attended the Green Section's program on Saturday, February 9, at the Orange County Convention Center. James T. Snow, National Director of the USGA Green Section, served as moderator for the afternoon's program of 20 speakers who addressed this year's theme, "Making Accommodations for Golfers and the Environment."

The Best Turf Tips of 2001

One of the most popular annual features of the Education Conference is the Best Turf Tips. This year, 18 Green Section staff members reported on some of the helpful ideas and ingenious innovations they came across while visiting golf course superintendents in every part of the country during 2001. The Turf Tips appear throughout this issue.



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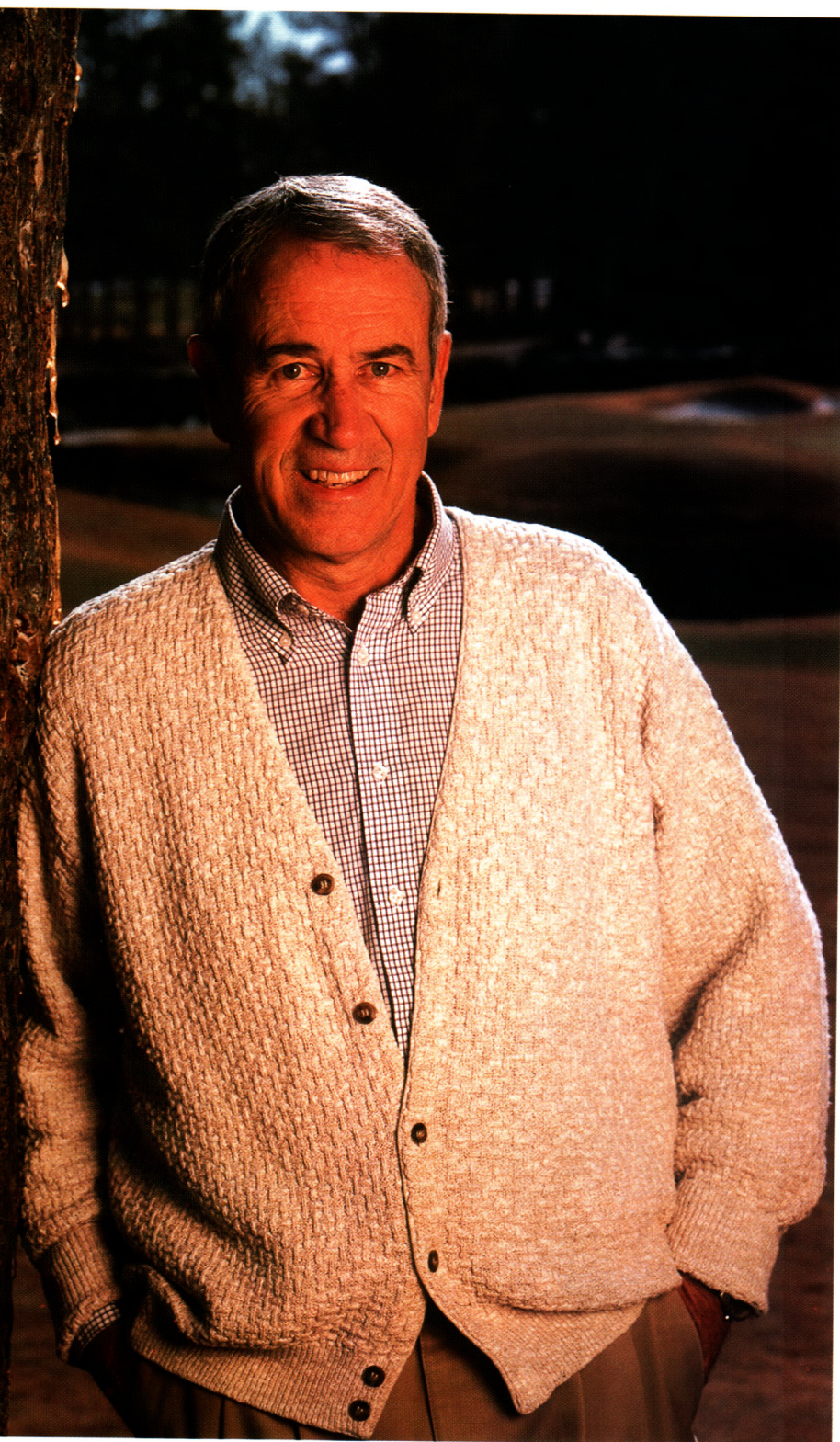
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2002 USGA GREEN SECTION AWARD: George B. Thompson



“All of my heroes in the turfgrass industry have received this award,” George B. Thompson, CGCS, of Pinehurst, N.C., a man synonymous with leadership by example in the turfgrass industry, joins this prestigious list upon receiving the 2002 USGA Green Section Award. The award is granted annually by a distinguished panel of experts in the turfgrass field and recognizes persons for distinguished contributions to golf through work with turfgrass. The award was presented to Thompson by John O’Neill, a member of the USGA Executive Committee, at the Golf Course Superintendents Association of America Conference and Show in Orlando, Fla., on February 9, 2002.

A quiet, unassuming man, George Thompson is known throughout the industry as the consummate dedicated professional. As a golf course superintendent for 36+ years, he focused his attention on the golf course as he took pleasure in the tasks required to improve the course each day. And just as important, he developed the admirable quality of sharing his experience and knowledge with others, and teaching them the requisite skills for becoming successful golf course superintendents.

While delivering newspapers as a young boy, he always marveled at the beauty of the golf course, admiring the shadows and the dew in the early morning hours. He got his first taste of the game caddying at age 11. Even then, he tried to be the very best at what he did. Earning 65 cents for a nine-hole round, he noted how he learned a lot about Mother Nature as well as human nature. “This was my rite of passage into the industry,” said Thompson.

After a very successful stint at the Columbia Country Club (Chevy Chase, Md.), George moved in 1982 to The Country Club of North Carolina, where for 18 years he worked his magic. Always willing to investigate new techniques, he was one of the first to use the improved perennial ryegrass varieties for fairway turf in the transition zone in the late 1960s. Many university researchers and chemical companies sought him out to evaluate new products and turfgrass varieties. Researchers liked working with George because

they knew he understood the significance of research and was willing to follow the necessary research protocols to produce high-quality field studies.

When the U.S. Fish and Wildlife Service wanted to establish the Safe Harbor Program in the mid-1990s to benefit the red-cockaded woodpecker in the North Carolina Sandhills, George Thompson and The Country Club of North Carolina were among the first to join the program. The Safe Harbor Habitat Conservation Plan offers participating property owners an incentive to manage their lands for this endangered species. The club worked actively to create hospitable woodpecker habitat among the old-growth longleaf pines on their property, and the course had the honor of having one of the largest populations of these woodpeckers on any golf course in the Southeast. Since 1991 Thompson has continued this environmental activism as a participant in the Audubon Cooperative Sanctuary Program for Golf Courses.

George Thompson is often lauded for his willingness to give back to the industry. He was eagerly sought out by turfgrass students for the opportunity to intern on his golf course. Their training included not only the basics of golf course maintenance, but also life lessons about what it took to be successful in the business. Many of his assistants have gone on to become successful golf course superintendents and in-

dustry leaders in their own right. Even in retirement, George is sought out by superintendents for his advice and counsel.

George has been an active volunteer in the local turfgrass industry as well. His resume includes positions as president of the Mid-Atlantic Golf Course Superintendents Association, the Greater Washington Golf Course Superintendents Association, and the Turfgrass Council of North Carolina (TCNC). His leadership with the TCNC came at a time when the association was experiencing growing pains, and his guidance led to a beneficial collaboration with all sectors of the industry, including a strong, long-term university/turfgrass industry relationship.

George continues to influence the golf course superintendents of the future through his teaching and speaking activities. Throughout his career he spoke at countless meetings and conferences, and he is still in demand. In addition, since his retirement in 2000 he has continued to teach a turf management course at nearby Sand Hills College.

In accepting the award, he expressed gratitude to his friends and peers in the industry and promised to continue to instill desire in his turf students. George noted, "Contributions are what it's all about." The golf course industry and the caliber of its superintendents have come a long way because of contributions from people like George Thompson.

George Thompson is often lauded for his willingness to give back to the industry. He was eagerly sought out by turfgrass students for the opportunity to intern on his golf course. "Contributions are what it's all about," George notes.



Rolling Out The Carpet

A last-resort measure that is now a routine part of practice tee management.

BY JOHN FOY

Every region of the country has its own set of course and turf management concerns or issues to deal with. In Florida, we are at a big disadvantage because for the vast majority of clubs and courses, the primary play season is winter, when the base bermudagrass turf cover is in a semi- to fully dormant stage. With a large influx of people escaping the cold weather of the north, golf courses get very crowded. While we typically enjoy very mild winter weather, the base turf cover of Florida golf courses is in a semi- to fully dormant phase in response to cool temperatures and reduced day length, which impacts aesthetics, wear tolerance, and divot recovery during the peak play season.

Overseeding of putting greens, tees, and fairways has been a standard practice at courses in North and Central Florida. In South Florida, even though the bermudas do not go fully dormant, overseeding has been a growing trend.

Obviously, when the base bermuda is not actively growing, recovery from divot damage is not going to occur, either. Practice range tees are routinely overseeded in the fall, and then periodic reseeds are often conducted in an effort to maintain a turf cover. Yet, with constant and heavy use during the peak winter season, it is difficult to schedule time to work on range tees. Supplemental irrigation for good seedling establishment is also very difficult. During the middle to latter stages of the winter season, a common complaint heard from golfers is having to hit off thin, juvenile turf and sand.

The Bonita Bay Club in Bonita Springs, Florida, has been one of the most successful real estate developments in Southwest Florida. A couple of years ago the practice tee had become so heavily divoted that Mark Hampton, Director of Course Operations, decided that resodding was the only option. As a result of good experience with this program, *rolling out the carpet* has been incorporated into the routine winter-time maintenance program. In the fall, as the members begin returning from the North and activity on the range begins to build up, the hitting line is restricted to the back half of the tee. This setup is maintained through the holiday season, when extremely heavy member and guest activity occurs. Then, in early January, the front half of the tee is brought into use and the back of the tee is closed. At this point, a commercial grade sod cutter is brought in and used to remove all of the remaining turf from the back portion of

the tee. This is followed by surface preparation using laser leveling and fill soil work as needed, and then big roll sod is installed. The resodded portion of the tee is kept closed for a week or two so that the turf can become rooted. Mark Hampton pointed out that *thick* cut sod works best and is less likely to slip or get dislodged before the roots have had a chance to fully establish.

Resodding approximately 20,000 square feet of tee surface is not inexpensive, but the cost is considered to be worthwhile at Bonita Bay. The golfers are provided a much better quality tee surface through the remainder of the winter season. Also, with sodding, a more mature turf condition results so that the golfers do not feel as if they are constantly hitting out of sand and a thin ryegrass turf. Furthermore, significantly less water and fertilizer must be used after resodding compared to being in a constant grow-in process. I know that, at least in Florida, I visit very few courses that have practice tees large enough to handle heavy activity throughout the winter season. This is especially true with the growing popularity of annual range ball programs and unlimited access to balls. Thus, if maintaining a turf cover on the practice tee has been a major battle, you might want to consider *rolling out the carpet*.

JOHN FOY is director of the USGA Green Section Florida Region.



Thick cut, big roll bermudagrass sod is used to re-grass the back half of the practice tee. Rolling out the carpet on the practice tee has proven to be the best option for accommodating the golfers.

Let's Get Site Specific About Golf Course Irrigation

Irrigating according to localized conditions saves water, time, and turf.

BY JAMES H. BAIRD, Ph.D.

Recent droughts and water use restrictions in the Northeast and elsewhere along the East Coast are an indication that water availability may soon become a primary concern facing all golf courses, regardless of climatic conditions.

Efficient water use on golf courses is dependent upon several factors, most notably the irrigation practices of the turf manager and performance of the irrigation system. Erick Holm, CGCS, of the Onondaga Golf & Country Club in Fayetteville, New York, is a good example of a superintendent who has combined both sound turf and irrigation management practices with the latest irrigation technology. How does he do it?

In 1999, a new irrigation system was installed at Onondaga G&CC. The original system managed at least 6 or more sprinklers per controller station, so large areas of turf received identical amounts of irrigation even though they often had very different water requirements. Now, it is important to point out here that you don't need a state-of-the-art irrigation system to irrigate on a site-specific basis. In fact, Erick had to rely a great deal on hand watering with the old system in order to prevent over-application of water. However, capitalizing on the latest irrigation technology can significantly improve both the effectiveness and efficiency of site-specific irrigation. For example, the new irrigation system at Onondaga manages one sprinkler per controller

station on greens and no more than two sprinklers on the remainder of the golf course. Another key component of Erick's new irrigation system is an on-site weather station that monitors meteorological variables that are then input into a mathematical model to predict turf water loss from evapotranspiration (ET) for irrigation scheduling.

When it comes to scheduling irrigation, one can be very general or, like Erick, very site specific. Unfortunately, too many turf managers take the easy way out and set all of the sprinklers at the same 10-20 minutes per head and then use the "global adjust" to account for different water requirements. On the other hand, Erick plugs several variables into his computer equipped with irrigation management software (Rain Bird Cirrus) that calculates the proper amount of water to be applied to a given area. Predicted ET is corrected for the type of turfgrass (warm vs. cool season) and specific climate using a crop coefficient. Erick then takes three additional steps to dial-in the proper irrigation requirement. First, he uses "ET_{adjust}" as part of the computer software to account for irrigation requirements on different areas of the golf course. For example, putting greens are adjusted to 55% of the corrected ET, whereas fairways are set at 70%. Determination of ET_{adjust} is based largely on cultural practices, specifically mowing height. Erick then uses "AREA_{adjust}" to account for the specific growing environment within an area. For instance, a

shaded green would be adjusted to a value less than 100%, whereas a green with an open, southern exposure would be set adjusted to a value greater than 100%. Most specifically, Erick uses "STATION_{adjust}" to account for the area surrounding each sprinkler based upon visual observations of the turf and underlying soil. Similar to AREA_{adjust}, a sprinkler located in a pocketed area of a shaded green would be adjusted to a value less than 100% to further reduce the amount of water applied to that area.

Overall, the irrigation requirement (inches/day) for turf at Onondaga G&CC is calculated as the product of $ET \times \text{Crop Coefficient} \times ET_{\text{adjust}} \times \text{AREA}_{\text{adjust}} \times \text{STATION}_{\text{adjust}}$. Although it looks complex, it's as simple as plugging the numbers into your computer and letting the irrigation management software take it from there.

Water conservation is the biggest bonus of site-specific irrigation management. Furthermore, having the latest technology allows you to document water savings. For example, 2,201 gallons of water were saved on greens on one day alone at Onondaga as a result of site-specific irrigation management. When you consider irrigation over the entire growing season and that greens represent only 1-2% of the irrigated turf on most golf courses, water conservation will be substantial — conceivably in the range of 500,000 to 5,000,000 gallons per year! In addition, site-specific irrigation management can help reduce the time and money spent on hand watering, provide healthier turf, and yield firmer and more consistent playing conditions.

Whether or not your golf course is equipped with the latest in irrigation technology, it's never too early or late to begin practicing site-specific irrigation *for the good of the game, golfers, and the environment.*

JIM BAIRD is an agronomist in the Northeast Region of the USGA Green Section.



Research yields an invaluable amount of information for turfgrass practitioners. Accessing this information is easier through the Turfgrass Information File and the USGA Turfgrass and Environmental Research online technical journal.

USGA Turfgrass and Environmental Research Online

A new online technical journal provides research results at your fingertips.

BY JEFF NUS, Ph.D., and MICHAEL KENNA, Ph.D.

Since 1983, the USGA Turfgrass and Environmental Research Program has funded more than 215 research projects at a cost of \$21 million. This turfgrass research funding program is by far the largest of its kind and provides funding opportunities to university faculty interested in working on environmental and turf management problems affecting golf courses. The vision is simply *to use science to benefit the game of golf* in the areas of turfgrass and resource management, sustainable development, and environmental protection.

COMMUNICATION IS ESSENTIAL

There are three fundamentally important components of successful research programs: funding, research, and communication. The USGA Executive Committee has steadfastly provided the necessary funding for research to address a range of issues, including germplasm development, environmental protection, and integrated turfgrass management, as well as improved methods for putting green construction and materials testing procedures.

Turfgrass scientists across the country have overwhelmingly responded to the USGA's calls for proposals. Nearly every land-grant university supporting a turfgrass research program has received research funding.

The third critical element of research funding programs is communication. When research results are generated, they need to be effectively communicated to those who can benefit from them. This information is important to the scientific community as well as golf course superintendents, educators,

industry representatives, and course officials who want to learn about the science of golf course turf.

INFORMATION AGE CREATES OPPORTUNITY

The last 20 years saw the world move into the Information Age. The rapid development of faster and more powerful computers and other new technologies provides communication capabilities that seemed incomprehensible. The opportunity now exists to use the Internet as a major delivery method of research information for scientists, educators, and practitioners who have an interest in keeping abreast of the latest research findings.

A new online technical journal has been launched to publish the results of USGA-funded projects. This publication, *USGA Turfgrass and Environmental Research Online (USGATERO)*, focuses on publishing USGA-funded research results for turfgrass scientists and others. The writing style also will be understandable to golf course superintendents and other turfgrass managers, educators, and course officials interested in learning more about the science of turfgrass.

THE TGIF CONNECTION

The *USGATERO* technical journal will reside at the Michigan State University libraries to take advantage of the comprehensive turfgrass literature database already housed there. The Turfgrass Information File (TGIF) is a searchable, bibliographic database containing more than 77,000 records regarding the culture and management of turfgrasses. Since its inception, major financial support has been provided by the United States Golf Association, in addition to the support provided by Michigan State University for library space and staffing.

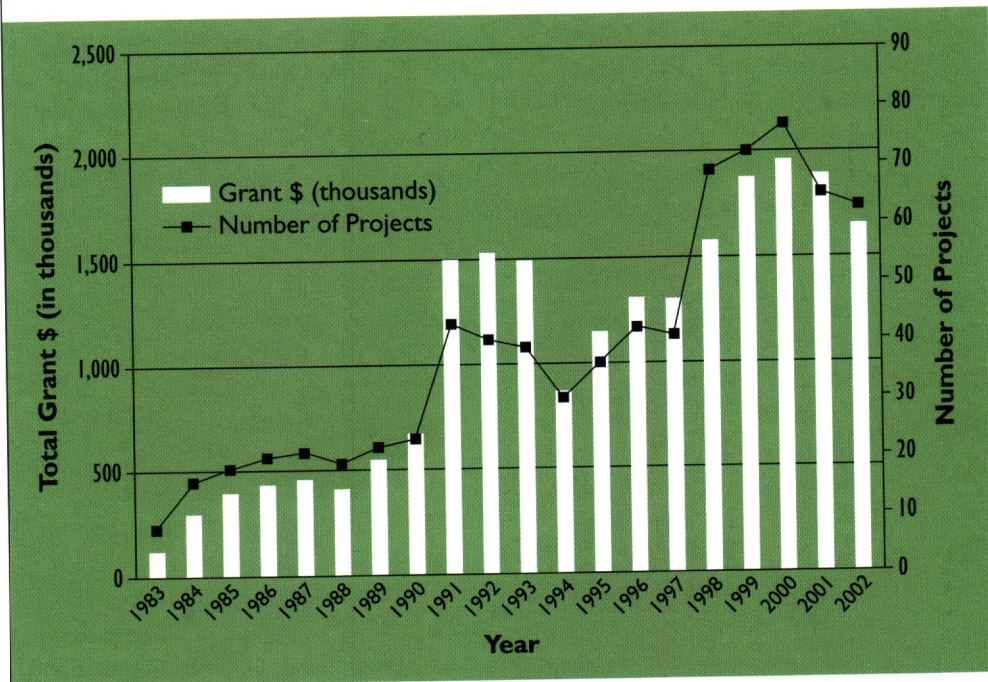
TGIF is the turfgrass information source for the industry. Publishing the *USGATERO* through TGIF will enable this publication to link to important reports already housed in TGIF. In addition to links to other research

reports pertaining to the USGA-supported project, links can be made to most references listed in the literature-cited sections of the journal article. For someone needing additional information about a referenced aspect of the article, these literature linkages are extremely valuable.

THE FUTURE IS NOW

Only a few short years ago, publishing information as an online electronic journal was only a dream. That future is now. You may access the USGA Turfgrass and Environmental Research Online at <http://usgatero.msu.edu>.

JEFF NUS and MIKE KENNA are manager and director, respectively, of the Green Section Research Program.



Lost and Found

Restoring lost hole locations on *Poa annua* greens.

BY PAUL VERMEULEN



Restoring lost hole locations on *Poa annua* greens can be as easy as removing the existing sod and filling in the depressed area with aerification cores harvested during the fall.

For most of us, the hands of time are admittedly cruel. A wrinkle here, a few pounds there, and before we know it, the innocent child of our youth has been lost and replaced with someone who is the parent we swore we would never become. Worse yet is the fact that these changes occur so gradually that we are scarcely aware of them until we look at an old, forgotten photograph.

On the face of a green, the hands of time can be equally wicked. Over a period of a few months a putting surface can shrink an imperceptible fraction of an inch because a conscientious employee is worried about scalping the collar and avoids the edge of the green while mowing. Over a period of years, the fractions can add up to a few feet or even a yard or two, and all of a sudden the prized Sunday hole location in the back corner has disappeared.

To restore a lost hole location, superintendents across the country typically plant sod that is either grown on site or purchased from a commercial nursery. The advantage of so doing is that sodding yields instantaneous results that today's *I-want-it-now* golfers like to see.

The disadvantage for those maintaining *Poa annua* greens, however, is that sod grown in a nursery seldom has the same color and texture because it is established with creeping bentgrass. As a consequence, the putting surface looks scarred for several years or, more specifically, until the *Poa annua* from the green invades the restored area.

Perfectionists that they are, Richard Bowden, Robert Lively, and Raymond Schmitz (all superintendents in the Chicago area) chose to try something just a little bit different. Instead of using sod, they chose to use aerification cores harvested from their courses during the fall season. In each case, the results speak for themselves in that one can hardly tell that several of their greens have been restored to their original shape.

To restore lost hole locations on their *Poa annua* greens, Bowden, Lively, and Schmitz used the following simple approach:

Determine the boundaries of the restoration area by identifying lost hole locations. Once the boundaries have been determined, mark them for later reference with paint or small indicator flags. Following the set boundaries, use

a sod cutter to remove the existing turf. If the boundary extends into the rough, then cut the rough sod separately from the collar and dispose of it.

Relocate the existing collar to conform to the new boundary of the restoration area. As the length of the new collar area will be greater than that of the existing collar, it will be necessary to reduce the width of the new collar to avoid exhausting the available sod supply. After the existing collar has been relocated, remove an additional 2 inches of soil from the exposed restoration area. To remove an even 2-inch layer of soil, loosen the ground using a sod cutter.

Prepare the planting bed for the aerification cores by cultivating the soil with an aerifier or heavy-duty, walk-behind vertical mower. If appropriate, incorporate a starter fertilizer while cultivating the soil.

Harvest a supply of $\frac{3}{8}$ " aerification cores from the putting surface being restored. If additional cores are needed, harvest cores from a neighboring green with similar characteristics. Using the cores, fill in the restoration area. Level the surface of the cores by adding top-dressing material. If desired, sprinkle a few handfuls of creeping bentgrass seed over the surface of the cores. Finally, roll the cores with a heavy roller to true the putting surface.

The grow-in of the new turf simply requires equal parts of patience and common sense. In the Chicago area, the putting surface grows in after approximately eight to ten weeks when the cores are planted in mid-September. By the following June, the mowing height of the restored area can be reduced and the new location readied for play by Father's Day weekend. This approach may take a little longer than sodding, but as they say, the proof is in the pudding.

PAUL VERMEULEN is the director of the Mid-Continent Region and concentrates his Turf Advisory Service visits in Illinois, Kansas, and Missouri.

Practicing Integrated Pest Management (IPM) involves using all available information to make responsible decisions concerning turf management options. A holistic turfgrass management program provides the opportunity to control as many management variables as possible. For example, fairway preparation involves much more than just mowing grass. Timely aeration, strategically implemented fertilization programs and judicious water management are major core components of an IPM program that allows fairway turf to be presented in the desired manner.

The benefits of dew and clipping dispersal go far beyond just keeping golfers' shoes dry and clean. Many of the diseases battled on golf course turf in general and fairway turf in particular are perpetuated by excess moisture. Free moisture on fairway turf is a critical factor in the development of foliar blighting diseases. The longer the leaf blades remain wet, the greater the potential for high levels of disease incidence. As such, anything that can be done to dry the turf sooner is beneficial. Turfgrass pathologists agree that if free moisture is reduced, disease incidence will be lowered, which in turn may reduce the reliance upon chemical control strategies.

With this information in mind, John Shaw, CGCS, at Rolling Hills Country Club in McMurray, Pa., developed a method to remove dew accumulation and has integrated it into existing practices and labor resources. Using materials such as PVC pipe, nylon rope, 1" irrigation hose, various nuts/bolts, and duct tape, a prototype fairway drag was developed. The drag had to be light, easy to use, flexible, maneuverable, and, most important, effective. With modifications, John devised a drag that was functional and offered a high level of efficiency.

It takes 1.5 hours to drag 24 acres of fairway turf at Rolling Hills C.C., and the process is performed 5 to 7 days a week. The speed with which the



Dew It This Way

Preparing fairway turf doesn't have to be a drag.

BY KEITH HAPP

The practice of dragging fairways can be developed into a routine maintenance exercise that helps prepare the turf for play while also aiding pest control strategies.

process can be finished allows the operator to accomplish this task before regular daily play begins. Dew removal is performed before mowing, and the procedure is repeated in a site-specific manner where clipping dispersal is necessary. Using the drag has allowed course preparation and inspection to be improved without incurring significant added expense.

While several key employees have been trained to drag the fairways, the horticulturist on staff is the primary operator of the drag system during the week. On the weekends another crew member completes the task. Their duties include: dragging fairway turf from the tee to the green, inspecting each tee and green, and scouting for problems that are then communicated to John, his assistant superintendent, or the spray technician. The use of the drag has allowed more people on staff to be involved with fairway preparation. This has provided for better scouting of course conditions. At Rolling Hills

C.C., the practice of dragging the fairway turf has become a routine core component of fairway preparation.

While mowing is essential to provide acceptable playing conditions, it is only one piece of the preparation puzzle. Dragging the fairway turf removes dew from leaf blades, disperses clumps of grass clippings, aids in the management of many turf diseases, and provides an opportunity to scout the course prior to play. Scouting is a major component of IPM, and any level of increased turf inspection can lead to better control of pest problems. Dragging fairway turf can be an aid to presenting an agronomically strong and aesthetically pleasing product. Preparing fairway turf doesn't have to be a drag, so don't rule out the option to use one.

KEITH A. HAPP is an agronomist in the Mid-Atlantic Region, visiting courses in the states of Delaware, Maryland, Pennsylvania, Virginia, and West Virginia.

Sometimes More Is Less

A tip for increasing aerification effectiveness and reducing disruption.

BY DAVID A. OATIS

Eric Greytok, Winged Foot Golf Club (N.Y.), modified his aerifier to narrow the spacing pattern and increase the tine size. The result is aerified greens, modified soils, and less surface disruption.



The single biggest problem facing golf course superintendents today is the pressure to avoid disruption, both of the turfgrass surfaces and of the golf schedule. As a result, superintendents are finding it increasingly difficult to find the time necessary to carry out normal turfgrass maintenance tasks. Cultural activities such as verticutting, topdressing, fertilization, etc. frequently are delayed or missed entirely as a result of a heavy golf schedule. Aerification often suffers a similar fate. Aerification of putting greens generally means disrupting the putting surfaces for as few as a day or two, to as many as three or four weeks or more. Not surprisingly, tremendous pressure can be brought to bear on superintendents to aerify less and to choose the least disruptive equipment (such as smaller or perhaps solid tines).

If everyone dislikes aerification so much, one has to wonder why in the world putting greens still get aerified. The answer is simple: Despite the many advances in the science of turfgrass management, good old-fashioned hollow-core aerification remains one of the most important tools available to superintendents today. A properly timed and conducted aerification program can help superintendents address a number of different problems, but the trick is getting it done with minimal disruption to the course and perhaps even your career.

There are many different aerifiers on the market today, and there are just as many options for equipping them. We have conventional aerifiers, deep-tine aerifiers, drilling and filling machines, and high-pressure air and water injection, for example. The conventional

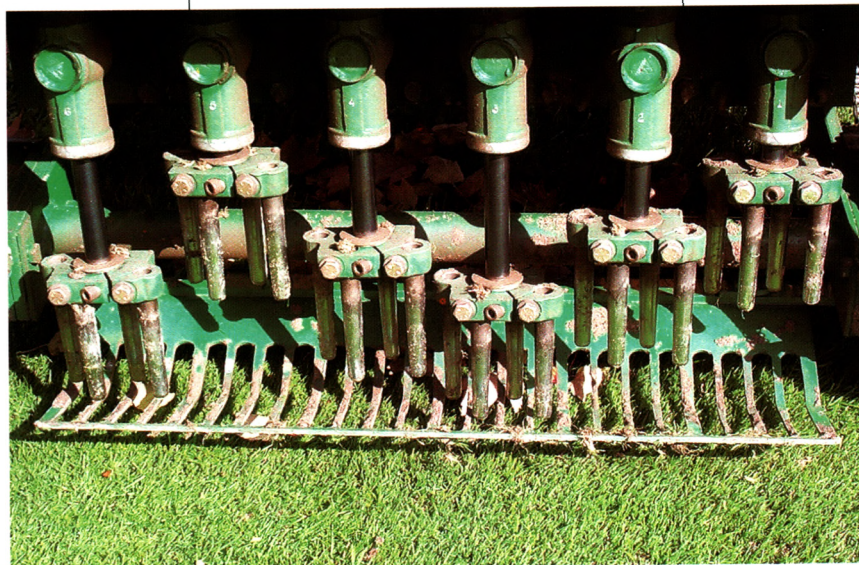
high-impact vertical piston type can be outfitted with solid or hollow coring tines ranging in diameter from $\frac{1}{4}$ " to $1\frac{1}{8}$ " or more. With all of these options, the key to success is to identify your soil problem and design a program to address it.

When it comes to modifying soils, the number and size of the aerification holes are critical. More and larger holes cover more surface area, and larger holes are much easier to fill with topdressing material. So, the choice should be an easy one, right? Courses with a particular need to modify soils or reduce thatch need larger holes (so they can be filled) and more holes per square foot to impact as much surface area as possible. Unfortunately, it isn't always easy. Larger holes increase both surface disruption and golfer dissatisfaction.

If your putting green soils require modification, this turf tip is for you. It comes from Eric Greytok, golf course superintendent at Winged Foot Golf Club in Mamaroneck, N.Y. It is unique in that Eric has discovered a method of aerifying greens and effectively modifying their soils, and this is accomplished with less surface disruption. That may sound like a tall order, but if you listen to this turf tip, I think you'll agree.

Eric's tip is very simple. Use a narrower spacing pattern and a larger tine. Eric uses Ryan Greensaire aerifiers, but this could probably be accomplished with many of the other available models. Eric had the quadra-tine holder attachment, but modified it to accept a larger tine. In addition to drilling out the tine holders, the slots in the turf hold-down kit had to be widened. Instead of the traditional 2½" spacing, the quadra-tine holder has 1¼" spacing, and with a larger hollow tine, it

now has the capability of affecting an impressive amount of surface area. Most surprisingly, the surface disruption is actually reduced and the end result is impressive.



The quadra-tine holder was modified to accept a larger ½" hollow aerification tine. It now has the capability to impact a larger amount of surface area.

Switching from a ¼" tine to a ½" tine quadruples the amount of surface affected, and changing the spacing from 2½" to 1¼" also quadruples the number of holes per square foot. All told, using a ½" tine on a spacing of 1¼" affects an impressive 13.64% of the surface area! Compared to the old traditional

approach of using ⅝" hollow tines on 2½" spacing, which affects only 5.33%, this new approach affects 2½ times more surface area and leaves the surface much smoother. Thus, more but smaller holes can result in significantly more surface area being affected with less overall disruption. Hence, *sometimes more is less!*

The downside? With all those holes, plan on using more topdressing material, and you may need to hand-broom it in for optimum effectiveness. For more information about aerification hole spacing, tine size, and the percentage of surface area affected, read Pat O'Brien and Chris Hartwiger's article,

"Aerification by the Numbers," which appeared in the July/August 2001 issue of the *Green Section Record*.

DAVID OATIS joined the USGA Green Section in 1988 and has been director of the Northeast Region since March of 1990.

Tine Size and Surface Area Chart

Tine Size (in.)	Spacing (in.)	No. Holes per ft. sq.	Surface Area of One Tine	Percent Surface Area Affected
¼	1.25 x 1.25	100	0.049	3.41%
¼	2.5 x 2.5	25	0.049	0.85%
½	1.25 x 1.25	100	0.196	13.64%
½	2.5 x 2.5	25	0.196	3.41%
⅝	2.5 x 2.5	25	3.07	5.33%

Accommodating Golfers with Disabilities

Opportunities are available within golf for individuals with disabilities.

BY MARK FRACE

Tom Watson, a five-time British Open champion, who has seen the most challenging of links conditions, said, "We're not on a fair course," when referring to Carnoustie during the 1999 British Open. Thirty percent of the field failed to break 80 in the first two rounds. How hard is Carnoustie? I've been to "Carnasty," and while the best players in the world thought it was difficult, imagine playing it with one arm and lacking full mobility of one of your legs. The high rough, strong winds, and rain of Carnoustie's challenging links were the setting for my first experience in the Society of One-Armed Golfers' World Championship. My most successful finish in the championship was my eighth-place finish in 1997, but the most fulfilling was three years earlier at Carnoustie.

I began working with the USGA in 1998 as part of the second class of Fellows to participate in the USGA Fellowship in Leadership and Service Program. I have always had a passion for bringing the game of golf to all individuals with disabilities. Currently, I serve as the coordinator for the USGA Resource Center for Individuals with Disabilities with the USGA Foundation office in Colorado Springs.

Founded in 1965, the USGA Foundation serves as the philanthropic arm of the organization. In November 1997, the USGA Executive Committee announced its 10-year, \$50-million "For the Good of the Game" Grants Initiative.



Mark Frace, USGA Foundation

Grants go towards junior golf programs for economically disadvantaged youth, caddie, and occupational programs, affordable and accessible facility development, and golf programs for individuals with disabilities. Last year, the Foundation awarded 290 grants totaling more than \$6.1 million. Since 1997, more than \$27 million has been awarded in 50 states and the District of Columbia. Over the past four years, the Foundation has granted more than \$1.5 million toward golf programs for individuals with disabilities, and has participated and helped fund each of the six National Forums on Accessible Golf.

The USGA investment has not been limited to programming; we also have collaborated in the name of research. In 1997, with the GCSAA and PGA of America, a study funded at Rutgers University tested the impact of carts and wheelchairs used by people with mobility impairments on a number of different golf surfaces. The study concluded that modern equipment frequently used by people with mobility impairments did not do any unorthodox damage to any of the surfaces. This in-depth study is available through the USGA Green Section.

In 2000, the USGA took its biggest step, launching the USGA Resource Center for Individuals with Disabilities. The goal is to distribute information to any golfer with a disability who is interested in learning about and playing the game, as well as reaching those

in the golf community who may not know about the opportunities within the game. The Resource Center reaches out through a website (<http://golfcenterdisabilities.usga.org>), magazine articles, and speaking engagements. Overall, the website contains information on golf programs, equipment (e.g., single-rider golf carts and adaptive clubs), attending USGA Championships, articles, accessibility topics, and modified Rules of Golf. Future plans include a searchable database of golf courses that are accessible to golfers with disabilities. In the end, the USGA wants the Center to be the most comprehensive place to create awareness for golf within the community of individuals with disabilities.

One of the first Resource Center projects was the production of a booklet geared toward making all golf facilities more welcoming to individuals with disabilities. *From Bag Drop to 19th Hole*, developed by Gary Robb (Executive

cation topics. The sixth Forum created national educational strategies that will make the game more accessible to individuals with disabilities. For example, convincing the medical and rehabilitative communities to use golf more as a rehabilitative tool.

Another exciting development is the formation of a National Alliance for Accessible Golf. Leaders from the golf industry and representatives of organizations serving people with disabilities and golfers with disabilities formed the National Alliance for Accessible Golf in July 2001. The Alliance is facilitated by the National Center on Accessibility at Indiana University, the University of Utah, and Clemson University.

The purpose of the Alliance is to develop solutions for making the game of golf accessible to persons with disabilities, such as:

- Increase understanding of the benefits of golf among persons with disabilities.



Director, National Center on Accessibility), was published in 2000 through a USGA grant. This booklet contains information on the use of adaptive equipment on the course and making the course as accessible as possible. This has been distributed to 10,000 USGA member clubs and courses and all the National Golf Course Owners Association members. It is available free of charge from the USGA Foundation office.

Other exciting and new projects within the golf industry are striving to improve accessibility to the game. For example, six National Forums on Accessible Golf have been held since the early 1990s. The first Forum focused on clarifying the ADA and how it applies to golf. The second, third, and fourth focused on architectural and program access. The fifth focused on communi-

- Increase the golf industry's awareness of the benefits of serving persons with disabilities.
- Advance models and resources for persons with disabilities to learn the game of golf.
- Increase awareness of the needs of golfers with disabilities among golf course owners and operators, teaching professionals, and related personnel.
- Advance scientific understanding of the benefits of golf for persons with disabilities.
- Assist the golf industry in resolving issues related to expanding services to persons with disabilities.
- Assembling and reviewing technical information for golf course managers, rehabilitation and recreation professionals, and golf professionals that leads to improved inclusive services.

An important step for golf courses is to develop an accessible route for mobility equipment to access the golf course.

The USGA Resource Center strives to distribute information to any golfer with a disability who is interested in playing the game.



The National Alliance for Accessible Golf works to increase the golf industry's awareness of meeting the needs of persons with disabilities.



The Leadership Council for the Alliance identified four high-priority projects. These projects include the creation of a Tool Kit for golf course owners and operators, LPGA-PGA curriculum for instruction and training, continued expansion and enhancement of the USGA Resource Center website, and the development of a model program called Project GAIN that welcomes individuals with disabilities to the game and maximizes the opportunities for continued participation. A two-year grant from the USGA totaling \$156,000 was awarded to support Project GAIN.

Another very important initiative is the development of the Americans with Disabilities Act Accessibility Guidelines. The U.S. Access Board establishes the minimum guidelines, and in 2000 the Board distributed the draft of the final Rule. It is expected this will be reviewed in March 2002 and will become official. The Rule only applies to newly constructed golf courses and any alterations that might be made through renovation or remodeling.

Specific guidelines to golf courses are as follows:

- An accessible route connecting the bag drop areas, accessible teeing ground, weather shelters, and putting greens must be provided.
- Teeing ground: Where one or two are provided, at least one must be accessible. Where three or more are provided, at least two must be accessible.
- Driving ranges, practice tees, putting greens, weather shelters: Designed and constructed so that a golf cart can enter and maneuver easily. Weather shelters must be minimum 60 inches by 96 inches and designed so a golf cart can enter and exit. Putting greens must be designed and constructed so that a golf cart can enter and exit.

In the end, we must do all we can to capitalize on the unique nature of a game that provides the ultimate in integrated recreation for people. Ultimately, it is about the magic of watching people do something that was outside of their personal realm of possibility and the impact that it has on their lives and the lives of others.

MARK FRACE is coordinator for the USGA Resource Center for Individuals with Disabilities. The Resource Center can be reached at <http://golfcenterdisabilities.usga.org>.

What Does Your Future Hold?

This tool will help you make an educated guess.

BY JAMES FRANCIS MOORE

Superintendents have to do a lot of guessing. What is the weather going to be like tomorrow (or even this afternoon)? Who is going to show up for work today, and who is going to call in sick at the very last minute prior to that shotgun start? How many tournaments is the golf professional going to arrange before he/she decides to check the calendar for the aerification dates? And every year, many superintendents throughout the country have to make one of the most unsettling “guesses” of all — how well has my turf survived the winter?

What the superintendent needs is a crystal ball — a tool to peek into the future — at least when it comes to determining how well the turf will come out of winter. A new trend in southern putting green maintenance is accentuating the need for such a tool. A rapidly growing number of bermudagrass courses are choosing to abandon the winter overseeding of putting greens. This is particularly true at courses that have converted to the new ultradwarf bermudagrass varieties. Not only do these new grasses have a shorter dormancy period, but they also offer extraordinary putting quality throughout the winter months — even while dormant. On these courses, green color is achieved with a light application of indicator dye rather than the sowing of bentgrass, ryegrass, or *Poa trivialis*. It is less expensive, eliminates the loss of putting quality that occurs during overseeding establishment and transition, and eliminates spring competition between the bermudagrass and the overseeded grasses. The only real drawback

is that the superintendent spends all winter worrying whether or not the bermudagrass is going to “wake up” in the spring.

Back in 1994, a turf tip was offered that utilized a soda pop bottle to create a small biosphere. A cup cutter plug could be placed into the biosphere and the turf grown out to help in disease identification. Unfortunately, soda pop bottles have been redesigned in a manner that eliminates this useful alternative function. Necessity being the well-recognized mother of invention, an even better option is now offered. For less than \$3, a miniature greenhouse can be purchased from Wal-Mart. Three pieces make up the unit. There is a tray to hold water, a second tray into which the plugs are placed, and a clear plastic cover to create the greenhouse effect. Although designed for starting plants from seeds, the unit is perfect for growing out plugs removed with a standard soil probe.

There are 12 sections in the tray with six spaces for plugs in each section. Collect plugs from the green from the back left, back right, middle left, middle right, front left, and front right. These plugs can be similarly oriented in the tray to help keep track of where they were collected. By collecting and growing out plugs removed from dormant putting greens, the superintendent can better predict the health of the turf, and whether or not the remainder of the winter should be used to update the resume.

The miniature greenhouse creates a warm, humid environment that is perfect for promoting disease activity,



Constructing a mini-greenhouse provides a useful tool for golf course superintendents to assess how well the turf may come out of the winter, identifying diseases, and observing various biotypes present on an older green.

and so it can be helpful in disease identification. Also, by allowing the turf to grow longer, one can better observe the various biotypes of grasses present in older greens. And last, but not least, it can be used for the very function for which it was designed — seed germination. Closely examine a sample of seed removed from a bag. Look for different types of seeds and place them into the tray. After a few days, you might find there is more in the bag than you thought.

JIM MOORE is director of the USGA Green Section Construction Education Program.

Customized Posting

Postings for riding cart usage are customized for each hole.

BY BOB BRAME

When and where carts can be used are very often controversial issues at golf courses throughout the country. It is common for usage posting to be strategically located at the first and tenth tees. This approach addresses the entire course, or at least nine holes, as a package. If one or two holes are such that carts cannot be used, the most common default is for the posting to reflect the weak links, even though cart usage may not be a problem on a majority of the holes. Recognizing that stopping or restricting cart usage is often virtually the same as closing the course, customized postings address this shortfall by treating each hole individually and thereby enhancing management flexibility.

Make sure it has been clearly established who will make the final decision about cart usage. At most facilities this responsibility falls to the course superintendent. Who else can better determine damage potential? Input from other key individuals like the golf professional, manager, committee chairs, and an owner is important, but someone must weigh all the issues and make a decision. The value of the course is directly tied to ongoing maintenance. Since cart usage can, at times, compromise maintenance efforts, the logical choice is for the superintendent to administer cart usage and any needed posting.

The first step toward customized posting is the proper placement of a sign on each hole. In most cases, placement should be at the tee and situated so that the sign hangs perpendicularly to the cart path or the flow of traffic. When there are multiple tees, central



Cart usage for this hole is clearly posted and can be adjusted/changed quickly and easily to accommodate conditions.

placement normally works best. Extended tee complexes may require more than one sign per hole. Each sign should be printed on both sides so that it can be read when approaching or when looking back. It should not be possible to miss a sign when playing from any one of the tee surfaces.

Cart usage options will need to be decided upon and 18 signs, printed on both sides, made up for each alternative. There should be no hole numbering on any of the signs so that they can be mixed and matched throughout the course. The most common package of usage options is:

- Carts scatter,
- Carts on paths only or carts in deep rough only, and
- One cart crossover per hole.

The combination of options may vary, depending upon a course's specific

needs or limitations. Once the usage option package is determined, maintain continuity so that players will become familiar with the policy.

During course setup each morning, the grounds staff, with approval from the superintendent, should review conditions and then display the appropriate posting for each hole. At times, all holes may be posted the same. However, there may be other times when a mix of all posting options exists — implemented appropriately throughout the course. The proper customized postings will guard turf quality, while allowing maximum flexibility for cart usage and potentially speeding play.

Customized posting is not overly confusing to players, but communicating to players the necessity of checking cart usage signs at each hole is vital. In reality, it is a simple concept and golfers will better accept the need to stay on paths or in the deep rough on certain holes if they know that random scattering may be allowed on others. Posting on each hole also will avoid the tendency of players to forget the policy, a limitation or excuse that is common when there are only one or two postings for the entire course.

While riding carts have become an integral part of American golf, their usage must be monitored and controlled if turf quality and course playability are to be maintained at a high level. Cart usage flexibility, pace of play, and income must also be considered, and customized posting covers all of the above.

Author's Note: Mike O'Connell, CGCS, superintendent at the Maketewah Country Club in Cincinnati, Ohio, is the source of this turf tip on customized posting.

BOB BRAME is director of the North Central Region. Bob focuses his course visiting in Indiana, Kentucky, and Ohio. While walking is Bob's preferred approach to playing golf, riding carts are a reality that is here to stay.



Pairs of painted dots eliminate confusion over mowing responsibilities for the mowing of transition areas between fairways and approaches.

Mowing fine turf areas is one of the most basic elements of turfgrass maintenance. Proper mowing provides a neat appearance and is crucial to the uniformity of individual playing areas. If this task is not performed properly, it can create a less than desirable set of circumstances for the golfer.

At Cattail Creek Country Club, golf course superintendent Stephen Lutz experienced problems with the mowing of the transition area between the fairways and approaches. Sometimes, the individual who mowed approaches would not mow out far enough to meet the cut of the fairway mower, and vice versa. This resulted in turfgrass not being mowed in the transition between the fairways and approaches. Wear areas and compaction were also a problem. The larger fairway mowers would often turn in the same area of the approaches at every mowing, causing deterioration in turfgrass quality. The consistency between the fairways and approaches needed improvement. The ultimate goal

Connect the Dots

A simple technique helps correct a consistency problem.

BY DARIN S. BEVARD

was to provide the best quality of turf in these important in-play areas.

To address this problem, Steve instituted a *connect-the-dots* system between the fairways and approaches. A set of white, yellow, and red dots were painted on each side of the approaches at various distances from the front of each green to delineate daily mowing patterns. The dots are small enough that they are barely noticeable by golfers.

The mowing of approaches dictates which set of dots will be used on a particular day, and a regular rotation is used. At every mowing, a different colored dot is used as the starting point for the approach mowers. For example, if yellow is the color for the day, the approach mowers cut from the yellow dots up to the green. The fairway mowers then mow up to the line between the yellow dots established by the approach mower. The next time the approaches are mowed, red may be the chosen color. The cut of the mowers then meets at the red dots.

This method eliminates the confusion regarding where the approach mowers stop and the fairway mowers begin. It also effectively distributes wear from the larger fairway mowers over a broader area, which reduces the negative impact on turfgrass quality. The connect-the-dots system also provides a definitive

transition line between fairway and approach spray applications.

The dots should be painted in a different order on consecutive approaches based upon the actual area of the approaches to be mowed. The goal is to mow about the same area on any given day.

This system of small painted dots of varying colors to address mowing patterns is very simple, but effective. The results provided at Cattail Creek speak for themselves.

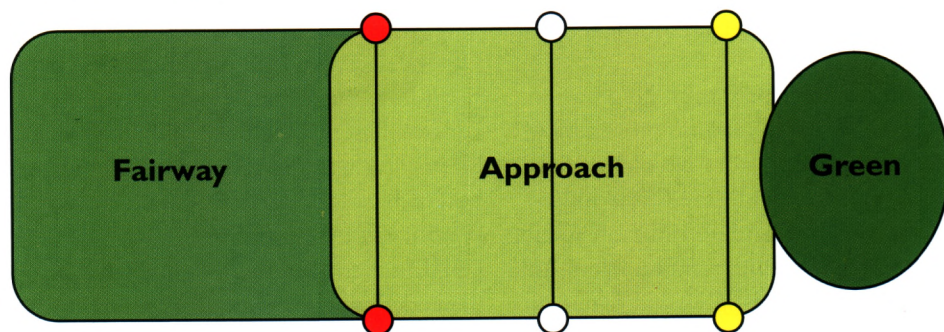
DARIN BEVARD is an agronomist in the Mid-Atlantic Region. He visits golf courses in Pennsylvania, Maryland, Delaware, and Virginia.

- The order of colors starts with the color closest to the green.

- The underlined color indicates the limits of spray for both fairways and approaches.

#1. White, Yellow, Red
#2. Yellow, Red, White
#5. Red, White, Yellow
#7. White, Yellow, Red
#9. Yellow, Red, White

- The colors only change with the mowing of the approaches.





Bubble Bath

Keeping golf course ponds clean using oxygen circulation and barley straw.

BY CHRIS HARTWIGER

Oxygen is released from the bubbler plates on the pond bottom. Unlike fountains, there is no distracting stream of water at the surface.

Ponds play an integral role in the strategy, ecology, and beauty of many golf courses. When maintained properly, a pond complements the surrounding landscape and makes a positive impression on those playing the course. Unfortunately, many ponds are unsightly and are cluttered with unwanted aquatic vegetation, particularly algae.

Bill Anderson, CGCS, golf course superintendent at Carmel Country Club (Charlotte, N.C.), faced an on-going battle to keep algae populations under control in the ponds at Carmel C.C. All too often the ponds were overwhelmed with algae and became an eyesore. Aquatic herbicides were the typical remedy to bring the algae under control.

Bill thought there must be a way to manage algae populations preventatively instead of using a curative control with an aquatic herbicide. He found his answer in a GCSAA seminar on aquatic weed management: pond bubblers and barley straw.

POND BUBBLERS

Aquatic weed managers have known for years that increasing the oxygen content in lakes can help reduce nutrient levels, limit thermal stratification, and decrease algae growth. Bill decided to try a submerged oxygen pumping system to increase pond oxygen levels. He used a commercial system that used an onshore compressor to pump oxygen through plastic tubing to feed bubbler units mounted on the pond bottom. Depending on the size of his ponds, Bill used models with either two or three bubbler units. Each unit is capable of circulating a water column of up to 4,000 gallons per minute. The size of the onshore compressors varied based on the number of bubbler units in the pond. Because the compressor is located onshore, there is no electricity in the water. There is no distracting fountain spraying water in the pond. The bubbles disperse at the surface and are hardly noticeable by golfers.

Once the number of bubbler units needed was determined, the next task

was deciding where to hide the onshore compressor. Bill had three ponds to treat and disguised the compressors in three different ways. One of the compressors was placed in a small underground vault away from areas of play. Another compressor was hidden above ground within the canopy of a large tea olive tree. The final compressor was placed in an above-ground vault located away from play.

BARLEY STRAW

The use of barley straw to control algae and clarify ponds was developed in the 1990s in England (Lembi, 2001). Researchers in the United States have tested barley straw with mixed results. The exact mode of action is unknown, but researchers have speculated that algae growth may be inhibited by a chemical exuded from the decomposing barley straw or by a metabolic product produced by fungi that decompose the barley straw. The consensus is that the control mechanism is believed to be algistatic (prevents new algae growth)

rather than algicidal (controls existing algae) (Lembi, 2001).

Bill Anderson purchased commercially available barley straw for use in the ponds at Carmel C.C. Guidelines obtained in the aquatic weed management seminar suggested packing the barley straw into long cylindrical netting so that water and air can circulate through the straw. A commonly recommended dosage is 225 pounds of barley straw per acre of water in shallow (four to five feet) ponds. Bill weighted the net tubes of barley straw and placed them in the pond. The barley straw is replaced approximately every six months.

RESULTS

The results at Carmel Country Club have been dramatic. Algae populations are under control and future blooms are being prevented by the bubbler system and barley straw. Chemical applications have been reduced. In 2001, aquatic



The long tube of barley straw is weighted and submerged in the pond.



The barley straw should be packed in long cylindrical tubes to allow the circulation of oxygen and water to speed the decomposition process.

herbicide applications were reduced by 72 percent and labor was reduced by 77 percent. Eventually, the cost of installing these systems will be offset by the savings associated with reduced chemical and labor costs.

The ponds at Carmel Country Club are now features that enhance the golf course. Best of all, the use of oxygen circulation and barley straw continues to work around the clock to keep the ponds in great condition. This innovative solution keeps staff involvement to a minimum, is cost effective, and is friendly to the environment.

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CHRIS HARTWIGER *lives and bathes in Birmingham, Alabama, as a Southeast Region agronomist for the USGA Green Section.*

A Sign that Golf is Good for the Environment

Using interpretive signs on the golf course.

BY PATRICK J. GROSS

Stop. Caution. Exit. We encounter many different kinds of signs on the highway and in our communities every day. How about a sign that says, "Golf is Good for the Environment"? Why not?

Superintendents have made great strides in the past ten years with projects to protect and enhance wildlife habitat on golf courses. While the results have been fantastic, golfers may not be aware of the effort being made. Most are so focused on hitting their next shot that they don't always look up and enjoy the scenery. But don't let that stop you from getting your message across. You simply have to look for opportunities during a round of golf to expose golfers to the environmental projects and wildlife habitat at your course. An excellent way to do this is by placing interpretive signs in key locations on the golf course. Three courses in California provide excellent examples of what can be done.

CRYSTAL SPRINGS GOLF COURSE

Located in Burlingame, California, Crystal Springs Golf Course occupies a very important stretch of land that forms part of the buffer zone along Crystal Springs Reservoir. This is one of the few undeveloped portions of the San Francisco peninsula, and there is an abundance of wildlife. Ray Davies, CGCS, worked with environmental specialist Jim Mocci to identify and implement habitat enhancement projects, including nest boxes, brush piles for rodents, and erecting raptor perches for hawks that inhabit the area; then they placed signs on the course to

let golfers know about the projects. The signs were professionally made at a local sign shop, using weatherproof materials for about \$500 each. Most of the interpretive signs are near tees, allowing golfers to read about Crystal Springs' habitat enhancement efforts while waiting to tee off.

PASATIEMPO GOLF CLUB

Pasatiempo Golf Club is a member of the Audubon Cooperative Sanctuary Program for Golf Courses, and one of their outreach activities was to install Audubon bulletin boards on the course. Information is posted about birds that inhabit the golf course as well as other seasonal wildlife activity. Members of Pasatiempo's Audubon Resource Committee donated the materials and built the attractive cabinets that were installed next to No. 5 tee and No. 13 tee. Superintendent Dean Gump and landscape supervisor Francine Moody work together throughout the year to develop laminated information signs that are posted in the cabinets and rotated each season. The signs are well received by visitors and regular golfers alike.

PGA OF SOUTHERN CALIFORNIA GOLF CLUB AT OAK VALLEY

The PGA of Southern California built two new courses west of Palm Springs that were opened in 2000. During construction, sections of the course were set aside as habitat for the California gnatcatcher, an endangered species. Paul Mayes, CGCS, and his staff implemented many other projects during and after construction of the course, including preserving wildlife corridors, installing

Pointing out areas of the course with unique wildlife activity adds interest and enjoyment to the game for golfers of all ages.



nest boxes, and protecting native vegetation in out-of-play areas. During construction, interpretive signs inform guests of the unique environmental conditions and wildlife activity on the site. The signs are placed near tees in sections of the course where the wildlife activity is most prominent. The engraved rock signs match the style of the tee monuments and other accessories on the golf course. The signs are a nice way to get golfers to take a brief break from the game to enjoy and appreciate their surroundings.

Each of these courses has benefited in many ways by installing interpretive signs:

- The signs provide an excellent educational opportunity for golfers and the maintenance staff.
- They increase awareness of wildlife on the golf course.
- Golfers get a sense of satisfaction when they can identify a bird, tree, or flower, and it adds to a greater appreciation of the course.
- The signs demonstrate a commitment to environmental quality and habitat preservation.

Installing interpretive signs is one of many ways to let golfers know about your efforts to enhance wildlife habitat and spread the message that golf is good for the environment.

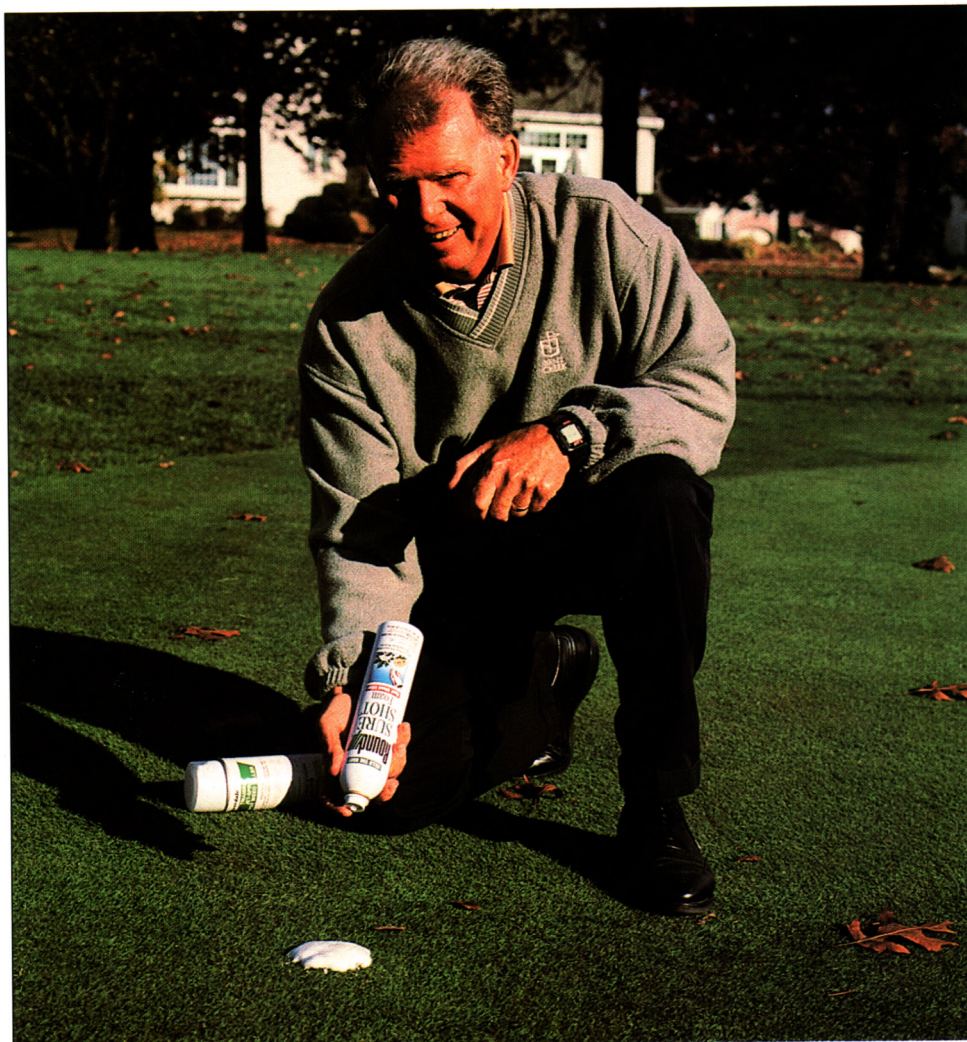
PAT GROSS is director of the Green Section's Southwest Region.

A Can-Do Attitude for Weed Control

Constant attention to detail pays off in the long run.

BY STANLEY J. ZONTEK

Jim Loke, CGCS, Bent Creek Country Club (Pa.), spot-treats errant weeds while making his daily tour of the golf course.



How many times have you heard the term *attention to detail*? How many times has your golf course, in otherwise good condition, been criticized for a lack of *attention to detail* by someone because of a few weeds scattered about the golf course? It's hard to imagine that distractions like a few weeds are a sign that your *attention to detail* is not the best. How frustrating!

Small points of golf course conditioning can be difficult to address, especially with labor being so tight. The current economy and concerns about budgets only make the situation more difficult. For many superintendents, it is all they can do to keep the grass cut, watered, sprayed, and fertilized. Sometimes extra labor just is not available for small yet visible jobs, like controlling a few weeds. These weeds may detract

from how your course looks but not necessarily from how it plays.

This turf tip is an attempt to show how one golf course superintendent improves his attention to detail by controlling small yet obvious weeds that are visible on the golf course. You know the weeds. They seem to be the ones that defy control, the weeds adjacent to a tree, in a flowerbed, in the cracks of a cart path, or along a fence. Jim Loke, CGCS at the Bent Creek Country Club, Lititz, Pa., offers this turf tip.

Bent Creek Country Club is a relatively new golf course and is very well presented each day for the players. In touring Jim's golf course, everything seems to be in its place. Even those pesky weeds just are not there. How does he do it?

During his daily tour of the course, Jim carries aerosol cans filled with

herbicides, one being Roundup and the other a combination of 2,4-D, MCPP, and Dicamba.

Here is the point. When Jim sees a weed, he stops and sprays it. In some cases, he does not even need to leave the vehicle. He sees the problem weeds, grabs the appropriate can, and sprays the weed. It's just that simple. Obviously, if you have an acre of weeds, fill up a sprayer and treat the area. But if you only have a few nuisance weeds, this is a quick and cost-effective way to tidy up the course. If these canned products are not available, a small pump-up 3-gallon sprayer will do the job. Give it a try, and encourage your assistants and other crew members to do the same.

STANLEY ZONTEK is director of the Green Section's Mid-Atlantic Region.



Growing In Seashore Paspalum with Multiple Challenges

A systems approach to maintaining
this useful turfgrass.

BY RONNY R. DUNCAN and R. N. CARROW

Editor's Note: This article provides a summary of the presentation made by Tim Hiers, CGCS, Superintendent at Old Collier Golf Club, Naples, Florida.

All golf course grow-ins have a myriad of normal challenges, but sometimes Mother Nature deals a series of additional conditions that bring out the best in people. Such was the case at the Old Collier Golf Club (TOCGC) in Naples, Florida. Beginning with the initial decision in late 1999 to grass the golf course with seashore paspalum, numerous challenges emerged:

- The need to utilize irrigation water from the Cocahatchee River. This water resource ranges from 300 ppm salt during the summer rainy period, to Gulf of Mexico salinity (34,500 ppm salt) during the dry winter period.
- A record drought during the winter grow-in period (October-December 2000 + January/February/April/May 2001 = seven-month period with less than two inches of rain).
- Phase two watering restrictions from all surface water resources imposed by the South Florida water management authority.
- Record cold temperatures (number of days setting new record lows) during the winter of 2000/2001.
- Reduced light quality and quantity from short winter days and declining sun angle, which affects all turfgrasses.

- Restricted use of pesticides to meet labeled restrictions and to meet the guidelines required by Audubon International in its Signature Gold Program, since only a few fungicides, insecticides, and herbicides are specifically designated for paspalum or warm-season grass use.

- Grassing wasn't complete until early October; ideally, grassing should be finished by July or early August when anticipating a January opening date.

- The grassing source (the only viable source available at that time) was contaminated with significant amounts of bermudagrass. *In all fairness to the supplier, this course would not have been grassed without this source of sprigs and sod.*

Turf management under these conditions requires special qualities — resourcefulness and correct decisions. This Audubon International Gold Signature Cooperative Sanctuary golf course also incorporated environmental stewardship and water conservation strategies even with these challenging conditions.

THE KEY PLAYERS

Tim Hiers, golf course manager at TOCGC, surrounded himself with an excellent, dedicated staff. Todd Draffen (assistant superintendent), Mike Cella (first assistant superintendent), Mike Koopman (equipment manager), Joel Howard (natural resource manager), plus Ricardo Uriarte (foreman) and Dean Watkins (CGCS who came to offer his services between international jobs and to gain experience with seashore paspalum) were instrumental in meeting and overcoming the challenges. Special thanks to Steve Swanhart from Hawaii, whose extensive paspalum experience was invaluable to the operation. The staff members were allowed to perform their jobs and did so with dedication and extraordinary attention to detail. The successful result was opening for play at the end of September 2001.

THE SALT CHALLENGE

What obstacles stood in the way of the successful venture? Perhaps the greatest challenge was high total salt level, which induced nutrient imbalances (resulting in loss of nutrients as salts were leached), decreased water uptake and plant growth, suppressed cytokinin-enhanced shoot/root activity (slowing root development and recovery), and suppressed cytokinin-gibberellin-enhanced stolon and shoot growth (plant growth regulator effect). To overcome these challenges:

- Monthly adjustments were made in the fertility program based on water, soil, and tissue testing (including wet lab analysis). Targets included tissue N:K ratios of 1:2.5–3.0, extra magnesium to foster chlorophyll development, and consistent application of manganese to maintain enzyme activity for maximum growth.

- Fertigation with soluble nitrate sources, application of wetting agents, and foliarly applied (prescription fertilization) micronutrients were used to enhance turf performance under highly saline conditions.

- Regularly scheduled aeration was not practical because of the bermudagrass contamination issue and fear of spreading this cultivar. Only one deep-tine aeration was performed during the grow-in. Under normal circumstances, deep aeration (11–12 inches or 275–300 mm) is needed to help displace excess Na and to promote leaching of Na and excess salts.

- Careful irrigation water conservation strategies were essential to simultaneously manage the salts and supply water to the growing turfgrass, while complying with the phase II water restrictions imposed on Southwest Florida.

- Occasional verticutting (but less than desired because of bermudagrass contamination)/light grooming/heavy to light topdressing to firm up and smooth out the putting surfaces, primarily when salt levels were low, in order to achieve recovery and tighten up the turf canopy. Two primary factors had to be considered when making the decision to verticut: bermudagrass contamination that could be spread by verticutting and salt load in the irrigation water that could accumulate at cut surfaces of the turf plant and cause desiccation/salinity injury to the exposed cells.

- Occasional use of cytokinins and gibberillic acids to escalate root and shoot/stolon growth, respectively, when the turf growth was suppressed by salt (generally >5,000 ppm salt-laden irrigation water). *Note: Gibberillin applications should be applied infrequently and with caution. Use only when shoot growth has shut down during the grow-in mode. Hormonal adjustments need to be done delicately to maintain the proper balance in the plant, and small trial areas should be established before application to large areas.*

- Spot treatment and micromanagement of highly salt-challenged small areas on the golf course. Managing high salt loads is much easier with a sandy soil profile that facilitates salt

(Opposite page)
The greatest challenge at Old Collier Golf Club was establishing and maintaining a grass that could tolerate high salt levels.

In areas of high salinity such as Old Collier Golf Club (Florida), management has to be oriented to an entire system approach to achieve the desired end product.

management, mainly because you can move salts down below the root system more effectively with high percolation rates and good drainage. Fines migrate to low spots, especially around drains and areas with sequestered salts. These areas required additional aerification to keep the salts moving and to prevent growth slowdown.

OTHER CHALLENGES

- High salt flux areas, such as berms, mounds, west- and south-exposed slopes (in the Northern Hemisphere), where moisture management is challenged by high salts rising back up through the soil profile by capillary action, are often predisposed to pathogens, such as *Helminthosporium (Bipolaris)*, and require topical/systemic fungicide and potassium applications for effective and environmentally safe control. The manager must know exactly where the salts are being deposited, and moisture management in these “hot” zones must be adjusted frequently. On the positive side, salt load in the irrigation water can be used as a growth regulator during the rapid summer turf growth season and for both pre- and post-emergence weed control.

- These high salt flux areas are also sensitive to upward movement of overwintering insects, such as white grubs. When salts move up through the profile, the insects are brought to the surface, where birds, raccoons, opossums, armadillos, and other animals rip up the turf to feed on them, and insecticide applications are required in the middle of winter when grubs normally are not a problem. Generally, some winter irrigation should be practiced to maintain net downward movement of salts, especially during dry winters when evapotranspiration may be high. Ironically, pumping high-salinity water and following water conservation principles may be a positive IPM strategy to force grubs to the surface during selected seasons to minimize potential future insect feeding injury.

- Several days that exceeded record low temperatures (with the lowest temperature at 28°F or -2°C) challenged the heat load in the turfgrass-soil interface and slowed down growth. Milorganite® was applied on specific areas to absorb heat during the sunny winter days because of its dark color. Turf areas were also dyed dark green to absorb heat, and greens were topdressed with green sand. Ten new record lows were set during the grow-in period.

- Silt and other fines, as well as salt-adapted aquatic species that came through a 200-micron self-flushing sand filter at the intake from the river, impaired the irrigation system’s ability to perform efficiently. This required constant monitoring and manual cleaning of the intake twice yearly, especially during the winter dry season when the Gulf of Mexico backs up to the intake. Barnacles were a concern at the river intake pipe, and they threatened the irrigation system itself. Although barnacles have not yet penetrated the filter at the intake point, this mollusk requires constant monitoring, and the intake must be cleaned periodically to insure maximum intake volume. The silt problem originates from upstream construction and movement down a 40-mile linear watershed, which contributes to the fines being continually dispersed on the course.

- Grassing was completed early in October 2000 at a time when the high-salinity water from the river had to be used, slowing growth and prolonging the grow-in phase. The September/October planting of the last greens necessitated the use of grow-lights (seven 1,500-watt meta-fluoride lamps per green) run by generators at night to facilitate the grow-in. Some of the greens were protected with a porous polymer cover that allowed water and air to penetrate but also retained heat and helped facilitate grow-in during the winter months.

- Nighttime application of 34,000 ppm salty water dictated that mowing the next morning had to be done very carefully, since salt residue covered leaf surfaces. Freshly mowed grass would then accumulate salt particles on the newly cut tips, causing desiccation or leaf tip burn.

- The prolonged drought increased the salt problems beyond the performance capabilities of the irrigation heads and pump stations. Research and development from the irrigation companies helped to develop new components that would withstand extremely high salty irrigation water. All pilot valves and solenoids were replaced on the golf course. For example, during March and April 2001, ET averaged 0.28 to 0.34 inch daily, while only 0.50 inch irrigation could be applied weekly due to water restrictions. Irrigation efficiency was critical to the success of the overall management program using high-salinity water.

An additional challenge occurred when small sections of soil on a few fairways would not support adequate turf growth. One initial hypothesis



was high salt content in the soil; however, low electrical conductivity readings suggested that salt was not likely the limiting factor on these areas. Extra slow-release and soluble fertilizers were micro-applied, but the grass did not respond. Finally, a more complete soil chemical analysis was run, and the results indicated that these problem soil areas were composed of sands that would not hold water, and what little moisture that was held on the surface was not available to the turf root system. Nutrients were not available for uptake by the roots and, subsequently, the turf root system could not establish properly. The areas were eventually excavated down eight inches and the problem sands were removed. A sand:peat mix not exceeding an 85:15 ratio (exceeding that ratio can lead to buildup of excess salts over time) was used. Zeolite was added to improve CEC. Extra P and K were added to enhance the root system. Gypsum was applied and the areas were resodded.

THE CULTIVARS

“Salam” seashore paspalum from Southern Turf was grassed on the fairways and roughs, while “SeaIsle 2000,” an experimental cultivar from the University of Georgia, was planted on the greens and tees. Certified SeaIsle 1, a fairway-type cultivar from the University of Georgia, was sodded on some excessively salt-challenged and high-evapotranspiration areas on the fairways. An additional challenge was bermudagrass contamination in the Salam planting material, which is difficult to eliminate with herbicides. Most of the herbicides that remove bermudagrass also damage the paspalum, and this challenge will take time (possibly as long as 24 months) to resolve by managing the environment to the benefit of the

paspalum over the bermuda. This involves using less nitrogen, applying more salt water at appropriate times, and maintaining aggressive growth behavior in the paspalum so that it eventually shades out the bermudagrass (salt will slow down the bermudagrass more than the paspalum).

A critical consideration for anyone grassing a golf course with seashore paspalum is to make absolutely sure that the planting stock is bermudagrass free; university-backed, certified paspalums must meet that criterion. Growers meeting that criterion can be found at www.seaisle1.com and through the state turfgrass certification agencies. Ask for

blue-tag, certified sprigs or sod.

GREENS DENSITY

The next challenge was getting a smooth and firm putting surface on the SeaIsle 2000 greens. Regularly scheduled topdressing and rolling accomplished that feat. The effort was enhanced by occasional verticutting and core aeration when salinity levels were low. A change from the Toro 1000 to the Flex 21 mower minimized scalping in concert with weaning the greens off nitrogen almost to the point that dollar spot (*Sclerotinia homeocarpa*) started to show up. Once the greens were lean on the nitrogen side, growth slowed down and more uniform, smoother cuts were achieved. Acceptable green speeds were realized and ball roll trueness improved significantly. By late January 2002, the greens were being mowed at 0.113 using a walk-behind mower with a Wiehle roller. All greens were very consistent, firm, and fast, but receptive to good shots (ball actually biting and holding when struck properly). The greens were still young, but the management program will improve them as they age.

PEST ISSUES

All turfgrasses are challenged by insects and diseases, and seashore paspalum is no exception. All pesticide and fertilizer applications were applied with environmental stewardship and IPM procedures in mind. Challenges came from billbugs, armyworms, webworms, leaf blights, and patch diseases, mostly sporadic events that occur seasonally throughout the year.

WATER ISSUES

Having a consistent level of saline water is better than having a saline water source that constantly

changes. Water from the Coghatchee River changes frequently in salinity levels both seasonally and with rainfall frequency. The salinity range has varied from 300 ppm salt during the rainy summer season to 34,500 ppm (Gulf of Mexico water) during the dry winter season, especially during the December through June time frame. With wide-ranging salt levels, management has to change accordingly to prevent salt accumulation near the root system. Irrigation scheduling, irrigation efficiency, and fertility program adjustments must be instituted to manage the grass effectively during a time when golf play is the highest.

salinity strata (in the lower Hawthorne aquifer) to supply water with a consistent salt level during the winter dry season. A second, separate pump system was constructed as a backup control system and to provide flexibility in implementing the water conservation standards for the course. The long-term goal is to operate pumps during off-peak times when demand is reduced and electricity costs are the most economical. Each pump system is capable of irrigating the entire course in 4.5-5 hours, which ensures effective salt and water management. This dual system also allows the use of high-salinity water for pre- and



Native plant species existing in the area around the lakes were selected for their salt tolerance.

Remember, salt management in the soil takes priority over turfgrass management. Having a sandy profile with high percolation rates is critical for proper salt management. Irrigation heads had to be monitored constantly to ensure that each sprinkler was operating properly. Additional heads were added after construction (bringing the total to 2,700 heads on 77 acres of irrigated turf area) to improve application uniformity.

Due to the wide variation in salinity levels from the river source, a permit was granted to drill a well into the non-potable 5,200 ppm

post-emergence weed control and the associated plant growth regulation from salt at selected times, followed by use of lower-salinity water for leaching and salt control.

Periodic granular gypsum applications and other calcium (Ca) supplements have been helpful in minimizing the buildup of excess sodium (Na). Calcium is instrumental in displacing Na, which can then bind with sulfates from the gypsum and be leached down below the turf root system.

What about salt accumulation? The golf course naturally recycles subsurface water back to the

Cocahatchee River by gravity flow, essentially at the same or lower level of salinity than initially came out of the river. Therefore, the course is neither concentrating the salts, nor is it building up salts that could lead to sterile growing conditions. They are simply applying the water to the natural grass filter on the golf course and recycling the unused water through subsurface gravity flow back to the river. Seven test wells are located on the course and salinity levels are monitored monthly, with reports going back to the Florida water management authority.

An example of the tough decisions that were made on the course included one on February 25, 2000, when the use of river water at 30,000+ ppm salt was stopped because of the high salt load, followed by the switch to limited use of the pond water twice weekly. This decision was made because of the severe drought from October 1999 through February 2000, the forecast for a very dry March through May 2000, the cold winter temperatures, and the fear of a buildup of salts in the soil profile/turf rootzone. This would have accompanying growth regulator effects, which could potentially delay grow-in even further.

With the challenge of heavy winter golf play occurring at the same time that river salinity levels were at their highest, the course began using the Hawthorne water source. The pump system for this source came on line in December 2001 and will be used primarily during the winter period when the river water exceeds 10,000 ppm salt. As a result, they will be recycling water back to the river with salinity levels that are lower than normally would be coming out of the golf course during the winter. The golf course can, thereby, meet the water restrictions imposed by the water authority, utilize water conservation strategies, and at the same time use water normally not acceptable for human, landscape, or agricultural consumption. Management programs will be adjusted seasonally to maximize turf performance with these water sources.

Regular soil testing, water monitoring, and tissue analyses are conducted on a monthly basis. "Wet lab" chemistry analysis of the tissue samples has been used in place of NIR (near infrared reflectance) to build a data bank on nutrient uptake of paspalum and develop sufficiency levels with high-salinity irrigation water. The wet lab analyses provide additional data on some nutrients that the NIR analysis does not.

TIM HIER'S COMMENTS ON THE GRASS

- Seashore paspalum is not a panacea, but in the hands of the right managers, it can provide an excellent to superior playing surface. The ball sets up on the canopy exceedingly well.
- The grass cannot be grown-in with high salt levels in the water (not more than 10,000 ppm). Salt loads in the 5,000–10,000 ppm range will be a challenge because of their growth regulator effect, but *mature turf* is very tolerant if the entire system is managed properly.
- Grow-in time is similar to bermudagrass under identical conditions (i.e., use of alternative water resources, soil profiles, and climatic changes for both grasses).
- If the grass is managed like bermudagrass, you will develop excess thatch with high nitrogen applications. Paspalum can potentially use 30–50% less N than bermudagrasses under the same challenges once the grass reaches maturity and the rhizosphere organic matter load stabilizes.
- The grass has a propensity for Ca, P, K, Mg, and Mn, and continuous spoon-feeding is important for good turf performance.
- Recuperative ability is similar to bermudagrass, but the recovery comes from rhizomes and not stolons.
- Insect resistance is potentially similar to bermudagrass, except mole crickets do not seem to prefer the thick density of the canopy.
- Seashore paspalum can and has produced championship playing conditions.

SUMMARY

Seashore paspalum is the first major warm-season turfgrass to become available to turf managers in 30 years, and this species can tolerate much poorer water quality than other grasses when the most salt-tolerant cultivars are used. Many of the initial uses of this grass will be on sites normally challenging to other grasses, usually with salinity involved.

The Old Collier Golf Club is a living example of how an effective *systems approach* can be environmentally compatible even with multiple challenges. The system encompasses the grass, soil chemical/physical/biological aspects, irrigation water, groundwater, surrounding wetlands, wildlife, and site-specific management. There were initial concerns that salts would build up to unmanageable levels on the golf course when high-salinity water was used consistently. That problem has not occurred. The normal topography carries the salts back to their original source — the Cocahatchee River — in a natural recycling design, neither increasing nor decreasing the salinity level during its exposure to the golf course. This excellent architectural plan fully encompassed environmental stewardship and water conservation principles. The landscape plants were integrated by the golf course architect, Jan Beljan

SEASHORE PASPALUM'S NOTICEABLE ATTRIBUTES COMPARED TO BERMUDAGRASS

- Better cold tolerance transitioning into the winter period.
- Poor water quality tolerance is excellent.
- Superior low light intensity tolerance (cloudy weather, not shade from trees or buildings).
- Potential for improved playability.
- Striping very similar to northern grasses.
- Needs less nitrogen.
- Does not need to be overseeded in South Florida.
- Looks like Kentucky bluegrass or perennial ryegrass.
- Does not form a "grain."

(design associate with Tom Fazio), into the course design based on innate salinity tolerance and exposure to salt-laden irrigation water or spray drift. The whole systems approach on this golf course is what has led to a successful venture.

The other positive aspect of dealing with all the challenges was that the company had the vision, resources, and patience to wait until the course was imminently playable, allowing the staff to deal methodically with adverse conditions while achieving a successful grow-in. The team had remained steadfast in its vision and did its research, knowing that waiting would lead to their expectations — opening one of the premier golf courses in the world.

THE KEY PLAYERS

With the right resources, staff, soil profile, equipment, and management program in place, seashore paspalum is capable of providing championship-

level playing surfaces, even with numerous environmental and man-made challenges and with use of non-potable, highly saline water resources. Management has to be oriented to the entire *systems approach*, since salinity tends to exacerbate turf problems in response to environmental extremes.

ACKNOWLEDGEMENTS

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WEBSITES FOR ADDITIONAL INFORMATION

www.georgiaturf.com and click on "seashore paspalum"
www.seaisle1.com

DR. RON R. DUNCAN (*turfgrass genetics/breeding, stress physiology*) and DR. ROBERT N. CARROW (*turfgrass stress physiology and soil physical and chemical stresses*) are research scientists in the Crop and Soil Science Department, University of Georgia, Georgia Experimental Station at Griffin. E-mail: rduncan@gaes.griffin.peachnet.edu.

Greens were carefully maintained to achieve a smooth and firm putting surface.



Many good ideas have emanated from grillrooms, where a number of spirits — or should I say “tools”? — are available to stimulate the imagination. Seldom, however, do the ideas literally come out of the grillroom or clubhouse as this one has. Pat Kriksceonaitis, grounds manager at Essex County Club (Manchester, Mass.) conceived the idea in the act of enjoying a lunch and favorite beverage in the grillroom, and it involves the club’s paper place mats, which provide a scaled map of the golf course.

The place-mat maps have found many uses in the maintenance program. Reduced-size copies of the maps are given to new employees to familiarize them with the golf course and guide them to their assignments. The small maps are especially helpful when language barriers make verbal communication difficult.

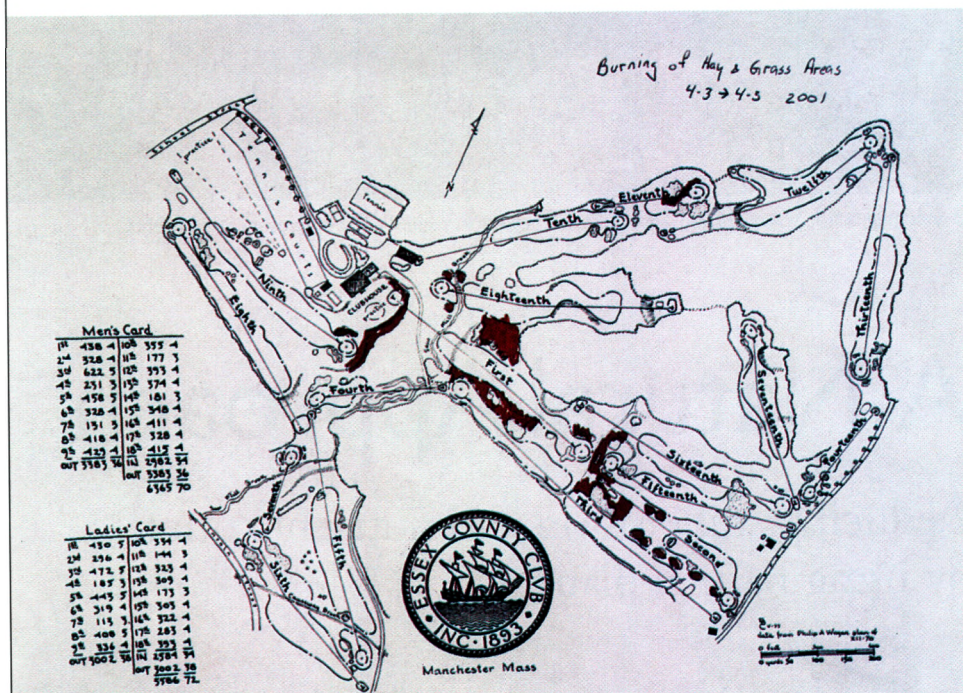
Full-size copies of the maps and hole location sheets for the greens are also used. The maps and hole location sheets are made available in the break room for the entire staff to record any irregularities observed in the field. The staff member simply circles or marks the area on the sheet that corresponds to the irregularity they observe. The sheet is initialed and left on Pat’s desk so that he or an assistant can later check on the area. Pat relies on his staff’s observations and feels that the system is effective because it provides a less intimidating means for employees to provide input to the operation.

The maps also are used to coordinate a wide array of operations throughout the property. Everything from tree removal, bunker work, controlled burns, drainage, and pesticide and fertilizer applications are diagramed on the mats. The visual image provided is a more effective and straightforward guide than a written list alone. This is especially true with the holistic management philosophy that is used on the environmentally sensitive site, where blanket applications of fertilizer or pesticides are rare.

Grillroom Technology

Simple mapping technology to improve communication.

BY JIM SKORULSKI



The place mats at Essex County Club (Mass.) are used to reference the naturalized rough areas that were burned in spring. The visual reference is useful for planning a wide range of operations and serves as a historical record.

Another important use of the maps is charting pest activity, pesticide and fertilizer applications, renovation work, and other projects to provide a historical reference. Local conservation committee members and municipal authorities find the maps to be a useful reference tool when evaluating management programs or proposed project work on the golf course. The maps also are used to clearly illustrate and coordinate project work and maintenance activities with the membership.

Mapping is a valuable and multifaceted tool for any golf course operation. The simple map derived from

the place mats at Essex County Club has proven to be a very effective and inexpensive tool for training new employees, improving communication, eliciting staff input, documenting maintenance activities, and working with local conservation and municipal authorities. Obviously, maps can be derived from a wide array of sources, so explore your options for tapping into this useful tool. The grillroom just might be a good place to start.

JIM SKORULSKI is a USGA Northeast Region agronomist located in the New England area.



Maintaining buffer strips around water hazards results in a number of environmental benefits.

A Natural Approach

Reducing soil erosion and nutrient runoff by using natural plant material.

BY BRIAN MALOY

When it comes to golf course hazards, none are more feared than the dreaded water hazard. Defined by red or yellow stakes, water hazards can impose a heavy toll on golfers who stray. So heavy is the price for landing in this no man's land that, at the end of a round, it can mean the difference between one's personal best and just another routine day on the links.

For superintendents, the management of water hazards also can be a frustrating experience. Oftentimes, water hazards have steep banks that are prone to erosion. What's more, golfers typically demand that the grass surrounding a water hazard be kept short so they can

find and retrieve their \$4.00 golf ball with little difficulty. I guess taking a penalty stroke is bad enough, but losing a brand-new golf ball on top of that is an experience no one should have to endure!

To control bank erosion, one can often find retention walls built with a wide variety of materials. The most popular of these are railroad ties, bags of concrete, gabion baskets, and large aggregate rocks. These materials range in price from \$40 to \$80 per linear foot, depending on material costs and the height of the wall.

At Riverbend Country Club in Sugar Land, Texas, George Cincotta faced the problem of stream bank

erosion and decided for a number of reasons that construction of a retention wall was not necessarily the best solution. First and foremost, restricting the channel of a stream with a permanent barrier can increase the velocity of the water and cause it to erode the base of the streambed. As such erosion progresses, it can eventually undermine the foundation wall, causing it to fail in the long run.

As an alternative, George chose to employ a more natural solution. University research has proven that an unmown vegetative strip, a *buffer strip*, will control erosion by anchoring soil in place with a strong network of plant roots. Furthermore, the establishment of tall vegetation along a shoreline helps filter nutrients from runoff that might otherwise pollute the body of water.

George's first attempt at erosion control involved planting pickerelweed along the stream banks. This effort proved futile as the plants were quickly devoured by nutria, a small South American rodent introduced on the Gulf Coast.

His second attempt was to plant yellow flag Louisiana iris (*Iris pseudacorus*). This work was a great success in that the one-gallon containers planted on two-foot centers have completely filled in over the bare soil and stopped the ongoing soil loss in the short span of two years. In addition, the iris provide a stunning spring color display.

While yellow flag iris may not be a perfect fit for every situation, the basic principle of using a natural solution to solve an age-old problem is universal. For assistance in determining what plant will work best in the many different regions of the United States, contact Audubon International for a list of materials.

BRIAN MALOY was an agronomist for the USGA Green Section in the Mid-Continent Region from 1996 to 2002. As of April 2002, he is superintendent of Coldwater Creek Golf Links in Ames, Iowa.

Makin' Hay

The use of common farm implements to manage natural roughs.

BY BOB VAVREK

The trend at many courses is to reduce the acreage of costly, manicured roughs and incorporate more low-maintenance turf into the layout. Consequently, areas of unmowed turf, native grasses, and wildflowers are becoming a common sight in more golf course out-of-play areas as golfers begin to appreciate this transition. The course with vast expanses of wall-to-wall manicured turf is becoming an endangered species in many areas of the upper Midwest.

The benefits of reducing the amount of high-maintenance turf have been well documented over the past ten years as an increasing number of golf courses have become participants in the popular Audubon Cooperative Sanctuary Program. Less mowed rough ultimately reduces maintenance costs, and the natural areas can provide excellent habitat for wildlife. However, natural roughs still require annual maintenance to prevent uncontrolled weed growth and the undesirable accumulation of excess plant debris that can detract from the overall appearance of the course.

The most common method of maintaining a consistent natural rough is to scalp down the site during the late fall or early winter and then collect the excess plant material. Collecting the clumps of debris is a time-consuming, labor-intensive operation, particularly in expansive roughs. A cool burn can be an effective way to manage prairie grasses and some species of unmowed cultivated turf, but local ordinances often restrict or prohibit burning operations. The topic of this turf tip is a fast, simple way to mow and clean the

debris from natural areas using common farm implements.

First, mow the site during late fall using a bush hog-type unit, flail mower, or rotary mower, depending on the composition of plant material found in the native area. Clean, sparse grasses can be scalped down with a common rotary unit, but sites with woody plant material, saplings, or extremely dense grass will require more heavy-duty mowing equipment.

The next critical step is to windrow the plant debris to facilitate the bailing process. A Kuhn rake is ideal for this operation. The downpressure on the spinning tines can be increased to scarify the soil and thin out thick native grasses.

The final step is to use a small New Holland bailer to collect and bail the plant debris. Bails can be rolled onto a small trailer and removed from the site. These bails typically contain too much

soil and other undesirable material to be useful as feed for livestock. Once the bulk of the plant debris is removed, the sites can be cleaned up with additional light rotary mowing operations, if necessary. Clean, scalped sites will produce a consistent crop of relatively uniform turf the following season and facilitate the application of pre-emergence or post-emergence herbicides, if needed, the following spring.

The cost of a common bush hog-type unit or flail mower with enough muscle for scalping down dense roughs is approximately \$6,000. A Kuhn rake costs about \$4,000, and the smallest New Holland bailer costs about \$14,000. Balers and rakes can often be rented in many rural areas.

Mike Morris, CGCS at Crystal Downs Country Club (Frankfort, Mich.) has used this technique with success for several years. Rick Grunch, superintendent at the Belvedere Golf Club (Charlevoix, Mich.), using slightly different equipment, has performed similar and equally successful operations. Both courses provide golfers expansive areas of pristine roughs each season by *makin' hay*.

BOB VAVREK can be found makin' hay while the sun shines at golf courses throughout Michigan, Wisconsin, and Minnesota.

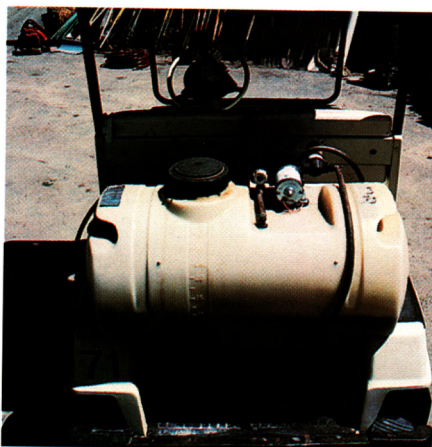


Removing dense clumps of plant debris from mowed sites is a time-consuming operation unless specialized equipment is used. A Kuhn rake will windrow plant debris and the tines will further thin out dense stands of native grasses.

Enlightened Solutions

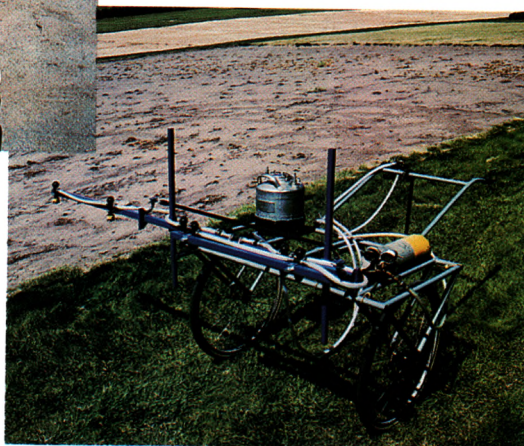
A good method to spot-treat weeds and a simple, lightweight sprayer.

BY MATT NELSON



Two old golf carts were retrofitted with 25-gallon sprayers to serve as dedicated spot-sprayers for both post- and pre-emergence weed control.

This simple design resulted in a lightweight, stand-alone sprayer with many potential applications for golf course maintenance.



Spot application weed control and the use of lightweight spraying systems are nothing new in turfgrass maintenance. Scouting and mapping for weeds, followed by herbicide spot applications, are recognized integrated pest management strategies. Each of these strategies is commonly employed, and turfgrass managers continuously refine the tools needed to utilize these management philosophies.

DEDICATED SPOT-SPRAYER

Victor Wassner can be considered a guru of spot spraying for weed control. While serving as the golf course superintendent at Shadow Valley Golf Club (Eagle, Idaho), Victor maintained weed-

free turf with good cultural programs and only spot applications of herbicide over the past seven years. To facilitate the spot-spraying program, Victor retrofitted two golf carts with 25-gallon spray tanks. The spray tanks were purchased from a local agricultural supplier and fitted with a 25-foot hose. Pressure regulators maintain a constant spray pressure of 40 psi, and a marine battery is used to supply enough charge for continuous agitation throughout the day.

Victor set up one spray system for post-emergence broadleaf weed control and another for pre-emergence weed control under tree basins. Each spray cart is clearly labeled for its intended

use. The beauty of this system, according to Victor, is that these spray rigs are always ready to go when weed control is necessary and the wind is not a factor.

Victor estimates the value of a used golf cart at \$500, and the cost of the sprayer, battery, and hose is \$250. Certainly this is a low-cost way to manage weeds while performing other maintenance tasks on the golf course.

AN ULTRA-LIGHT, HOMEMADE SPRAYER

Charles Golob, turfgrass research technician at Washington State University, needed a portable, lightweight sprayer to apply various products for different treatments in relatively small research plots. Using lightweight steel pipe, bicycle tires, and an adjustable boom assembly, the sprayer was created. Pressurized CO₂, a small pressure tank, a pressure regulator, and 110-degree flat fan nozzles constitute this simple sprayer. While there are commercially available models of lightweight sprayers, not many are as portable, lightweight, or operate as stand-alone systems. Total cost of constructing this sprayer is estimated at less than \$750.

So how can this be applied to golf course maintenance? Obviously, difficult-to-treat areas can be sprayed more easily with this type of unit. A special niche for such a sprayer, however, is for grow-in of new putting greens. This lightweight rig is a great way to apply fertilizer and other products to an immature stand of turf without causing turfgrass injury or surface disruption. Light, foliar applications of fertilizer lower the potential for leaching by reducing the nutrient load in the system.

Lightweight sprayers and spot application of pesticide are good ways to maintain excellent turfgrass quality in an ecologically and economically sound manner. Perhaps these examples can help you work these strategies into your maintenance program.

MATT NELSON works as an agronomist in the Northwest Region.

Home on the Range

Increasing course accessibility for juniors.

BY PAT O'BRIEN

The game of golf has never been more popular for junior golfers. Unfortunately, they face many barriers in trying to play the game, including expensive green fees and equipment, and long, intimidating layouts. Although junior players may have access to teaching professionals to learn the fundamentals and etiquette of the game, most golf courses do not have the space to add new junior golf facilities with shorter holes.

The Rivercut Golf Course, a public course operated by the Springfield Greene County Park Board in Springfield, Missouri, addressed the accessibility issue for juniors by using their driving range as a part-time course. The driving range is three acres in size with five target greens that are easily converted into short, simple golf holes. Best of all, there is no cost for juniors.

This idea was so popular that the Heart of the Ozarks Junior Golf Foundation, a non-profit entity, was created to take this idea a step farther and build a four-hole junior golf facility adjacent to the driving range at the Rivercut Golf Club. Contributions to fund the project were secured from groups such as the USGA, the Missouri Golf Association, and tax-deductible donations from individuals.

Construction began in the summer of 2001 to build the new four-hole Betty Allison Junior Golf Course at Rivercut. All holes will range between 50 and 75 yards long. Unique course features will include low-maintenance Meyer zoysiagrass putting greens and tees, a 2,500-square-foot bentgrass practice putting green, practice sand

bunker, landscaping and water display, starter building, and a special four-foot asphalt circular path for walkers, spectators, and wheelchair participants. A fence around the perimeter to secure the area and special parking for both cars and buses are also parts of the plan, so organizations can bring groups out to play. Restrooms and a mini-pro shop will be available, and a scoreboard will be erected. Lights may be added at a later date for night golf. The estimated cost of the project is \$300,000. However, most courses could do this at a lower cost by simply using existing driving ranges and target greens, and designing a simple layout for part-time use by junior players.

Ed Halasey, CGCS, plans to maintain the facility with existing labor and equipment already at Rivercut. The junior course will be maintained every Tuesday morning from 7 to 9 AM and will require 15 to 20 man-hours. The native soil zoysiagrass putting greens and tees will be mowed with the regular approach mower at 1/2". The average putting green size is 2,000 square feet. The tall fescue on the driving range will be mowed at the normal rough height of cut of 1 1/2". Course amenities, such as ball washer and water coolers will be scaled down and available for the players. An extra \$40,000 will be spent annually on maintenance costs, and the Springfield Greene County Parks will pick up this tab.

Junior golfers in Missouri will have something special once the course opens this summer. Not only will there be free golf, but golf balls, tees, and junior-size clubs will be provided. Plus, area PGA professionals, including Rick



Creating a junior-friendly golf environment can help launch a lifelong enjoyment of the game.

Grayson, a noted golf teacher and Executive Director of the Ozarks Junior Golf Foundation, will provide free instruction during certain times. To play the course or to get a lesson, kids need only make an appointment and bring an adult supervisor. No impact on the range revenue is expected from the part-time use of the facility as a junior golf course, as the special events will occur mainly at off-peak hours. Predicted initial play levels are 20,000 annual rounds.

This model junior golf facility is an affordable beginner-friendly layout and won't take long to play. Hopefully, it will motivate your course to use existing land, such as the driving range, and convert it into a beginner links.

PATRICK O'BRIEN is the director of the USGA Green Section Southeast Region. He first played golf as a youngster with his father on a par-3 course in Pittsburgh, Pa. They have been golf buddies ever since those days.

Pacific Standard Time

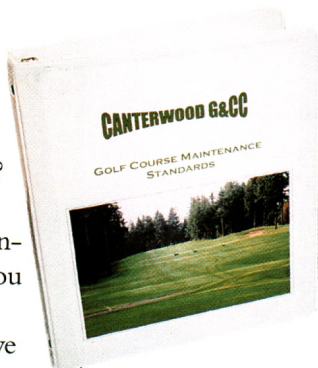
A simple method to create continuity for your maintenance operation.

BY LARRY GILHULY

Question — Does your golf course maintenance operation have a set of written standards that outline how the golf course will be maintained? If the answer is no, and your golf course suffers from the lack of maintenance continuity that is giving you a headache, maintenance standards offer the simplest method to achieve continuity while virtually eliminating the individual playing preferences of players. For an in-depth look at why maintenance standards should be used at your golf course, read “When In Doubt, Spec It Out!” by Pat Gross in the March/April 1997 issue of the *USGA Green Section Record*. Written maintenance standards created by the golf course superintendent and the Green Committee (or similar group) with approval from the Board of Directors provides a very definitive blueprint for the golf course superintendent. However, two golf course superintendents in the Pacific Northwest have taken this simple document to another level to educate players about their maintenance operation while providing a feeling of pride within the maintenance staff.

THE ROLLS ROYCE APPROACH

Forrest Goodling, superintendent of the Portland Golf Club, had a set of good written standards for his golf course, but he wanted more than just the written word. Along with John Manley, general manager, and Larry Lamberger, director of golf, they introduced the concept of adding photographs of the golf course and of regular maintenance operations that include various maintenance staff members. The budget at Portland G.C. also provided for the use of an outside



When photography is added to written maintenance standards, the level of professionalism and understanding of the golf course maintenance operation is greatly enhanced.

company to create the final document with color photographs, high-gloss paper, and a very professional appearance. At slightly over \$100 per copy, they provided their Green Committee and Board of Directors a highly visual and simple way to get up to speed on the maintenance operation, while answering many common questions through the use of photography. In addition to the maintenance standards, a historical perspective of the golf course is included, detailing all of the significant architectural changes since the initial construction during the early 1900s. Also, each golf hole was photographed from above and is described in detail, along with the practice facility, maintenance facility, and clubhouse area. The Portland Golf Club Course Manual is simply the finest method available to educate members about their maintenance operation! For more information, e-mail Forrest Goodling at pgccrew@aol.com.

THE CADILLAC APPROACH

While the maintenance standards document created for Portland Golf Club is

outstanding, many golf courses simply do not have the budget to produce such a remarkable document. Scott Young, CGCS, Canterwood Golf & Country Club, was very impressed with the Portland Course Manual, but decided to modify it slightly to reduce the cost. Using Microsoft Word as the software program, Scott used a combination of digital images

and his written standards to create a document that is slightly different from Portland's, but still produces the same results — educating the membership about the maintenance operation. Scott made sure to include photos of all of his key employees to recognize their efforts, and included hours required to complete each task. The Canterwood G&CC Maintenance Standards booklet is not finished professionally with high-gloss paper and extremely crisp photography, but it is organized to allow the reader to quickly find any section of the book and write notes in the book if they have questions or comments. It is given to the Green Committee and Board of Directors and has proven to be very popular. At approximately \$10 per copy, it is well within budget and a very important tool in the member education process. For more information, contact Scott Young at (253) 851-2752.

If you do not have a set of maintenance standards or currently use only words to describe your operation, using photography is an outstanding way to educate your players about your maintenance program. It may be about (Pacific Standard) time for you to consider this idea.

LARRY GILHULY is director of the USGA Green Section Northwest Region.



Your golf course deserves all the best equipment.

A Turf Specialist from the U.S. Golf Association's Green Section could be the best tool at your disposal. Their unique expertise and experience allows our advisors to analyze your golf course with a keen, objective eye. And their personal visits are always followed by a detailed written report, reviewing subjects such as course conditions, environmental and safety concerns, and long-range planning. That report provides a tool perfectly primed to help your course save

money, improve efficiency and maintain the highest possible standards. Currently, more than 1600 golf courses nationwide are Turf Advisory Service subscribers, including most of the top 50 U.S. courses. For more information on how the Turf Advisory Service can help your course, contact either the USGA's national headquarters or your regional Green Section office today. Or, visit us at www.usga.com.



BUD WHITE REJOINS THE GREEN SECTION STAFF AS MID-CONTINENT AGRONOMIST



It is with great pleasure that the USGA Green Section welcomes back Bud White to the staff after a 15-year hiatus. He will be establishing an office in the Dallas, Texas, area, replacing Brian Maloy, who is moving back home to Iowa to become the golf course superintendent at the Coldwater Creek Golf Course in Ames. Bud worked as an agronomist and later as the Green Section's Southeast Region director from 1978 to 1987. Since that time he has worked two stints with the LESCO Company; served as golf/landscape director during construction, grow-in, and maintenance at the Harbor Club in Greensboro, Georgia; worked as an agronomist for the Toro Company; and since 1995 has been owner of Total Turf Services, a consulting company. He also is the author of the book *Turf Manager's Handbook for Golf Course Construction, Renovation, and Grow-in*.

Bud received his B.S. degree from Tennessee Technological University and an M.S. degree from Clemson University.

Bud will be making Turf Advisory Service visits in the states of Texas, New Mexico, Oklahoma, Arkansas, and Louisiana, working with Paul Vermeulen, director of the Green Section's Mid-Continent Region.

LAUBACH RECEIVES USGA PIPER AND OAKLEY AWARD



Robert A. Laubach (left) with Jim Snow, Green Section national director.

Robert A. Laubach of Scottsdale, Ariz., has been honored with the United States Golf Association Green Section's Piper and Oakley Award. The award was established in 1998 to recognize meritorious service to the USGA Green Section and the game of golf by a volunteer.

Laubach, who has been a member of the USGA Green Section Committee since 1974 and has participated in several meetings of the USGA Turfgrass and Environmental Research Committee, was thrilled and surprised to receive this year's award. "The USGA Green Section has been such a wonderful experience for

me," Laubach said. "It's just fascinating to be involved in what's going on to make the game better for the golf community."

Laubach also served on the USGA Sectional Affairs Committee (1981-1999) and Senior Amateur Championship Committee (1994-1999), and in 1999 he received the Ike Grainger Award, given by the United States Golf Association in recognition of at least 25 years of volunteer service to the organization. In addition, he is a past president of the MacKenzie Society, former director of the Golf Association of Michigan, and a former vice-president of the Arizona Golf Association.

His dedication to the game was evident even during the hardest of times. During 14 months in a POW camp in Germany during World War II, he established a makeshift golf course to help prisoners pass the time.

Laubach, who resides in Frankfort, Mich., for part of the year, lives with his wife Nancy. He has two children, two stepchildren, 10 grandchildren, and two great-grandchildren.

Dr. Charles V. Piper and Dr. Russell A. Oakley were among the earliest scientists to conduct studies in the fields of turfgrass science and golf course management, and they served as the first Chairman and co-Chairman of the USGA Green Section when it was formed in 1920. They were men of great character, keen vision, and remarkable achievement, whose contributions to the improvement in early greenkeeping methods were immeasurable. The Piper and Oakley Award periodically recognizes others who have so generously contributed to the programs and activities of the USGA Green Section.

PHYSICAL SOIL TESTING LABORATORIES

The following laboratories are accredited by the American Association for Laboratory Accreditation (A2LA), having demonstrated ongoing competency in testing materials specified in the USGA's Recommendations for Putting Green Construction. The USGA recommends that only A2LA-accredited laboratories be used for testing and analyzing materials for building greens according to our guidelines.

Brookside Laboratories, Inc.

308 Main Street, New Knoxville, OH 45871
Attn: Mark Flock
Voice phone: (419) 753-2448
FAX: (419) 753-2949
E-Mail: mflock@BLINC.COM

Dakota Analytical, Inc.

1503 11th Ave. NE, E. Grand Forks, MN 56721
Attn: Diane Rindt, Laboratory Manager
Voice phone: (701) 746-4300 or (800) 424-3443
FAX: (218) 773-3151
E-Mail: lab@dakotapeat.com

European Turfgrass Laboratories Ltd.

Unit 58, Stirling Enterprise Park
Stirling FK7 7RP Scotland
Attn: John Souter
Voice phone: (44) 1786-449195
FAX: (44) 1786-449688

ISTRC New Mix Lab LLC

1530 Kansas City Road, Suite 110
Olathe, KS 66061
Voice phone: (800) 362-8873
FAX: (913) 829-8873
E-Mail: istrccnewmixlab@worldnet.att.net

Hummel & Co.

35 King Street, P.O. Box 606
Trumansburg, NY 14886
Attn: Norm Hummel
Voice phone: (607) 387-5694
FAX: (607) 387-9499
E-Mail: soilldr1@capital.net

Thomas Turf Services, Inc.

2151 Harvey Mitchell Parkway South, Suite 302
College Station, TX 77840-5247
Attn: Bob Yzaguirre, Lab Manager
Voice phone: (979) 764-2050
FAX: (979) 764-2152
E-Mail: soiltest@thomasturf.com

Tifton Physical Soil Testing Laboratory, Inc.

1412 Murray Avenue, Tifton, GA 31794
Attn: Powell Gaines
Voice phone: (912) 382-7292
FAX: (912) 382-7992
E-Mail: pgaines@friendlycity.net

Turf Diagnostics & Design, Inc.

310A N. Winchester St., Olathe, KS 66062
Attn: Sam Ferro
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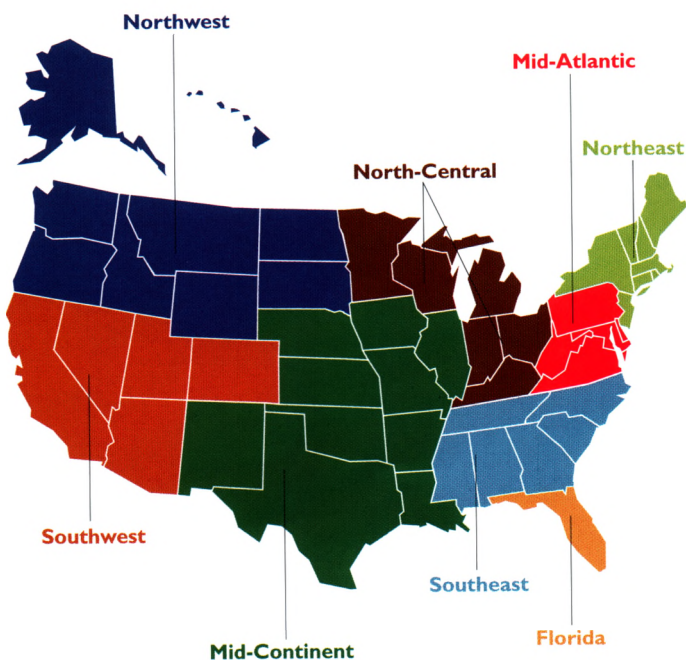


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Turf Twisters

Q: Japanese beetles were discovered for the first time last year at my golf course in southern Wisconsin. How many beetle traps will I need to place around my course to prevent injury to turf and ornamental plantings? (Wisconsin)

A: Japanese beetles continue to spread slowly and steadily from east to west across Wisconsin and into Minnesota. Unfortunately, the feeding-lure/pheromone traps that are available in many lawn and garden stores do not provide an effective level of control for these



pests on golf courses. In fact, a concentration of traps near the playing surfaces can have the unwanted result of

attracting a damaging population of adult beetles from the neighboring area. However, a high population of adults found in a *few* well-placed traps on the course would indicate the need to sample fairways and roughs to monitor grub populations later in the season.

Q: What do you recommend as the minimum distance for planting trees next to greens? (California)

A: As a general rule, trees should not be planted closer than 65 ft. from the edge of a green. This minimizes any potential negative impacts from shade and tree root encroachment. Interference with irrigation patterns is

also reduced, since most golf course sprinklers have a 65 ft. operating radius. Of course, any tree planting close to greens should be carefully scrutinized to avoid future problems with shade and air movement. Contact

your local Green Section agronomist and arrange a Turf Advisory Service visit to evaluate tree planting programs so you can avoid potential problems in the future.

Q: After 20+ years of traditional management, I'm in the process of switching to a zone or sectional management concept. Any suggestions? (Georgia)

A: An article published in the June 1991 *Green Section Record* discusses this concept. You can request a copy from any Green Section regional office. Also, we can tell you a few things superintendents have learned over the years with this management strategy. No more "I thought someone else was going to get that" or searching through the records to see

who cut that green or changed the hole location. Extra tools are needed so each zone has what it needs. Lock them up or permanently mark them so there is no "borrowing." Zone management is a great system if a superintendent can keep it staffed and have enough equipment to make it work.