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Dr. Ralph E. Engel (left) accepts the 1993 Green Section Award from Raymond B. Anderson, Chairman of the USGA Green Section Committee.

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Ralph E. Engel — 1993 USGA Green Section Award Recipient

DR. RALPH E. ENGEL, whose career spanned more than 40 years of service as teacher, researcher, and extension specialist, is the 1993 recipient of the Green Section Award of the United States Golf Association. Raymond B. Anderson, Chairman of the USGA Green Section Committee, presented the award to Dr. Engel on January 30, 1993, in Anaheim, California. The presentation was made at the annual banquet of the Golf Course Superintendents Association of America annual conference and show. The award serves to honor those persons deserving special recognition for distinguished service to golf through work with turfgrass.

"It is wonderful to be recognized for a lifetime of work in one's profession," noted Dr. Engel in accepting the award. "I can't tell you how much it means to me."

Dr. Engel has a very long and distinguished involvement with turfgrass. His career at Rutgers University, in New Jersey, spanned 39 years of service as a teacher, researcher, and extension specialist. His research work contributed many of the basic principles on which turfgrass management practices are based today. His early work with nitrogen fertilization of bentgrass concluded that applying smaller nitrogen amounts more frequently is the best way to manage bentgrass. He was instrumental in the development of misting as an aid in turfgrass survival during high-temperature stress periods. Mist systems have become a popular tool in greens maintenance programs. Dr. Engel's root studies provided evidence that many preemergence herbicides are root inhibitors. He also demonstrated that differences between bentgrass and annual bluegrass temperature requirements for seed germination could be used as the basis for the timing of turfgrass renovation programs.

His research work was not confined to cultural practice investigations. Dr. Engel was instrumental in collecting the first turf-type perennial ryegrasses. Some of his selections were used in Dr. Reed Funk's polycross release, Manhattan ryegrass. His discovery of a superior-looking Kentucky bluegrass resulted in the release of the variety "Mystic."



Dr. Engel did some of the early research work involving the USGA's Stimp meter.

Dr. Engel's teaching role may have been nearly as important as his research work. Many of his former students play influential roles in the turfgrass industry today, and more than 125 golf course superintendents in the New Jersey/New York metropolitan area received their basic turfgrass science training from him. His role as administrative advisor and instructor in the Rutgers Winter Turf Program over the years also has touched countless students. Nine of Dr. Engel's graduate students currently are involved in university turfgrass teaching programs, training yet another generation of our leaders for tomorrow.

As a direct service to golf course superintendents and golf turf, Dr. Engel has authored and co-authored hundreds of scientific and popular articles over the years. He has been a lecturer at the GCSAA National Conference and regional seminars, as well as many state turfgrass conferences and local association meetings. During his first years in New Jersey, Dr. Engel conducted a turfgrass visitation service for the Metropolitan

Golf Association and the New Jersey Golf Association, a forerunner of the current USGA Green Section Turf Advisory Service. His approach always centered around helping the superintendent think through his problems with the available knowledge to search for the most logical solution. This cooperation and willingness to serve continued with a nine-year tenure as a member of the USGA Green Section Committee.

Through his 40-plus years of work, Dr. Engel has received many befitting honors, including the GCSAA Distinguished Service Award, election into the New Jersey Turfgrass Hall of Fame, Professor Emeritus from Rutgers University, and the John Reid Lifetime Achievement Award by the Metropolitan Golf Course Superintendents.

Dr. Engel could not have imagined what a far-reaching influence he was going to exert on his students, colleagues, and the turfgrass industry when he received his Ph.D. degree in 1951, and the USGA is proud to list him among the distinguished recipients of its Green Section Award.

Fitting the Pieces in the Golf Course Management Puzzle

January 30, 1993, Anaheim, California

FOR THE 12TH 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 1,300 people attended the Green Section's program on Saturday, January 30, at the Anaheim Convention Center. James T. Snow, National Director of the USGA Green Section, introduced the afternoon's program of 17 speakers who addressed this year's theme, "Fitting the Pieces in the Golf Course Management Puzzle." Following are the full proceedings.

The Environment: Where Environment, Nature, and the Game Can Coexist

by ROBERT TRENT JONES, JR.
President, Robert Trent Jones II

I'M NOT SURE when the term was contrived — perhaps it was back in the teens or even before that — but many of our early golf courses were called "country clubs." Emphasize the word *country*. These early clubs and courses were located well out of the inner cities — out in the *country*. One reason they were there was because golf requires some space, to be sure, but mainly they were there because of the *environment* they provided for members and players of all ages. In those early days you went to your club in a horse and buggy, and later in a Model T with your clubs in the rumble seat. The streets of the city were festooned with horse manure and later with smoke-belching vehicles. The environment of the major metropolitan city was not all that delightful in those days, and some agree it is not much better or perhaps even worse today.

At that golf course out in the country, or that country club, all was bright and beautiful. One hundred acres or more could be



Robert Trent Jones, Jr.

found of green grass, white sand in the bunkers, and often a glittering blue sky as a backdrop. There were no horse droppings, no smoke, no noise, no clutter, no urgency, no problems . . . unless, of course, you consider a tricky downhill 3-footer a problem.

So, you see, greenkeepers were among the first environmentalists. Your fathers and grandfathers before you provided the foundation on which our game was built and the very platform on which it stands today.

Isn't it strange that the game that found its earliest roots in environmentalism is often attacked today by those who call themselves environmentalists? But let me caution against a violent knee-jerk reaction to these zealous people, the majority of whom want only for this world to be a better place in which to live. What we are talking about here today is the building of bridges from those of us who love the game of golf to those on the other side who don't truly understand or appreciate the game. Many of



(Left) The Chateau Whistler Golf Course was designed to incorporate the needed drainage channels and streams to handle runoff from the snowmelt during the spring and summer.

(Below) The environmental movement is here to stay, and golf will play a major part in it. Golf course superintendents work with professionalism and attention to proper maintenance methods.

these otherwise well-intentioned people see golf as an elitist game, one which is enjoyed only by the wealthy. They see it as a giant club with privileges not to be enjoyed by the populace. They see it as wasteful of land and water, and they see it as a residue of chemicals gone astray.

There is obviously some growing political and social misunderstanding here, and it is our mission to heal this void, to bring more true understanding to these detractors and to make them realize that we — all of us — are true environmentalists. It's not something new with us or the game of golf. That's where we started and that's where we still are. Golf course superintendents, with their absolute professionalism and sharp attention to maintenance methods, provide the best, clean, wholesome environment they possibly can.

We must carry the message to these critics that golf may once have been a game for the well-to-do, but now it is played by everyone. Take them out to our local municipal courses. Let them see the seniors play, the women, the juniors, the peewees, and the handicapped. Let them see the billions of recreational hours this game provides for some 26 million Americans year after year.

Let them see our strict adherence to tight regulations on chemical use, whether it be a fertilizer or a pesticide. Show them that we follow the rules. We often do better than what is regarded as standard practice. We are



where we have always been, with a long history and with thousands of golf courses to prove it. We are dedicated environmentalists, and we are getting better at what we do with each passing day.

Then explain to them that the game has grown just like the country has grown. Many of those golf courses and clubs that once were out in the country have now been enveloped by sprawling suburbs. Here in

Southern California, the Santa Ana Country Club was once surrounded by orange groves. When Rancho Park G.C. was first built in Los Angeles in 1921, it was a pack trip from downtown. Riviera was even further away. What better proof is there that golf courses preserve open space than the greater Los Angeles basin? The next time you fly into or out of LAX, just look out the window and check those green jewels amid all the asphalt

and concrete, and then try to convince me that golf courses are not good for the environment.

Whether public or private golf, it also pays its own way. How many other recreational or environmental endeavors can claim that? In fact, many counties and municipalities use the net income from golf operations to pay for athletic fields, tennis courts, picnic areas, and so much more.

Golf courses provide not only a pleasing sight for the eye, they actually produce oxygen, a commodity often in short supply in some parts of Southern California. Golf courses also are the centerpieces for reclamation and restoration projects from the tops of our mountains to desert and valley locations that are actually below sea level. Let me give you some examples.

At Whistler, about an hour and a half north of Vancouver, we have just recently completed the Chateau Whistler course. This is one of the world's great ski resorts, and you can imagine what the runoff from snow melt is like in the spring and summer. We improved the streams and drainage channel dramatically. The use of chemicals has been constrained. We have used our turfgrasses to filter the runoff. The water is now much cleaner, and fish and plant life are thriving in this improved environment. We see deer and bear all the time — some say more than before the course was built. The golf course and the fact that we cleaned up a major portion of the forest have minimized the danger of fire to the village and the resort. Whistler is now a year-round vacation destination, and the golf course, in this location, has improved the environment for all kinds of living things.

Some 500 miles away, in a totally different setting, but no less beautiful and no easier to put together, we went through an enormous environmental maze to produce the Links at Spanish Bay. For more than 40 years that very fine white Monterey sand had been shipped out of the northernmost portion of the 17 Mile Drive. For high prices, much of this gorgeous stuff found its way into cigarette urns in upscale hotels and ritzy nightclubs, and don't we wish some of it was still available for the bunkers at shrines like Cypress Point, Spyglass Hill, and Pebble Beach, as well as Spanish Bay? When the sand mining operation was concluded, the "moonscape" that was left was ugly, to be sure, and a scar crying for a new life. The concept of a Scottish-style links course and a new and more modern version of the Lodge at Pebble Beach was suggested. I enlisted Tom Watson, a five-time British Open champion, and former USGA President Sandy Tatum to work with us in the design and construction of a true "links" on the California coast.

It's a much longer story than we have time to tell, but we brought in a conveyor belt. We transported material, not that fine white sand to be sure, but a mongrel combination of sand, decomposed granite, and just plain dirt, and we actually rebuilt the dunes of years ago. We used what remaining white sand we could collect to cover these new mounds as well as possible. We planted a myriad of native plants. We built a wetland marsh and a bird sanctuary. We also built 18 hard and fast-running holes that will take you back to St. Andrews, Turnberry, Troon, and the rest. When the bagpiper comes out to play at sunset and you are trying to land that sand wedge close to the hole on Number 18 into a sharp ocean breeze, let's just say that "Golf in the Kingdom" is indeed close at hand.

On the other side of the map, in Vero Beach, Florida, there is another new course called Windsor. It's a totally different location and an enormously different set of circumstances, yet the same overall result.

This is the once absolutely flat site of an old grapefruit orchard, a desolate and most uninteresting piece of ground. Setting humility aside for the moment, we have designed and built a truly elegant golf course on a once down-and-dirty piece of real estate. More important, this has been a complete dedication to restoration. With all the rainfall in Florida, we actually collect the runoff, and our plant life truly filters out chemicals and residual nitrates. In fact, we even used two very specific types of wetland plants — *Spartina bakeri* and arrowhead — that are most efficient in the cleansing process as drainage is filtered into the adjacent river and from there to the Atlantic Ocean.

Back to the mountains once again, in a cathedral-like setting at the bottom of Squaw Valley, once the site of the 1960 Winter Olympics, we have yet another reclamation project. It is called the Resort at Squaw Creek, and we think it is magnificent. We took the remnants of the old parking lot for the Olympics and turned it into a stunning wetlands masterpiece. The approval process for this endeavor was all but impossible, and the list of mitigations was endless. But with total dedication and a very firm pursuit of purpose, we prevailed and made it all work. In fact, we actually maintained a test green on the floor of the valley for two years to examine, in minute detail, the potential leaching effects of turfgrass chemicals into a shallow aquifer that provides the local water supply. There also was concern about the pristine flow of the Truckee River, Reno's drinking water, a treaty with the Indians, and the fish life in faraway Pyramid Lake.

We probably doubled the wetlands area of the valley in the building of the golf course. We actually improved the water quality. With "constraint" as the watchword, golf course superintendent Carl Rygg has made quite a name for himself in presenting a marvelous combination of mountains, wetlands, and golf with the absolute minimal use of chemicals and painstaking attention to detail.

One of the most interesting new projects is the Orchards Golf Course near Detroit, Michigan. It is set upon a natural gas storage field, and Michcon is producing natural gas golf carts. In addition, Ron Dalby, the owner with Michcon, and golf course superintendent Ted Woehrle are insisting that the maintenance center be twice the square footage of the clubhouse for this public golf course.



Now, that's the way it should be for all you golf course superintendents in our environmental era.

So, the message for today is loud and clear. The environmental movement is here to stay, and we are a major part of it. We always have been a part of it. As devout and dedicated as we have been in the past, we can be even more so in the future. It's not always necessary to move a million cubic yards of material to build a golf course. Perhaps we need to work harder to lay the golf course into the land as did Ross, Mackenzie, Macdonald, and my father, Robert Trent Jones, Sr. We have learned how to be lean and very careful with our chemicals. Golf course superintendents, with the new highly sophisticated irrigation systems, are using water more efficiently than ever before. Even here on the dry, warm West Coast, the water consumption for a single round of golf is only that necessary to produce a single steak at the local restaurant. The economic value gained per gallon of water used on a golf course is far better than even the best of agricultural crops. We now have new and different kinds of grasses and plant life to use in a variety of ways to make our golf courses more beautiful than ever, cleaner and neater than ever before, and more playable for those millions who love the game as we do.

The golf industry demands that we be good at what we do, because there is no place for us if we aren't. Certainly superintendents prove how good they are every day, just as the golf professionals do on the tour. And, just as those talented players have the best equipment with which to play the game, we



Chateau Whistler Golf Course, hole #15.

The remnants of a parking lot from the 1960 Winter Olympics (below) were reclaimed into what is now the Resort at Squaw Creek in Squaw Valley, California. Working through countless mitigations and approvals resulted in an enhanced environmental combination of mountains, restored wetlands, and golf.



also have remarkable tools and pieces of machinery to help us with our work.

We desperately need more golf courses, especially on the public side. There are thousands upon thousands of seniors and young people, too, who would love to play our great game if only it were more available to them.

We are the answer to that need. This is not the time to rest quietly on our achievements of the past. It is a time to stand up and be identified, to attend those city council or board of supervisors meetings, and to speak out on that new golf course proposal. And, when the question is asked, it is especially the time for each superintendent and all of us together to stand tall and proclaim that golf is not an environmental problem. Golf is an answer, one of the best answers we have to make this world a better place in which to live, a place to play, a place to enjoy a clean and healthful outdoor environment. As I always say, a golf course is a place to learn life's little lessons of humility!

The Best Turf Tips of 1993

One of the most popular annual features of the Education Conference is the Best Turf Tips. This year, 12 of the Green Section's agronomists 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 1992. The Turf Tips appear throughout this issue.

Putting Your Cards on the Table

by LARRY W. GILHULY

Director, Western Region, USGA Green Section

HOW OFTEN has it happened? Days, weeks, or months are spent preparing for a major presentation to the membership. All of this hard work results in a thorough, well-prepared proposal and expectations for a quick acceptance. Then it happens. The floor is opened for questions from the audience. Some are good, honest requests for more information. Other comments are emotional and driven by various political factions. By the time the meeting is over, the concept you were trying to sell has been torn apart.

Sound familiar? This often occurs when golf courses are considering a much-needed improvement, but one that affects the players' pocketbook: a new irrigation sys-

tem. Virtually every reason imaginable can usually be heard in opposition to a new irrigation system. Quite often it simply is financial. However, a technique viewed in 1992 at Grants Pass Golf Club in Oregon may save the day if you are faced with a similar situation.

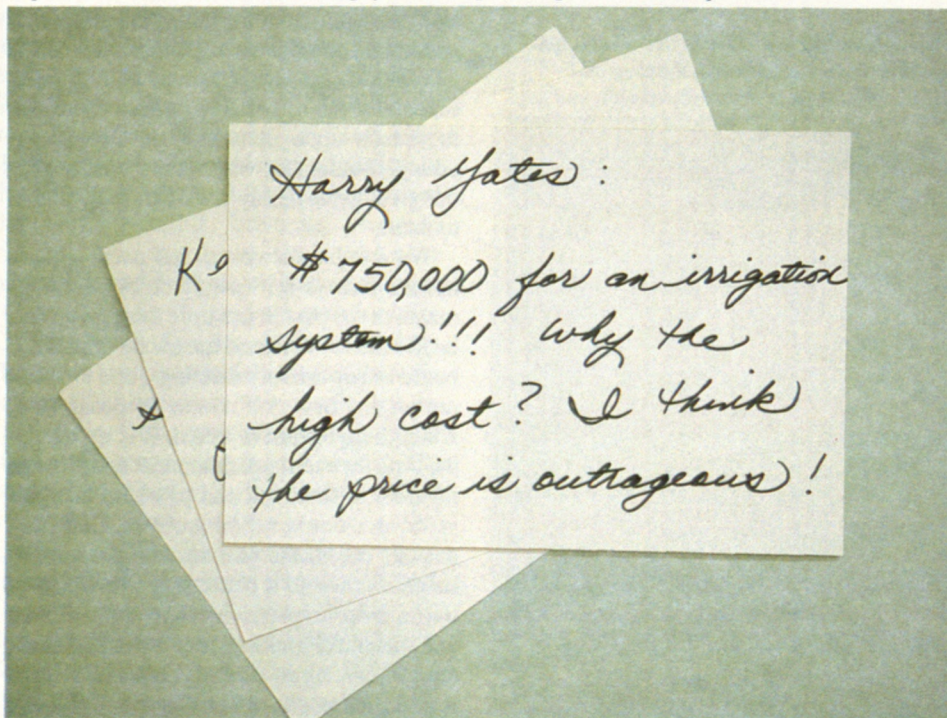
For six years the membership had been informed of the desperate need for an irrigation system, and for various reasons the requests had fallen on deaf ears. The golf course superintendent, Scott Shillington, decided to try once again. Working in close coordination with the club president, Ken Behymer, a plan was formulated to sell the membership on the worthiness of the project. After several months of meetings and in-

ternal education of the membership, a special informational meeting was arranged. Due to the size of the expected crowd, the meeting was held away from the golf club. This fulfilled two important objectives: a neutral site and no alcohol.

The next phase of the plan called for 10-minute presentations by the golf course superintendent, irrigation designer, USGA Green Section agronomist, and club president. Each speaker discussed specific areas, such as current conditions, the proposed design, why the system was necessary, and financial considerations. Rather than establishing a standard format of questions during or after the presentations, index cards were distributed. Questions were written on the index cards during the presentations, but none were verbalized. After the speakers finished, a 15-minute break allowed time for collecting cards and distributing questions to the speakers. Each speaker then read the questions *in his own tone of voice*. All emotion was removed, and just the facts were stated. When the responses to these written inquiries were completed, questions then were taken from the floor. Very few were asked, and emotion was virtually nonexistent!

Four weeks after the presentation, a new irrigation system was approved by a solid majority at a golf club comprised primarily of senior golfers. This innovative method of presenting controversial ideas to a membership has three obvious advantages. First, hosting the meeting at a neutral site removed the possibility of viewing the golf course — reality can be camouflaged by the effects of natural rainfall. Second, the elimination of the alcohol factor ensures potentially less disruption. Finally, removing emotion from the discussion allows the membership to make an informed decision based on factual data. So, the next time you are faced with a similar challenge, you may wish to put your cards on the table!

Putting audience questions on index cards and presenting them to the speakers at a club meeting helps eliminate emotion and encourage facts to reign during the discussion period.





To make a soil moisture probe, a bench-mounted grinding wheel is used to notch out a golf club shaft.

From Broken Shaft to Soil Probe

by **ROBERT A. BRAME**

Agronomist, Mid-Atlantic Region, USGA Green Section

WHAT TOOL CAN BE FOUND at nearly all golf course maintenance facilities, yet is used inconsistently by most turf managers? You guessed it — the common soil probe. Nearly every golf course maintenance facility has at least one soil probe, but often it is found hanging on a hook, gathering dust, or rusting in the back of a utility truckster. Regular use of a soil probe is the best way to accurately monitor root growth and health and to identify zones of soil compaction or layering. Although a common and basic tool of turfgrass management, the importance of the soil probe needs to be emphasized continually.

In addition to its importance in monitoring the soil and roots, a probe is essential in evaluating soil moisture. This information is vitally important in determining irrigation needs. However, a soil probe that works well for root evaluation removes a plug that, because of its large size, normally requires

replacement. This makes frequent and multiple probing to check moisture a slow, time-consuming, messy, and, as a result, often neglected practice.

The ideal soil moisture probe would allow easy and repeated usage, with no resulting turf repair work needed (i.e., a small hole). As it turns out, every golf course superintendent has an unlimited supply of inexpensive moisture probes that meet these criteria; they are damaged or discarded golf club shafts! Hollow steel golf club shafts can be made into very good soil moisture probes with the preferred small opening. Although it's not the type of tool we've come to expect of today's high-tech world, this basic management tool has a place in our maintenance programs. What other tool do you know of that can be used daily, costs almost nothing, is effective, and even recycles something that would otherwise be discarded?

The following step-by-step procedure will allow you to turn a golf club shaft into a

handy diagnostic tool in your putting green maintenance program.

1. Secure a hollow steel golf club shaft. The thicker-walled steel shafts will make a stronger probe. Although the length is not critical, longer shafts make the probe easier to use. A bent, broken, or damaged club is normally preferred (unless you have 15 clubs in your bag).

2. Using a tube cutter, cut off the head of the club and discard it. The cut should be made three to six inches from the clubhead. This produces a small-diameter end, and enough remaining shaft and grip to allow easy usage.

3. With a bench-mounted grinding wheel, notch out the end of the shaft. Begin grinding between $\frac{1}{4}$ and $\frac{3}{8}$ inch from the end of the shaft. The initial cut with the grinding wheel should be parallel with the end cut. The slot should be ground down to about half the diameter of the shaft (grind away about half the thickness of the shaft) and



(Above) Knocking the soil probe shaft against your foot will clear out the soil plug and make further probing possible. Be careful where you aim.

(Right) Does the soil roll into a ribbon or crumble? Feeling the moisture level in the soil is the best way to determine irrigation needs.



continue toward the grip, creating a 2½- or 3-inch slot. The grip end of the slot cutout can be tapered back gradually to the full shaft diameter.

4. With a round metal file, clean out the cut end and the entire ground-out slot, removing burrs and sharp metal shavings. The new moisture probe is ready to use.

A golf club shaft soil moisture probe is easy to push into the soil without having to bend over very far, making repeated usage quick and easy. Does the soil plug form a ribbon between your fingers, or does it crumble and fall away? The more frequently the soil is checked, the better the turf manager will become at evaluating the condition of the soil in comparison with other factors, such as weather conditions, traffic volume, time of year, irrigation programming, and chemical applications. There is an art to checking soil moisture and accurately integrating the information into a well-balanced maintenance program. Practice makes perfect!

After the soil moisture is checked, the probe can be cleared quickly and easily; this is the fun part. First, elevate your foot 12 to 15 inches off the ground, maintaining your balance. Then, using a short swing with a lot of wrist action, hit the midsection of the shaft against the sole of your shoe. When this is done with the notched-out section facing toward your shoe sole and below it, the soil plug will fly out of the probe and off to the side of the green. Be careful where you aim. A cleared probe makes additional moisture checks quick, easy, and even fun. Hopefully, easy and fun will equate to more usage.

The hole that is left in the putting surface from use of a golf club shaft soil moisture probe is small and will cover over quickly. The fact that there is no need to repair the probe hole adds to the speed and ease of checking multiple locations on putting surfaces. When the probe breaks or the tip wears out, replacements can be made quickly.

The greatest agronomic pitfall in golf course maintenance, as identified by a Green Section staff survey, is overwatering. The cardinal rule is to "keep the turf as dry as possible." When programming an irrigation system, aim for the dry side; more water can always be added. Too much moisture is difficult to remove and often results in poor turf quality and playability. A soil moisture probe helps determine moisture levels, allowing for more efficient watering, healthier turf, and better playing surfaces. Take advantage of a readily available resource and go "from broken shaft to soil probe."

CATCH THE DRIFT

by **GEORGE B. MANUEL**

Agronomist, Mid-Continent Region, USGA Green Section

GOLF COURSE SUPERINTENDENTS throughout the country are hearing a clear message in the 1990s; spray fewer pesticides, use less fertilizer, and protect streams, rivers, and lakes. In other words, they're being asked to protect the environment. The good news is that the message is being both heard and addressed by concerned turf managers across the country.

Without question, both wildlife and the environment are benefiting from the activities of enlightened golf course superintendents. Unfortunately, many employees who apply pesticides sometimes are not receiving the same protection or consideration. This is not the case at Topeka Country Club, however, where Certified Golf Course Superintendent Cary Tegtmeyer is in charge. Cary, his assistant Leo Pellant, and mechanic John Kolodziej teamed up to develop a spray rig that protects the applicator while pesticides are being used.

The health of the pesticide applicator is too important to risk the inhaling of potentially hazardous chemicals. As most operators have experienced, it is difficult to completely avoid the drift of fine sprays or dust from granular materials during their application. In the past, protection normally was limited to goggles, a respirator, and in some cases protective clothing. Sometimes, because the gear is so uncomfortable (especially in the hot, humid summer months), it stays in the chemical room or closet instead of on the spray technician. This is what makes Cary Tegtmeyer's idea so appealing; it does a better job of protecting the worker while significantly increasing the comfort level.

Nearly three years ago Cary and his staff realized the importance of these issues and began searching for an inexpensive spray unit that could be modified. With the cooperation of a local turf equipment distributor, a suitable truckster and cab were found.

Although this modified rig may look somewhat cumbersome, it is very similar to those used on most golf courses. The system is PTO driven and has a 100-gallon tank and a 16-foot adjustable boom. The boom is easily detached, and a pull-behind unit for spreading granular materials can be put in its place. A flow meter is utilized to help calibrate and monitor chemicals applied.

What makes this sprayer so unique is the enclosed cab where the operator rides during application. Instead of being subjected to fine particles or spray drift, the individual is seated in an enclosed environment. When spraying, he is completely protected from exposure to any airborne pesticide particles. To help keep the spray technician comfortable, two different cooling systems are employed. A filtered system is used during the spraying operation, and the system used during travel times is not filtered.

During the application of materials, a charcoal-filtered fan system is utilized. Air is pulled into the cabin by small electric motors, and the air is filtered as it enters. The filters are easy to replace and should be changed every three or four sprayings, depending on the materials applied. There is one filter and fan setup on each side of the cab. The fans are turned on easily by flipping a single toggle switch. According to the staff, the incoming air pressurizes the cab slightly and further reduces the chance of chemical drift entering the cab. During travel to and from spray sites, the

windows are opened and an evaporative cooler (located on top of the cab) is turned on. This provides cooling and a steady stream of air. By using this type of cooling apparatus, the air in the cab is constantly changed, and the water is recirculated. On hot days it is not uncommon to fill the reservoir with a combination of water and ice. The chilled water absorbs more heat from the incoming air, resulting in a cooler flow.

This is the first enclosed sprayer that Cary, Bob, and John have developed. As with all "firsts," there are a number of refinements that need to be made on their next generation of modified spray rigs. Top priority among these modifications will be better insulation and a water-cooled engine to help dissipate heat in the cabin.

In spite of the minor drawbacks, this innovative thinking is protecting those who apply pesticides at Topeka Country Club. It is their hope and mine that everyone who reads this article will catch our drift, so your employees don't catch the drift from your spray application system.

Because the operator sits in an enclosed environment, the risk of coming in contact with spray drift is greatly reduced.



Evolving Roles in Golf

by WILLIAM R. ROBERTS, CGCS

President, Golf Course Superintendents Association of America

I WANT TO TAKE a broad perspective on the superintendent's evolving role as keeper of the game. Golf has been around longer than any of us. The game itself has evolved greatly over the centuries, and so, accordingly, has the role of the person in charge of the playing field.

In the earliest years, natural maintenance went hand in hand with natural architecture. Sheep cut the grass and rabbits dug cup holes. As the rules became more formalized, so did the maintenance of the course. Greenkeepers tried to keep livestock off the course, and they cut the grass by hand or used horse-drawn mowers. Then came tractors for mowing, carrying irrigation water, and spreading topdressing and manure.

Golf course maintenance standards have changed phenomenally in recent years. Televised coverage of pro tour events has had a lot to do with that. Regular golfers saw the lush, impeccably manicured courses that the pros played, heard the announcers discuss the lightning-fast greens, and decided that was what they wanted at their home club. Of course, these golfers didn't want to hear that the courses on television were tour stops, groomed to peak for a weekend. They didn't seem to understand that these courses weren't sustained at that level for the whole season.

The golf course superintendent responded to the club membership's mandate by employing intensive maintenance practices: course-wide irrigation systems, complex fertility and pest management programs, daily or even twice-daily mowing, and so on. Roughs started being maintained as fairways had been. Fairways started being kept as greens had been several years before. And greens started being manicured as no turfgrass had ever been maintained before.

Of course, today's golf course management standards and practices would not have been possible without the past 50 years' advances in petrochemicals, equipment technology, and computers. The 20th century's explosion of technology lit the fuse for a revolutionary change in what it means to be a golf course superintendent.

Before these advances, greenkeepers typically had to spend some 90 percent of their time on actual greenkeeping: mowing, fertilizing, watering, cultivating, and so



William R. Roberts, CGCS

forth. That's not to deny the challenge of greenkeeping. It was — and is — challenging.

But today, greenkeeping is only one element of golf course management. Nowadays, the breakdown of the job is more like 10 percent greenkeeping and 90 percent other stuff. The recipient of GCSAA's 1992 Old Tom Morris Award and the captain of the 1993 U.S. Ryder Cup team, Tom Watson, once observed: "In this day and age, a golf course superintendent has to be an educator, scientist, agronomist, and economist, and a good people manager. If you put all this together with a love for a piece of earth, then you've got a good golf course superintendent."

Today's professional golf course superintendent does indeed wear many hats:

Agronomist — The golf course superintendent directs a sophisticated turfgrass management program. Because every golf course is unique, this program must be uniquely designed to provide the playing surface that meets the club's aesthetic and playing standards, while preserving environmental integrity.

Scientist — The golf course superintendent needs to know not only about agronomy, but also about meteorology, chemistry, entomology, soil physics, mechanics, etc.

Environmentalist — Many golf course superintendents are first drawn to the profession by a love of the earth and growing things. But good land stewardship requires much more than a warm feeling. Today's superintendents must understand the complexities of the golf course ecosystem and its interrelationships with the larger ecosystem.

Golf Strategist — A love of the game itself draws many more to the superintendents' ranks. A superintendent must understand the rules and strategies of the game in order to provide a course that is fair and delivers the right mixture of challenge and entertainment. Without the playing field, there is no game — so as manager of the playing field, the golf course superintendent is indeed the keeper of the game.

Resource Manager — The golf course superintendent masterminds the allocation of the facility's resources — including labor, equipment, and supplies — to deliver a playing field that meets agronomic, aesthetic, and playing standards. The superintendent is the project organizer and the leader.

Administrator — The superintendent's administrative functions include budget development, purchasing, cost control, inventory control, and payroll — plus keeping records of weather, course conditions, and management practices. In addition, the superintendent is responsible for achieving and documenting compliance with the federal, state, and local laws and regulations that affect the golf facility.

Educator/Communicator — The golf course superintendent communicates with subordinates, superiors, the rest of the club management team, the club ownership, the club membership, vendors, suppliers, architects, builders, other superintendents, the media, and the community. The superintendent's goal often is to educate the other party — especially the club ownership, the golfers, the media, and the community at large — about golf course management in today's rapidly changing world.

The way the business management aspects of the job have grown, the golf course superintendent's performance affects the club's bottom line more and more.

Obviously, the superintendent's success in providing a golf course that meets aesthetic, agronomic, and playing standards is crucial to attracting players. And players mean in-

come: green fees, golf car rental, a new glove and a sweater at the pro shop, lunch at the grill, drinks at the bar, and so on — not to mention membership dues. The course's landscaping and the clubhouse grounds also can help sell lots in a real estate development.

And, of course, the golf course superintendent's skill in controlling labor, equipment, and supply costs also has a direct impact on the club's bottom line.

You may not realize how much the golf course superintendent's risk management and regulatory compliance efforts can influence the club's bottom line, as well. Let me illustrate:

Suppose the golf course superintendent fails to properly train a pesticide handler, and this individual accidentally causes a chemical spill that shuts down the golf facility for a day. There's nobody playing, so there's no revenue coming in. The whole organization is affected: There's nobody in the restaurant and nobody going through the pro shop. Then it turns into a media circus, and you have the uphill struggle to turn bad news into good PR — not to mention the possibility of liability for pollution damage or injury. This can get horrendously expensive.

This example is just the tip of the iceberg when it comes to the regulatory compliance issues that American golf course superintendents deal with day after day. There are also regulations dealing with underground fuel storage tanks, hazard communication, emergency planning, and on and on. And, of course, as long as new laws keep passing and new regulations keep coming, our jobs will continue to evolve. At least we have GCSAA's government relations program to keep both us and the regulators informed about each other's activities.

The continuing evolution of our role as superintendents, as keepers of the game, will keep having an impact on the organizations we work for. Our profession is perhaps the most dynamic one within the entire golf industry. Our profession and our role within the golf facility have evolved over the years. Our earliest forerunners were generalists who made greenkeeping one part of their job as keepers of the game. Then came the greenkeeping specialists, who changed forever the image of golf's playing fields. Now here we are, multitasking members of the golf facility's top management team.

Superintendents today are responsible for the care, maintenance and improvement of what is usually a multi-million-dollar property. They are highly educated, highly skilled, and highly professional individuals. Their performance is crucial not only to the success of the individual golf facility, but



Golf course superintendents today are mindful of wildlife and the environment (Bedford Golf and Tennis Club, New York).

also — in the long run — to the vitality of the game itself.

In fact, *Golf Digest* magazine has called the superintendent "the game's pivotal on-the-course employee" — which is another way of saying that we are indeed the true keepers of the game.

Golf Digest has also noted that GCSAA has "risen steadily in terms of influence and credibility." GCSAA has achieved this recognition as a sidelight, through years of striving creatively, diligently, and with vision to fulfill its primary mission — to advance the art and science of golf course management.

You may not be aware that when the organization that is now the GCSAA was being formed 70 years ago, there was some discussion about whether it would be better to organize as a trade union or as a professional association.

Today, we owe a great debt of gratitude to those who chartered our organization, for

their foresight. Without that early vision and continuing dedication to advancing the profession, golf course management might never have become such a sophisticated, challenging career. Without that vision and dedication, golf's playing fields might never have achieved the kind of aesthetic and playing standards that today's golfers seem to routinely expect. Without that vision and dedication, we might not be the valued keepers of the game that we are today.

Of course, GCSAA's programs today reach far beyond what our charter members probably imagined back in 1926.

As the superintendent's role has evolved into such a complex mix, the association's continuing education program has similarly evolved.

Today, GCSAA's curriculum includes more than 60 different courses on a wide variety of topics — from technical turf topics to advanced management concepts, like



Understanding sophisticated irrigation systems is just one of the superintendent's responsibilities.

those covered in the Executive Development series of seminars.

Our seminars are not just one- or two-hour overviews on a given subject. They are intensive, full-day — or two- or even three-day — classes on specialized topics that are germane to today's practice of golf course management. GCSAA is also adding more and more correspondence courses for superintendents who wish to complete course work at home at their own pace.

All courses are continually updated to ensure that participants are exposed to contemporary issues within the industry, state-of-the-art technology, modern teaching methods, and the latest printed and audiovisual materials. We're even looking at satellite uplinks to provide video teleconferencing in the future. We could hold a seminar at our headquarters education center and beam it out to multiple locations across the country. These would be two-way setups so that, for example, if a bunch of you go to Anaheim, a bunch to Chicago, and a bunch to Philadelphia to take part in this, all of you can see and hear the instructor in Lawrence, and he or she can see and hear

you. So you can ask questions and it's almost like being there. That's obviously a ways down the road yet, but it's something we're looking at very seriously.

And, of course, we'll always have our regular seminars at conference and in different regions throughout the United States and Canada. We had 54 seminars earlier this week here in Anaheim, and we will offer nine at our first Pacific Rim Conference and Show this March in Singapore.

Singapore... You know, since we opened our extension office in Singapore last July, we've offered a number of educational programs — in Thailand, Malaysia, and Japan, to name a few places. There is such hunger there for the kind of education and training that only GCSAA provides. And the entire operation is self-supporting, paid for by international members' dues, Pacific Rim trade show booth rentals, seminar and Singapore conference registration fees, and so on.

Here in America, we've already started providing technical training for the superintendent's staff, too, because we know that the evolving role as keeper of the game has

placed many additional demands on the superintendent's time and expertise. We're offering 30 spray technicians training programs around the country this season, plus we'll be piloting four sessions of irrigation specialist training in the next couple of months. And we held our first conference special session for equipment managers this year in Anaheim. Part of their discussions concerned the course content for a training program for equipment managers.

You know, too, that as an organization like GCSAA evolves, it goes beyond its traditional responsibilities with its own current members. An organization with an eye to the future must realize that it does have some social responsibilities and may have to make some extra efforts in terms of enhancing its role as a good citizen in society at large.

For a few years now, the public has been looking very critically at the environmental impact of golf. While many of us view ourselves as nature conservationists and stewards of the land, our public image doesn't quite measure up — at least not yet. A recent national survey found that golfers were about evenly divided on whether they thought that the fertilizers and pesticides used on golf courses pollute surface waters. And golfers — perhaps because they know us better — tend to give us more credit than non-golfers do. In a 1991 survey, golfers were about twice as likely as non-golfers to give a positive description of the overall effect of golf on their community.

Government has been responding to high levels of public concern about the environment by enacting laws and promulgating rules to make sure that superintendents take their environmental responsibilities seriously. Issues like the environment, however, are seen as "too big" to be tackled by government alone — at any level. That is why government is starting to forge more coalitions with business, educational institutions, and the non-profit sector — including organizations such as GCSAA and the USGA — to work together to solve the environmental problem.

GCSAA has asserted a leadership role in addressing the golf community's environmental responsibilities. One of our regular contacts at the Environmental Protection Agency actually says that the EPA now treats golf as an entirely separate entity from agriculture — thanks to the relationship we have developed with them. We are regularly invited to submit formal comments on proposed legislation and regulations that affect golf course management. And I personally have had the honor of representing the association and the golf industry at two Senate subcommittee hearings on golf

course and lawn care chemical use issues. We share what we know with those who make the rules and regulations affecting us.

We also share what we learn from key legislators and regulators with our members so that they can prepare for changes and achieve compliance. It is vital that our association's involvement in this area be backed up by environmentally responsible action by individual golf course superintendents. A single superintendent's environmental mistake carries a huge negative impact on the entire golf community's public image. Every one of us must shoulder this environmental responsibility carefully because, like it or not, each of us represents our entire profession. Each of us is a keeper of the game.

GCSAA's Environmental Management Program, or EMP, was developed to meet the complex training needs involved in environmentally responsible golf course management today. Superintendents participating in the EMP complete a series of relevant courses to earn a certificate in one of six distinct specializations. This credential demonstrates to the community the superintendent's strong commitment to preserve and protect local resources.

GCSAA is also strongly committed to supporting research on the environmental impact of golf. In recent years, GCSAA has provided several hundred thousand dollars to the USGA to help fund turfgrass breeding projects, studies on the fate of pesticides and fertilizers, and so forth. This important work will help to develop new grasses that are resistant to drought and disease, and answer questions about many environmental concerns. All of these studies and others, including assessments of wildlife habitat, will serve the golf industry well.

GCSAA also continues to independently assess the overall research arena and supports research that complements the USGA work. We look forward to continuing cooperation between our two organizations for the future benefit of golf.

Since it was founded in 1956, GCSAA Scholarship & Research has funded more than 150 independent research studies, such as the groundwater monitoring study now known simply as the Cape Cod Study — truly significant research for our industry. This study showed that even in worst-case scenarios, such as the sandy soils of Cape Cod, proper maintenance practices can prevent fertilizers and pesticides from leaching into water supplies. Other studies important to our profession have looked at how to solve black layer, localized dry spot, and many other golf course management problems.

Today, we see the need for more research in areas outside the current scope of the

USGA's work. There are additional crucial areas of importance in the day-to-day management of golf courses that need scientific study. And as the association of the individuals involved in day-to-day management who would benefit from such research, it is GCSAA's proper place to make sure that it gets done.

So now GCSAA is re-emerging as a major sponsor of independent research. As one example, we will be setting up a network to compile the findings of ongoing environmental monitoring programs at golf courses across America. This will help document the

environmental impact of real-life golf course management practices.

Another vital project GCSAA S&R will be funding — a project of monumental importance to our profession — is a series of studies examining the human health effects of pesticide exposure. The studies will be used to document worker safety, address public concern about pesticide exposure, and guide future GCSAA research and continuing education programs.

In October, we called a panel of distinguished experts to help us frame the questions we think are most important and what

The superintendent's role in managing major course construction projects ensures the best value for the club and its golfers (Upper Montclair C.C., New Jersey).



kinds of research will be most effective in answering them. The participants in this meeting included representatives of the National Institutes of Health, the Environmental Protection Agency's Health Effects Division, and the Colorado State University Department of Environmental Health, as well as representatives of turf chemical manufacturing companies. We are now beginning to evaluate proposals so we can select the researchers for this multifaceted project, which will include a mortality study of GCSAA members and a toxicology study. We are also soliciting funds to pay for this ground-breaking research. I want to extend our sincere thanks to our individual Golden Tee Club members, who give \$100 a year; our club and chapter Golden Tee Club members, who give \$1,000 a year; and our Platinum Tee Club members, who give \$5,000 a year. Their generous contributions are important investments in the future of golf. If you too would like to make a personal, tax-deductible contribution to the GCSAA S&R, please contact our development department at headquarters.

But the environmental issue is not our only social responsibility. We must address issues of social justice as well. Unfortunately, the image of golf as a game for wealthy white men still lingers among many non-golfers. That's sad, but sadder still is that that image also lingers in the clubhouses of some of

the game's most prestigious courses. If you read the *New York* magazine story called "Invisible Man," you know what I'm talking about. The story was written by a \$105,000-a-year Manhattan lawyer, a Harvard graduate, a black man, who went undercover as a busboy at an exclusive club in New England — not even in the South, mind you. It's not my place to say whether what he did was right or wrong, but the racist, anti-semitic, and sexist remarks and treatment he witnessed and reported surely didn't do much for golf's image. Now the word is that there will be a movie — I think a TV movie — version of his experiences.

We, as superintendents, may not be in a position to do much about the membership policies of the old-school private clubs. But there are strong social pressures for them to change. We're seeing more and more women, minorities, and people with disabilities out there on the course all the time. And government at all levels is getting more and more into the act here, too. In my home state of Michigan, an amendment to the state's civil rights act says that all private clubs fall under the definition of public accommodations. This means that all classes of membership must be offered without regard to sex, race, religion, marital status, or national origin. Further, all adults included under the membership must be granted equal access to club facilities. So with family

memberships, you can't give husbands the prime tee times and access to the bar and grill and keep the wives out. Of course, you can offer different membership classifications with different privileges, but the categories can't discriminate by gender.

I think we can expect to see similar things happening in other states, and maybe nationally. And I think that, as time goes on, this will be very good for the game.

As keepers of the game, though, there are some things we can do to increase the diversity in our profession.

The labor force today is characterized by greater ethnic diversity and a larger percentage of women than ever before. We don't have figures on the number of women or minorities who are golf course superintendents or members of GCSAA — we haven't asked because we will not allow discrimination. But if you look around at our conferences or if you think about whom you saw on that trade show floor, I think you'll agree we can be pretty sure that our profession does not reflect anywhere near the diversity of the labor force as a whole. We know that women outnumber men in the general population, though obviously not in our profession. And we can be fairly certain that racial and ethnic minorities are substantially under-represented in the ranks of golf course superintendents.

We have a social obligation to look at ways to actively recruit more women and minorities for our profession. It's part of our responsibility as keepers of the game. GCSAA is working to promote the golf course management profession to high school and college students who are beginning to explore career choices. We need to see what we can do to enhance women's and minorities' skills to make them a more available labor resource for golf course management. We may need to consider developing new educational opportunities in order to fulfill our social responsibilities in this area.

We might even look at scholarship programs. Since the GCSAA S&R foundation was created in 1956, we have awarded nearly 1,000 scholarships to promising turf management students, many of whom have gone on to become leading golf course superintendents, architects, and turfgrass researchers. S&R is an important element in our commitment to the future of the game.

At GCSAA, we are the professional association of the keepers of the game. We remain steadfast in our commitment to securing the best and brightest future of the game. At the same time, we take the pulse of what is going on in the world around us so we are able to make the most of the opportunities that are available for us to fulfill that mission.

Keeping up with research is a high priority today.



TGIF — 'ON CALL' FOR YOU!

by JAMES FRANCIS MOORE

Director, Mid-Continent Region, USGA Green Section

THE MOST IMPORTANT and powerful reference tool in the turfgrass management industry is the Turfgrass Information File, or TGIF. Why, then, don't more people tap this resource? The most frequent explanation we hear is that people don't know how to use it. They are wrong! Everyone who knows how to use a telephone knows how to use TGIF. To prove this, read the following transcript of an actual TGIF call made from the Mid-Continent office. The initials TGIF stand for Pete Cookingham at the Turfgrass Information Center. My end of the conversation is identified with USGA.

TGIF: Turfgrass Information Center, Cookingham.

USGA: Hi, Pete, this is Jim Moore with the USGA.

TGIF: Hi, Jim.

USGA: How are you doing?

TGIF: Pretty well. What can we do for you?

USGA: Well, I'm working with a fellow who has a little problem on his golf course.

He is wondering if some of the trees on his course could have been damaged as a result of herbicide use. I told him about TGIF and that you could do a search of the database to see what has been written on herbicide effects on trees. Is that something you could do for us?

TGIF: No problem.

USGA: What is the fastest way to get back the results on something like this?

TGIF: Unless you tell us otherwise, everything goes out Priority Mail, so you should have the information within the week.

USGA: Sounds good, but is there a way to get it even quicker? This is a hot topic at the club right now.

TGIF: Sure. We can ship it overnight or even fax it, if necessary. When someone is in a real bind, we can usually have it to them within six hours.

USGA: That's great.

TGIF: Do you know if he is worried about a particular herbicide?

USGA: No. Let's gather up everything we can find on the effects of herbicides on trees so he will have a good cross section of information.

TGIF: OK, can do.

USGA: Do you need my address?

TGIF: No. Since you are a subscriber, we have everything we need here on file. We will get it going right away.

USGA: OK, we'll be looking for it. Thank you.

TGIF: OK, see you later.

This entire conversation took less than two minutes, and the only high-tech instrument involved was the telephone. Don't miss out on this tremendous tool because you think you need a computer or have to know about databases. All you have to know is one of these numbers: 1-517-353-7209 or 1-800-446-8443.

TGIF — give us a call!



Trail Blazing

by PAUL H. VERMEULEN
Agronomist, Western Region,
USGA Green Section



Wire wheel attachments serve as excellent replacements for standard edging blades. The flexibility of the wire wheel produces a clean, uniform cut when edging asphalt cart paths.

FOR THOSE OF YOU who remember your childhood, how many times did your parents stand in front of the television set, threatening you with capital punishment if you did not clean your room? Thankfully, now that we are adults, those good housekeeping skills inherited from our parents can be invaluable because they reflect on our personal image and professional abilities.

At times, it is difficult for superintendents to be "good housekeepers" because available tools are ill-suited for the task at hand. One such instance concerns the edging of asphalt cart paths, where the jagged path edge prevents a standard edging blade from making a clean break in the sod. As a result, the sod can look as though it was carelessly ripped apart by the maintenance staff. Although this is a difficult task, ignoring the need to edge asphalt

paths can lead to the premature decay of these paths.

Frank Roll, of Industry Hills Golf Course, City of Industry, California, and Dr. Harold "Chip" Howard, of Sun City West Recreational Centers, Sun City West, Arizona, have come up with two interesting tips to lessen the burden of asphalt path edging. Although both might agree that the best tip would be to install concrete as opposed to asphalt, this is not always possible due to local soil conditions and budgetary constraints.

The first turf tip, by Frank Roll, involves replacing the steel edging blade with a heavy-duty, full cable, twist wire wheel to improve the contact between the asphalt and the edger. The flexibility of the wire wheel makes it possible to remove the sod and soil between the jagged edges of the asphalt, thereby producing a clean, uniform cut. Most turf supply companies do not

distribute industrial hardware, but heavy-duty wire wheels should be available through one of several supply catalogs, such as the McMaster-Carr catalog. When purchasing a wire wheel, remember to pay attention to the shaft diameter so that a special linkage will not be required.

The second tip, by Dr. Harold "Chip" Howard, is a follow-up to clean edging. For controlling new encroachment, a specialized spray boom is attached to the driver's side of a utility cart, allowing the applicator to apply a narrow band of glyphosate (Roundup). In practice, the application is extremely precise, with very little drift onto the adjacent turf.

Although blazing new trails in asphalt maintenance may never earn any good housekeeping awards, I hope these two turf tips will help make life a little easier next season.



(Above) Ignoring the need to edge cart paths leads to premature asphalt deterioration and gives golfers the impression that the maintenance staff has little regard for good housekeeping.



(Left) Once cart paths have been neatly edged, they can be conveniently maintained with precise herbicide applications. (This picture demonstrates how the apparatus works—it does not necessarily show how an actual application is made.)

SIMPLE FENCES MINIMIZE GOOSE TRAFFIC

by JAMES M. LATHAM

Director, Great Lakes Region, USGA Green Section

MIGRATING and “residential” Canada geese are stately birds, admired for their individual and collective beauty in flight and on the water. Time spent on the turf is another matter. Golf courses and other expanses of turfgrass are among their favorite grazing grounds. In small numbers, geese have been welcomed guests, but along major migration flyways, huge flocks and frequent visits have become significant problems for golfers and golf course superintendents. Their grazing habits can quickly give well-groomed, freshly mown turf an unacceptably unkempt appearance. More noticeable and unpopular are their droppings, indiscriminately deposited over the property.

Many attempts have been made to reduce or eliminate goose incursions on golf courses, but most have failed or have not been feasible over a long period of time. Repellents, trapping and removal during molting season, physical hazing with vehicles, special hunts, and explosives or pyrotechnic devices have given temporary

relief, but these methods lack permanence unless course personnel are continually involved. Dogs have been used successfully at several locations, but they may not fit in well at heavily played courses.

A few years ago, Garold Murphy, at Somerset Country Club in St. Paul, Minnesota, began using shiny narrow tape as a fence around ponds on the property. The idea was to prevent geese that land on the water from gaining a foothold on the shore. Because the tape is silver on one side and red on the other, the tape may also have a “scare” effect as it is moved by wind. Apparently, geese cannot push through the tape and are unable to duck under or step over the single strand.

Disbelief is a natural response to such a simple, passive restraint, but one cannot argue with the success at Somerset. Even stronger evidence is given by superintendent John Stevenson at Potawatamie Park Golf Course near St. Charles, Illinois, where he must cope with extensive frontage on the Fox River. Almost any type of barrier seems to be

effective, since surplus electrical wire is used by Martin Fuchs at Oakland Hills Country Club in Birmingham, Michigan, and thin nylon rope is used at Hazeltine National Golf Club in Chaska, Minnesota, where Patricia Knaggs is superintendent.

The fences are effective if erected on shore near the waterline, and they are equally effective when placed in the water a couple of feet from the water’s edge. Installations in the water are a bit more difficult, but they eliminate mowing problems around the stakes. Fences installed on land are less visible in areas where grasses are allowed to grow to their mature height.

Geese that land on solid ground will not be affected by this procedure, of course, but if their preferred water runway is fenced to prevent access to feeding and nesting areas, they are encouraged to go elsewhere. That should sharply reduce the number of birds returning to these fenced courses in the future. To most superintendents along the Mississippi flyway, these passive restraints are well worth the trouble of installation.

Surplus electrical wire is used by superintendent Martin Fuchs for fencing around the pond on the 16th hole at Oakland Hills Country Club. Note that the fence is well inside the shoreline and is as effective as those on the banks.



Television Golf and the Golf Course Superintendent

by JERRY PATE

IN MY LIFE, I have been very lucky. I was lucky to be born into a large family of six kids, have a mother and father who love this great game, and to take my dream as a golfer to the highest level of competition and win championships.

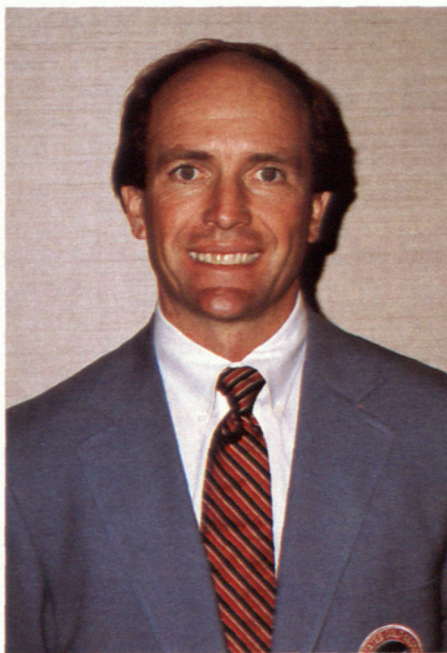
But one of the most exciting days of my golf career came when David Fay and Jim Snow asked me to become a member of the USGA Green Section Committee. As a professional golfer, to wear a USGA jacket as a committee member means a great deal to me.

About a year ago, I was asked to participate in the 1993 Green Section Educational Program during the Golf Course Superintendents Conference. My topic was to be "Television Golf and the Golf Course Superintendent." With my 17 years of Tour experience, 15 years of design experience, and five years with ABC Sports, I felt that this topic would be quite simple. As I started to formulate my speech, I found myself in a tug-of-war about the issues of design, maintenance, competition, and the television exposure of this great game.

It seems like television and golf have gone hand in hand since the beginning of the game, but it wasn't until 1953 (coincidentally the year that I was born) that the first live broadcast of a golf event occurred, and that was the World Championship of Golf at Tam O'Shanter. In over 400 years of this great game, not all that much had changed until we got to the television years during the past 40 years. And there's no question, television probably has played the largest part in the growth of this game in the 20th century. What it did was to bring the event and its participants right into our living rooms on Saturday and Sunday afternoons. And now with the age of cable television and VCRs, we can record those golf events in the daytime and watch them at night, and we can go out and play on the links ourselves.

But with the positive growth of any business, every change has its liabilities. During the history of golf course maintenance, we have progressed to a level that our predecessors hardly would believe.

For many years, the Augusta National Golf Club and the Masters Tournament have set the standard for precision in golf



Jerry Pate

course maintenance for television. And not far behind Augusta is the USGA setup of the courses for the U.S. Open. Even the courses playing host to the British Open sometimes have fallen to the pressures of television by allowing for greener fairways. This continuing desire to cut lower, fertilize more, water more, plant more flowering landscape materials, and beautify golf courses around the world has become known as the *Augusta National Look* or the *Augusta Syndrome*.

The real question is, can we continue to reach these high levels of turf maintenance while keeping golf affordable on courses around the world that do not hold professional championships? Low-cut fairways, greens rolling 10 feet with the Stimpmeter, grass throughout the year with no weeds and perfect conditions are a few of the qualities that your members and the public seem to want for these golf courses. Television has marketed these qualities to the golfing public, and today's golfers now want these conditions for their own courses. The real truth, of course, is that the courses you see on television today are not maintained that way year round; they are maintained that way for one week of the year, and the budgets

to achieve these conditions are sometimes astronomical.

Over the past 20 years, one of the most useful and yet devastating tools invented in golf course maintenance and course setup has been the Stimpmeter. In my 17 years on the Tour, we found that the Stimpmeter has really done a lot of things to the maintenance of golf greens. It was introduced back in the mid-1970s to measure the consistency of greens for USGA championships. Instead, people have used this instrument to see how fast they can get their greens, at the expense of good turf management, and I know that the greens at some events roll greater than 12 with the Stimpmeter. That is extremely fast, and I think that sometimes today we find ourselves making greens too fast for the good of the golf course and its design contours. Even Augusta National, in the last 10 years, has redesigned and flattened out many of its greens simply because they were just too contoured to allow fair play at ultra-fast speeds.

Another example of television's influence on maintenance practices came in the 1970s during a PGA Tour event at Houston. Rain forced the decision by the superintendent and the committee not to mow the fairways for several days during the particular event. Their mowing unit was the seven-gang tractor-type unit with which we are all familiar. It was too heavy to put out on the soaked fairways, so one of the PGA Tour officials asked the club to take a triplex greensmower and set the units at fairway height. They mowed the fairways with these lightweight machines, and the sponsors were happy, television was happy, and the players continued and completed this event. Thus, due to television forcing the play of that event, the superintendent took fairway maintenance a step higher, and it helped encourage other golf courses to try to adopt this emerging technology.

Television influences not only the superintendent, but the architect, too. Today, an architect considers many things before he completes his design for courses planning to host televised events, including cart path locations and their potential interference with television shots. One designer even told me a few years ago, "You know, Jerry, when I design a golf hole that will be seen



on television, I go up to the green and look at it from the green looking backwards to see how the hole is going to look from the eye of the television camera." This was interesting to me, since I'd always looked at golf holes from the tee to the green, the way I played them. But he was interested in the way it looked on television, partly because there was the opportunity for a tremendous amount of exposure that could give him credibility in his design practice.

Water hazards are everywhere today. Bulkheads of every type, island greens, and impossible penal bunkers seem to be the rule rather than the exception. These features make for exciting television, but they cause a lot of peril for the golfers, particularly the average golfer. But the most insidious effect of these design features is the escalation in the cost of maintaining golf courses. As long as the events want to pay for the maintenance, as long as the sponsors pay for it, and as long as we have golf courses on television, I think it's fine to design, build, and set up courses to these standards. But the tough task we face today as superintendents and people in the golf industry is educating the golfing public of this dilemma: Do I want what I see, or do I want what I can afford?

Today there is a very misused practice in golf course maintenance, and that's the overwatering of our golf courses. I think television, no question, has played a part in reinforcing the misuse of irrigation systems. People want to see green golf courses. When you go to major events, you have green



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(Top) The impact of television on golf has been tremendous for the player, the spectator, and the golf course superintendent.

(Above) The turf conditions found at a major tournament are the results of months, even years, of preparation for this one event.

(Opposite page, top) "Good or bad, whatever your point of view, the Stimpmeter has changed the way we maintain golf greens. It was first introduced in the mid-1970s to measure greens consistency for USGA championships. Now it has developed into a tool to see how fast people can get their greens."

(Opposite page, bottom) Water hazards and large sand bunkers have become important components of golf course design and maintenance. These features make for exciting television golf, but they cause a lot of peril for the everyday golfer.



tents, green cups, green observation stands, green hats, green jackets, green restroom facilities, green sandwich wrappers, and green pairing sheets. All we want to see is green. And as a player for many years on the tour, there's no question I like to see green, too. But there's no doubt, and you've heard this many times, that green is not always better.

As a traditionalist, I think we need to be careful not to ruin the character of our golf courses, and today it seems like the only way we can play a golf course is through the air. The game was played for some 400 years with a bump-and-run shot on natural turfs, and I hope we don't change the playing of this game through our misguided maintenance practices. And let's don't let the exposure of the game through television change the basic characteristics of the game.

Let's face it, television has been great for the game as well. It has given us all an opportunity to be seen throughout the world, and for people who don't play this great game to see what a wonderful game it is. But we must keep our priorities focused. We must continue the traditions of golf while allowing for the changes, too. We must strive to protect the honor and integrity of this game, and — the most important thing of all — we need to make it enjoyable and affordable for everyone.

Jerry Pate is a member of the PGA Tour, serves as a commentator on ABC Sports, and owns his own design firm, Jerry Pate Golf Design. He also serves as a member of the USGA Green Section Committee.



THE BEST TURF TIPS OF 1993

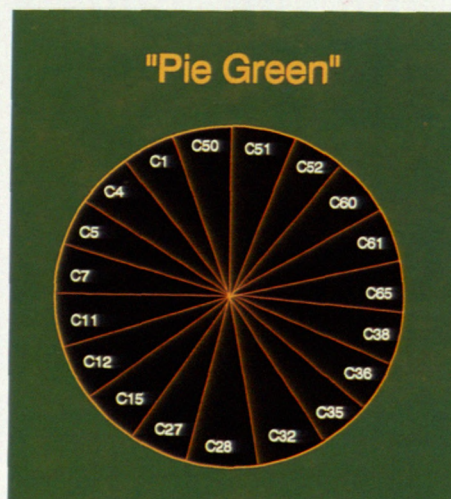
Survival of the Fittest

by PATRICK M. O'BRIEN

Director, Southeastern Region, USGA Green Section

MANY NEW bentgrass varieties recently have been released for use on putting greens. Unfortunately, limited information is available on the adaptability of these new bentgrasses for each climatic region of the United States. Golf course superintendents may find what they need to know about experimental and newly released bentgrasses by developing a turfgrass nursery at the golf course.

In the early days of turf care, most golf courses used South German bentgrasses for putting greens. As time progressed, alternative choices became available and decisions had to be made about which variety was preferred for that particular location. Before the release of Pennncross bentgrass in 1955,



superintendents relied on one or more of the numerous commercially available, vegetatively propagated bentgrasses referred to as the "C" strains, which were selected and developed by the USGA Green Section and the United States Department of Agriculture. (The "C" designation stood for creeping bentgrass.)

In the 1940s and 1950s, golf course superintendents constructed turfgrass nurseries to rate varieties. It was well known that the performance of a variety varied depending on location. The USGA Green Section promoted the use of "pie greens," which were composed of 12 or more wedge-shaped sections, each planted with a single strain of bentgrass. For comparison, each

(Above) The "Pie Green" concept was promoted by the USGA Green Section during the 1940s and 1950s to evaluate the "C" strain vegetative varieties.
(Below) David Stone evaluates 27 new and experimental bentgrass varieties in two turfgrass test areas at The Honors Course.





pie green was also planted with several commercially available varieties.

David Stone, golf course superintendent at The Honors Club, in Ooltewah, Tennessee, has taken this old strategy and improved upon it. Charles Darwin, famed naturalist who wrote *On the Origin of Species*, stated his theory that only the best-adapted species will survive over time. David's idea was to construct his test nursery in a shaded area where bentgrass has the least chance of survival. His shaded plot was a tough environmental site with large trees and mounds on three sides. Some areas of the plot were completely shaded throughout the day.

In addition to the environmental stress, extraordinary maintenance practices, such as daily $\frac{1}{8}$ -inch mowing, rolling, and overwatering, further enhanced separation of the varieties. For comparison, an identical nursery was constructed in a more favorable, sunny site subjected to the same management.

In the fall of 1991, two nurseries were constructed to USGA putting green specifications. A total of 27 varieties were donated to the test from various turf breeders and seed companies. Each variety was replicated four times in each nursery, and the plot size was 3 by 5 feet, with 1 foot between plots. Plots were seeded at 1 pound per 1,000 sq. ft. A 3- by 5-foot box was placed around each plot during seeding to prevent contamination of adjacent plots. The seed was mixed with corn meal and distributed with a salt shaker for accuracy. Dr. Tom Samples, Extension Turfgrass Specialist, University of Tennessee, helped with the design and establishment of each nursery.



(Top) The two turf test areas were established with 3- by 5-foot test plots. During seeding, a box was placed around the plot to prevent contamination of the adjacent plots.

(Above) Some cultivars appeared to perform better under shaded conditions than others.

Visual ratings for turf density and texture were measured by David and his staff, university turfgrass extension specialists, turf breeders, and USGA agronomists from April through October. Particular attention was given to which varieties maintained turf density during the hot weather of July and August. Significant differences were most apparent between varieties at this critical time.

Many varieties died under the punishing management conditions. However, other varieties had better disease resistance and faster recovery from summer thinning. It was apparent from his test that new varieties are available today which are superior to traditional seeded varieties.

All you have to do to find the best for your course is to establish a turf nursery and implement the "survival of the fittest" test!

WARMED-UP BUT NOT WORN-OUT

by **PATRICK J. GROSS**

Agronomist, Western Region, USGA Green Section



Creating a warm-up area close to the first tee will allow golfers to warm up without causing damage to the turf. To ensure safety, adequate space must be provided between the warm-up stations so golfers can swing freely without the fear of hitting each other.

ATHLETIC TRAINERS and sports medicine professionals agree that a proper warm-up before physical exercise is essential for top performance and injury prevention. This is true even for golf. Most golfers find that the ideal place to warm up is on the first tee. It is the natural place for people to congregate before they begin their rounds. Unfortunately, extensive turf damage can result from the heavy traffic, a multitude of practice swings, and even a few "Mulligans." This damage is even more pronounced at busy public golf courses and during the winter season when the turf is not actively growing.

For years, the H. D. "Dad" Miller Golf Course in Anaheim, California, fought this very same problem. It is a busy public facility that plays host to more than 105,000 rounds of golf each year. Superintendent Gary Wimberly came up with a creative solution to save the turf and still give the golfers an

opportunity to warm up. During the renovation of the clubhouse in 1991, the cart parking area was expanded and warm-up stations were built close to the first tee. The cart path was widened and six warm-up stations were constructed. To separate each station, low fences were constructed using 1-inch tubular steel and expanded metal fencing. A 5-foot by 5-foot artificial turf mat was placed over the concrete surface to simulate actual playing conditions.

To ensure the safety and success of the warm-up area, several other points were considered:

- Each station is at least 8 feet wide so that golfers can swing freely without fear of hitting each other.

- The warm-up area is adequately separated from the cart path to prevent pedestrians and golf carts from getting too close. This is accomplished with a few strategically placed planters or a similar barrier.

- The warm-up area is located close to the first tee, yet not so close as to disturb the group on the tee.

- The stations are used for stretching and practice swings only. No chipping or hitting golf balls is allowed in the warm-up area.

- The golf shop staff and course marshals routinely inform golfers about the function of the warm-up area and explain that their cooperation helps reduce wear on the first tee.

- The artificial turf mats are replaced annually to maintain a clean appearance.

The warm-up area of "Dad" Miller Golf Course has been a great success! Not only have the golfers been very cooperative about using the area, it also has significantly reduced wear on the first tee. By giving the golfers a separate area to take a few practice swings, they still are able to get warmed up, but the turf is not worn out!

Ball Marks to Bentgrass

by DAVID A. OATIS

Director, Northeastern Region, USGA Green Section

GOLFERS and superintendents alike have struggled for years with the ball mark dilemma. Superintendents and course officials argue that most golfers do not even try to fix their ball marks, yet most golfers protest that they fix many more than they make. The truth of the matter is, even when golfers do fix their ball marks, most are fixed improperly. This can be a result of a weak effort at ball mark repair or the turf being too severely damaged to begin with.

Ball mark damage can be a problem on almost any course, and it can be an especially tough problem on heavily played golf courses. Short holes where irons are used to hit to small greens are usually the most affected. The inevitable result is scarred, damaged putting green turf that looks bad and plays poorly.

There are numerous ball mark repair tools for sale, and a quick trip around any trade show will yield an array of different tools in all shapes and sizes. The idea behind most of these gadgets is to provide a method of quickly and efficiently smoothing the putting green surface (preferably without bending over). Few golfers put much, if any, emphasis on helping the turf heal more rapidly, however. That is why Angelo Petraglia's idea is such a good one.

Angelo is the golf course superintendent at Deal Golf & Country Club in Deal, New Jersey. This is an old course with small, severely undulating greens, and ball marks presented a real challenge. The greens were comprised mainly of *Poa annua* when Angelo took over a few years ago. The combination of the ball marks and too much *Poa annua* prompted Angelo to come up with this turf tip. Initially, his idea was to use a broken golf shaft adapted into a soil probe to take a core out of the center of each ball mark. The edges of the holes were rolled inward with a twist of an index finger, and the small hole was then kneaded closed with an ice pick. This idea works extremely well on small ball marks, the smaller of which can be completely eliminated.

This technique helped solve Angelo's ball mark problem, but it had no effect on grass populations. So, Angelo took the idea one step further and now removes a larger, deeper core, $\frac{3}{4}$ of an inch in diameter and 3 inches deep. This is accomplished with a homemade plugging device fashioned from a $\frac{3}{4}$ -inch fairway aerifier tine attached to a short length of 2-inch PVC pipe with the aid of several adapters. The cores simply back up inside the PVC pipe and are discarded periodically. This larger hole is

backfilled with a mixture of creeping bentgrass seed and topdressing material. A commercially available mechanical ball mark repair tool then is used to knead the larger hole closed. The final step is to add an additional dusting of the seed/topdressing mixture so that the surface is left perfectly smooth. The result is a smooth putting surface, with improved soil structure and more bentgrass.

Though it may sound a bit labor intensive, you might be surprised at the actual labor breakdown this technique requires. For the sake of efficiency, Angelo sends three crew members out together. Each performs one phase of the operation. They can do the most severely damaged holes, including the four par 3s, in 1½ hours, but it requires a total of just 3 hours to do all 18 greens. Angelo's practice has been to repair ball marks on the par-3 holes every week during the peak play months of June, July, and August, and the whole course is done every other week. Depending on the number of greens repaired, the program requires 4½ to 9 man-hours per week. After just two seasons of use, the results are very positive: Ball marks no longer are the problem they once were, and small patches of bentgrass exist throughout the greens.

Ball mark repair tools.



Removal of core from center of ball mark.



Kneading the hole closed.



Turfgrass and Golf Course Benefits — A Scientific Assessment

by **DR. JAMES B. BEARD**

Chief Scientist, International Sports Turf Institute, and

DR. ROBERT L. GREEN

Assistant Professor, University of California, Riverside

HUMANS have used turfgrasses to enhance their environment for over 10 centuries. Golf has been played on turfgrass for five centuries, or one-half that time. Thus, humans have had an interest and willingness to invest time in maintaining turfgrasses for the enhancement of their environment for many centuries. Point in fact, turfgrasses may be one of the oldest techniques humans have used to enhance their external living environment. Thomas Jefferson, one of the foremost statesmen in the United States, once wrote that communities "should be planned with an eye to the effect upon the human spirit by being continually surrounded by a maximum of beauty."

Over 7,500 species of grasses, grouped in 600 genera, are widely distributed throughout the world. While turfgrasses can be identified as to their origin in specific regions of the world, many of the major turfgrasses used in the United States have been naturalized in North America for over 400 years. If humans should disappear from this continent, these turfgrasses would continue to persist and thrive.

Turfgrasses are one of the principal vegetations used on golf courses. While there are certain intensively maintained turfed areas on the golf course in terms of closely mowed putting greens, tees, and fairways, more than 70% of the golf course is devoted to areas consisting of a naturalized ecosystem (Table 1). These areas provide rich habitat for trees, shrubs, flowers, birds, fish, and other wildlife. Unfortunately, there is a tendency for



Dr. James B. Beard

golf courses not to be recognized for their valuable contribution in preserving a naturalized ecosystem in and near urban areas. If golf courses did not exist, these areas probably would be used for either urban residential and industrial development or for intensive agriculture.

Turfs have numerous important functions as well as being both aesthetically attractive and important outdoor recreational surfaces.

These important beneficial characteristics, which are summarized in Figure 1, contribute to our quality of life and are too often overlooked. In addition to these important benefits, the maintenance of our turfgrasses contributes \$45 billion annually to the United States economy, representing a substantial number of jobs.

Soil Erosion and Dust Stabilization.

Turfgrasses are one of the more inexpensive, durable ground covers. They offer a cost-effective method to control wind and water erosion of soil, thereby protecting a valuable, non-renewable soil resource. For example, studies have shown the comparative soil sediment loss from a very intense 3-inch-per-hour rainfall to be 199 lbs./acre from bare cropland, whereas the loss from a turfgrass cover was only 15% as much (Gross et al., 1991). Note that rains of this intensity are rare. Most rains in the more normal range of 1 inch or less are characterized by negligible sediment loss from turfgrass areas.

Water Entrapment, Groundwater Recharge, and Flood Control. Mowed turfgrass typically ranges from 30 million to greater than 8 billion shoots per acre (Beard, 1973); a shoot density of over 26 billion is found on closely mowed putting greens. The closer the mowing height, the higher the shoot density. This dense plant canopy of mowed turf is one of the most effective systems in the entrapment of water and water-borne particulate matter and chemicals. The large amount of water runoff that occurs from impervious surfaces, such as asphalt, concrete, and roofs in urban areas, carries many pollutants in the runoff water that are trapped in the turf canopy, thereby protecting the quality of surface waters.

The dense turfgrass canopy that acts essentially as a sponge also greatly reduces the intensity of runoff water shortly after rains, thereby holding water in place to increase the rate of groundwater recharge and reducing the rate and amount of runoff water, thereby decreasing the need to invest in expensive man-made flood-control structures.

Carbon Storage. A grassland ecosystem is well known for its high soil organic matter levels in comparison to woodland areas. A

Table 1
Comparative Turf Utilization by Area for a Representative Golf Course

Turf Use	Area (acres)	Percentage of Area
Rough / water / woodland	130.0	72.2
Fairways	40.0	22.2
Building / parking lots	5.2	2.9
Putting greens	2.5	1.4
Tees	2.3	1.3
Total area	180.0	100.0

Figure 1
Summary of Benefits Derived from Turfs

Functional Benefits	Recreational Benefits	Aesthetic Benefits
Soil erosion control	Low-cost surfaces	Beauty
Dust prevention	Physical health	Quality of life
Groundwater recharge	Mental health	Mental health
Flood control	Safety	Social harmony
Carbon storage	Spectator entertainment	Community pride
Organic chemical degradation		Increased property values
Heat dissipation		Complements trees and shrubs in landscape
Noise abatement		
Glare reduction		
Air pollution control		
Nuisance animal reduction		
Allergic pollen control		
Fire hazard reduction		
Wildlife habitat		

(from J. B. Beard, 1989)

Table 2
Representative Microbial Biomass of Soils Under Three Types of Plant Utilization

Type of Utilization	Microbial Biomass (kg C/ha)
Grassland	1,200
Forest	850
Cropland	700

(from Smith and Paul, 1990)

high proportion of the world's most fertile soil was formed under a grass ecosystem. The very unique extensive, fibrous root system of turfgrasses contributes substantially to soil improvement through organic matter additions from decomposing roots and underground stems, which have an estimated turnover rate of 42%. For turfgrass, 66% of the annual net productivity of plant biomass is below ground (Falk, 1967). Thus, turfs function in carbon storage via conversion of carbon dioxide emissions to soil organic matter. They also serve a vital function in restoration of environmentally damaged lands.

Organic Chemical and Pesticide Degradation. Turfgrasses have a unique, fibrous root system that is continually being replaced. This dynamic decomposition process supports a large, diverse population of soil microflora and microfauna. Compared to grassland, the average microbial biomass is 42% less for cropland and 29% less for forests (Table 2). These measurements were made on unirrigated grasslands; thus, many irrigated turfgrass areas would have microbial populations that are even larger. The turfgrass-soil ecosystem with its large micro-organism population offers one of the most active biological systems for degradation of trapped organic chemicals and pesticides, thereby functioning in the protection of groundwater quality.

Enhanced Heat Dissipation. The transpirational cooling capabilities of turfs have a significant cooling impact on the micro-environment. Urban areas tend to be 10 to 12°F warmer than adjacent rural areas. Thus, the higher the percentage of turfgrass areas in urban communities relative to impermeable surfaces, the less the heat island effect. The temperature differentials that occur are dramatically illustrated on a typical August day in College Station, Texas (Table 3). These transpirational cooling effects on the microenvironment strongly buffer the potential heat stress effects on humans participating in sports and recreation on turfed surfaces when compared to the alternatives.

Reduction in Noise and Glare. Significant noise abatement can be achieved through the use of turfgrasses. For example, a 4-inch-high turfgrass area along a road reduces vehicle noise levels by 40% in a distance of 70 feet (Cook et al., 1971). This noise abatement is further accentuated by a combination of turfs, trees, and shrubs. By the same token, the multidirectional reflection of turfgrasses significantly reduces the discomfort of visual glare effects on the human eye.

Decreased Noxious Pests and Allergy-Related Pollens. Mowed turfgrass areas surrounding residences and buildings reduce the natural habitat for certain undesirable



Over 24 million golfers play 500 million rounds of golf on more than 15,000 golf courses, representing 2.4 billion hours of healthful recreation (Pebble Beach Golf Links, California).



(Above) Turfgrasses provide many functional, recreational, and aesthetic benefits (Queenstown, New Zealand).

(Top right) Turfs provide a resilient cushion that minimizes injuries (Auckland, New Zealand).

(Right) Maintenance of turfgrasses contributes \$45 billion annually to the U.S. economy.



animals, such as snakes, rats, and mice, as well as insects such as mosquitos, chiggers, and ticks (Clopton and Gold, 1992). The latter are particularly significant in the spread of Lyme disease. Finally, the numerous allergy-related pollens produced by dicotyledonous plants are significantly reduced in mowed turf areas.

Reduced Fire Hazard and Enhanced Security. The living green space of irrigated turf, parks, golf courses, and residential lawns provides a significant green space of low fuel value that is vital as a fire break,

Table 3
Comparative Temperatures of Four Surfaces
Assessed in August in College Station, Texas

Type of Surface	Maximum Temperature (°F)	Percent Increase Over Green Turf
Green, growing turf	88	—
Dry, bare soil	102	16
Brown, dormant turf	126	43
Synthetic turf	158	80

(from Johns and Beard, 1985)



The clean, cool green of turf provides a pleasant environment in which to live, work, and play (Park Country Club of Buffalo, Williamsville, New York).

particularly in areas that experience extended summer droughts (Youngner, 1970). Also, mowed turfs provide a high-visibility zone that restricts the activities of unwanted intruders.

Wildlife Habitat. A diverse range and a large number of wildlife are supported by the integrated landscape of grasses, trees, shrubs, and water features commonly found on over 66% of a typical golf course area. Studies by scientists conducted on the municipal golf courses in the Cincinnati area led to the con-

clusion that golf courses may be described as bird sanctuaries, especially when compared to the surrounding urban and agricultural uses (Andrew, 1987).

Recreational Benefits. Turfgrasses enhance the physical health of sports and recreational participants. Over 24 million golfers play 500 million rounds of golf on more than 15,000 golf courses in the United States, representing 2.4 billion hours of healthy outdoor recreation (Balogh and Walker, 1992). Turfs also provide a resilient

cushion that minimizes injuries. As golf courses represent less than 4% of the turf facilities, the total recreational activities provided by turfed areas is many times greater.

Ornamental Benefits. Grasses provide beauty and aesthetic benefits that are difficult to quantitatively measure. In a 1971 Harris-Life survey, 95% of the respondents reported one of the things they wanted most around them was "green grass and trees." Golf courses satisfy this human need. There also are the benefits derived from improved



(Top) More than 70% of a golf course can be devoted to area consisting of a naturalized ecosystem (National Golf Links of America, New York).

(Above) Golf courses attract a diverse range of wildlife. Wood ducks have made a home at the Jupiter Island Club, Hobe Sound, Florida.

mental health, social harmony, and work productivity (Ulrich, 1984). How we use vegetation in our surroundings is basic to social stability and harmony, particularly in urban areas. Ugliness is costly! Cities can be dismal without green turf in parks, beside boulevards, surrounding homes, and on golf courses. If we fail to provide representative amounts of turf in urban communities, there tends to be a loss of productivity and greater susceptibility to anxiety, and that may lead to mental illness. The clean, cool, green of turf provides a pleasant environment in which to live, work, and play. Such aesthetic values are increasingly important to the dignity of the human spirit and to the mental health of urban residents.

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THE BEST TURF TIPS OF 1993

ALGAE BUSTERS

by JOHN H. FOY

Director, Florida Region, USGA Green Section



A groomer reel, mounted on a lawn mower handle, is one method to help the superintendent break up an algae layer (left). The Garden Weasel is being worked over a problem area, resulting in a thorough shredding of the algae crust (right).

SURFACE ALGAE is a fairly common nuisance problem of putting greens throughout the country. No doubt it will continue to be a thorn in the side of golf course superintendents because of the environmental factors that favor its growth. The most favorable conditions are wetness and humidity, along with a fertile, compacted, waterlogged soil. If the turf canopy is thinned for any reason, a green or black algae scum quickly becomes established.

Just as a quick review, algae are minute, single-celled, thread-like green plants. Their spores are spread by wind and rain, and algae is neither a pathogen nor a parasite of turf. Researchers have found that most algae scums are composed of eukaryotic types and cyanobacteria.

Although surface algae is often a summertime problem in many areas of the country, the mild winter conditions of Florida make it a problem throughout the year. This winter, many courses throughout the state have been battling algae because of the unusually wet weather that has persisted.

From the first of November through the end of December, more than 27 inches of rain fell in Palm Beach County. Also, some courses have added 8 to 9 inches to the total during the first 10 days of the new year. The winter months are supposed to be the dry season in Florida!

When it comes to preventing surface algae, maintaining a dense turf cover and following through with proper irrigation practices and drainage improvements are the first line of defense. After an algae scum has formed, however, cultural and chemical control measures are usually required.

Spiking/slicing operations or coring is beneficial in breaking up and drying out algal scum. However, the resulting crust is almost impenetrable to light and water, and it tends to retard reestablishment of a good turf cover. When this happens, additional mechanical cultivation is needed to further break up the algal crust.

At two golf courses, unique methods have been found to help break up algal crust following spiking or as a spot treatment approach for small isolated patches.

Bill Henderson, golf course superintendent at the Wellington Country Club in the West Palm Beach area, has attached a groomer reel to an old lawn mower handle. The device is then "worked" over the problem area, and the close spacing of the blades results in a thorough shredding of the crust. During the fall and winter, this device also is used to prepare a seedbed prior to reseeding of thin areas in the winter overseeding layer.

Across the state at Quail West Country Club, just north of Naples, Florida, Kevin Leo also has found a very good Algae Buster. While shopping in a local hardware store, Kevin spotted a display for the Garden Weasel tool. The "ole light bulb" went off and he purchased one to try on a few algae spots. To his delight, the Garden Weasel did a good job of breaking up the algae so that turf coverage could be reestablished.

From time to time, surface algae probably will be a problem on putting greens across the country. To help bring it under control, you might want to give one of these Algae Busters a try.

'O HOLEY NIGHT'

by JAMES E. CONNOLLY

Agronomist, Northeastern Region, USGA Green Section



Spring Valley Country Club in Sharon, Massachusetts, has found performing aerification at night to be a very beneficial solution.

AERIFICATION is not always the easiest maintenance practice to carry out during the golfing season. Greens aerification leaves holes in the putting surface that affect ball roll and make putting difficult, and most golfers do not enjoy playing on a freshly aerified green. Late summer (mid to late August) is an optimum time to aerify greens in New England, but this is also peak golf time. The conflict between golf and aerifying is perpetual.

Another problem in the conflict is the potential turf injury caused by aerifying and topdressing during the heat of the day. The edge of an aerification hole is subject to excessive drying. In addition, topdressing sand can heat up during the day, causing even more drying and potential turf injury.

High sunlight intensity and temperature act like a catalyst, resulting in damaged, weakened putting surfaces.

Spring Valley Country Club in Sharon, Massachusetts, depends upon regular aerification to improve growing conditions on its severely compacted greens. John Adamonis, golf course superintendent, devised a program that reduces the negatives associated with aerifying. For Spring Valley, performing aerification at night is a logical answer. The golfers are home in bed, temperatures are cool, and there are no interruptions. Benefits of this program are:

1. Minimized turf stress.
2. Reduced interference with golfers.
3. A safe work environment (staff works without danger from golf balls).

4. Decreased labor intensity.

Good preparation is critical. Equipment breakdown during aerification can delay the procedure, thus extending the completion time. Aerification must be completed in the shortest time frame possible, and a practice run before the scheduled aerification helps minimize potential problems.

Mr. Adamonis tests the equipment on a practice green two weeks prior to the regular aerification. The equipment is serviced and fine-tuned, and inventory is checked for tines, belts, tires, etc. Supplies are stockpiled in preparation for fertilization, overseeding, and topdressing. A four-lamp light tower with a generator is reserved at the local rental store. Four lamps as opposed to two lamps provides a backup in the event of lamp

burnout. The staff makes arrangements for the shift in work hours, and the membership is notified of the pending procedure.

The program starts in the afternoon, following play. If possible, they try to schedule it after a holiday or major golf tournament when course activity the next day will be minimal.

Outline of Procedure and Duties

Monday, 5 P.M.

- Staff: crew assistant, mechanic, and two turf managers report for duty.
- Assistant — oversees the operation. He sets up the light tower, adjusts tine depth, removes flagstick and hole liner, inspects green and equipment.
- Turf manager — operates aerifier in a back-and-forth pattern. All turns are made off the green to minimize turf injury.
- Turf manager — in Spring Valley's case, a Verti-Drain machine is used, which requires a worker to signal the operator to lift and lower tines, and to tamp and repair the turf where needed.
- Mechanic — oversees equipment operation until 9 P.M. and remains "on call" throughout the night.

Monday, 7:30 P.M.

- Lights are turned on.
- The procedure continues through the night. The staff interchanges duties and are familiar with all aspects of the process. Approximately 13 greens are aerified by 5 A.M. Tuesday.

Tuesday, 5 A.M.

- Shift change.
- A new three-person crew finishes aerifying the remaining six greens by 12 noon.
- Simultaneously, a staff of four begins topdressing, fertilizing, dragging, and watering.
- Holes are changed and greens inspected.

Tuesday, 1:30 P.M.

- The course is opened for play.

Minimal interference with the membership and avoiding common stresses associated with aerification make night aerification a great alternative. This is an example of how creative thinking has made room for an important maintenance practice. Too often the decision is made to reschedule maintenance for the benefit of golf, rather than considering the needs of the turf. Put that creative thinking to work for you!



(Top) A generator/four-lamp light tower was rented from a local supplier.

(Above) Checking the results after the sun has come up.

Filling Aerator Holes Completely, The First Time

by **STANLEY J. ZONTEK**

Director, Mid-Atlantic Region, USGA Green Section



(Above) The first step is to apply dry topdressing sand heavily only to the strip that is to be aerated.

(Opposite page, top) The sand begins to fill the holes by gravity or the "hourglass" effect, even without brooming.

(Opposite page, middle) After the Verti-Drain has completed its pass, the crew hand-brooms the topdressing material into the holes. The back-and-forth action completely fills the holes with minimal injury to the turf.

(Opposite page, bottom) The final results — holes filled to the surface.

THERE CAN BE little doubt that deep soil aeration, by solid or hollow tines, has given the golf course superintendent a very important tool with which to better manage grass under less-than-perfect soil conditions. Unfortunately, the soil in most putting greens in this country is far from ideal, and as an alternative to the expensive and aggravating reconstruction of these greens, most turf managers exercise the option of trying to modify the existing soil through a program of shallow and deep aeration in conjunction with topdressing.

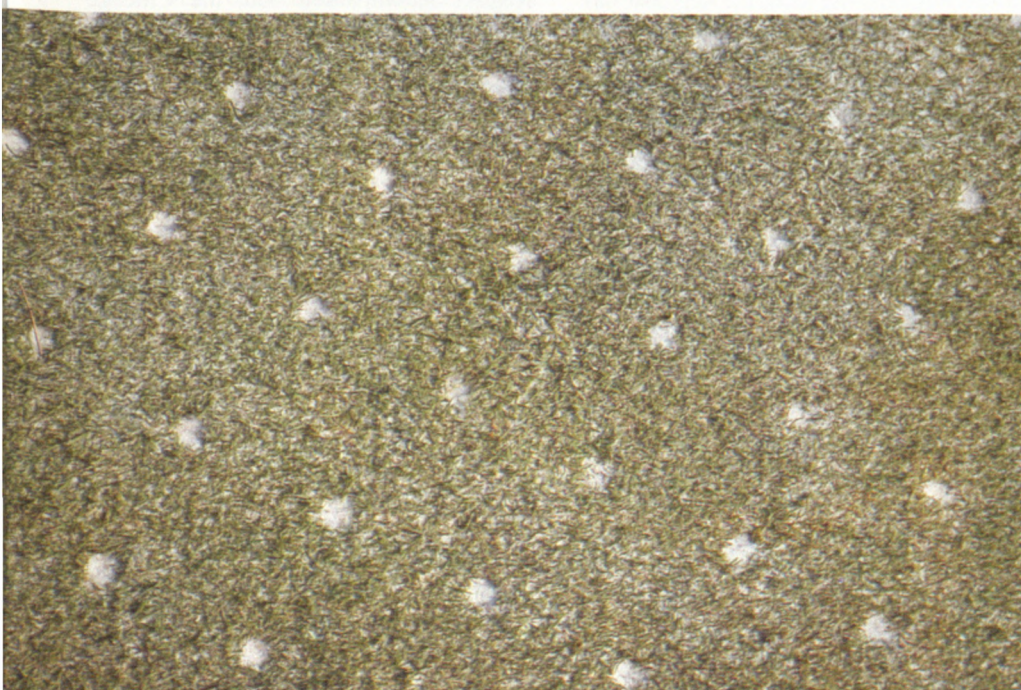
These techniques are well understood by the turf manager. What is more difficult is the

challenge of filling these deep-tine holes with topdressing material. In fact, due to the difficulty of filling these holes, most turf managers do not even try. A variety of techniques have been used, but the results usually fit one of the following descriptions: The holes are not filled the first time, the holes are only partially filled, and/or the greens are so heavily topdressed that the grass is either badly bruised or else the surface of the green is left buried in topdressing material.

Golfers tend to be unhappy with these results, and with most superintendents being sensitive to criticism, it is no wonder we see so many deep aeration operations being just

that — the punching of holes into the greens without any attempt made to fill the holes. It usually is just not worth the aggravation of trying to fill these holes, except on certain troublesome greens. The holes are left open not because it is better to do so, but because there does not seem to be a good method to fill the holes to the surface.

Why fill holes in the first place? In terms of improving drainage in a soil profile, there is no question that filling the holes to the surface is very beneficial. In fact, partially filled holes have little effect on water movement through the soil profile. Consequently, in situations where you want long-



term drainage improvement, soil modification, and interruption of layers in the profile, filling the holes is important. My turf tip this year is the result of a USGA Green Section Turf Advisory Service visit to Wilmington Country Club when aerification and topdressing were being done. Paul Latshaw, Sr., is the golf course superintendent. During our visit, I saw firsthand the filling technique described briefly in the following steps.

Step 1. Topdressing is applied heavily to the strip of the green to be aerated, in this case with solid tines.

Step 2. One or two passes are made over the topdressed area with a Verti-Drain.

Step 3. After the holes are punched through the topdressing and into the green, the topdressing is hand-broomed into each hole. It takes several employees to accomplish this task. The back-and-forth action of the brooms works the dry topdressing into the holes *completely* and *gently*. This careful brooming allows each aerator hole to be filled individually. If a little extra topdressing is needed, it can be back-brushed over the hole and, like an hourglass, the topdressing filters down into the hole and fills it up.

Step 4. Excess topdressing then is brushed forward into the area where the topdresser and Verti-Drain make their next pass. Thus, excess topdressing sand is moved forward and not left in place.

Step 5. The whole process is repeated on the next strip of green.

In seeing this technique in action, it was remarkable how little the turf was damaged. The greens were playable soon afterward, and the grass was less bruised and under less stress.

Naturally, matting of the entire green's surface after a heavy topdressing using a steel drag mat behind a wheeled vehicle can be very abrasive to the grass. Also, the heavy traffic over the green as the topdressing material is matted into the surface (usually in a circular motion) tends to mash down and close the aerifier holes you are trying to fill!

Please note that this turf tip involves significant handwork, and this may be a limiting factor for some golf course maintenance operations.

As with any golf course maintenance technique, what might work well at one course may not work so well at another. There are no panaceas in our industry. However, in situations where you want to fill aerifier holes completely and reduce the scuffing and abrasion of the grass so common with mechanical drag mat use, give this technique a try. It works well for Paul Latshaw, Sr., at Wilmington Country Club, and it could work for you.

NEWS NOTES FOR SPRING



Green Section staff members, from left: National Director Jim Snow, Jim Latham, Jim Connolly, Bob Vavrek, Jim Moore, Chuck Gast, Paul Vermeulen, Dr. Michael Kenna, George Manuel, Nancy Sadlon, Jim Skorulski, Larry Gilhuly, Stan Zontek, David Oatis, Pat Gross, John Foy, Dr. Kimberly Erusha, Bob Brame, and Pat O'Brien. Photo taken February 1992.

Green Section's Turf Advisory Service Celebrates 40 Years of Service to Golf

"Direct service to USGA member clubs and courses — helping clubs at the local level with their own particular problems." That was the emphasis of the USGA Green Section Regional Turf Service when it was introduced in the February 1953 issue of the *USGA Journal and Turf Management*. It was the brainchild of Richard S. Tufts, then Chairman of the USGA Green Section Committee, and Joseph C. Dey, Jr., then Executive Director of the USGA. The new service represented a departure from the long-standing program of turfgrass research, which had been the primary activity of the Green Section since its inception in 1920. The essence of the Regional Turf Service was to help golf course superintendents and course officials keep up-to-date on the best scientific and practical developments in turf management.

That objective has remained pretty much the same over the past 40 years. The field staff has grown to include 16 agronomists, field offices have been established in seven regions, and the national headquarters has settled at Golf House in Far Hills, NJ, but the goals of the Green Section's turfgrass research program and Turf Advisory Service have continued throughout this 40-year period of activity.

Initially, two Green Section regional offices were established, and there were hopes of eventually expanding to five or

six. Alexander M. Radko served as the first director of the Green Section's Eastern Region in Beltsville, MD, and Charles G. Wilson was appointed Western Region director and was located in Davis, CA. The Western Region office provided service to the states of Washington, Idaho, Oregon, California, Nevada, Utah, and Arizona. Within a year of the onset of the Regional Turf Service, the Northeastern Region office was established at Rutgers University in New Brunswick, NJ, and Al Radko was given responsibility for the Northeastern office as well as the office at Beltsville. The Northeastern Region office made the Regional Turf Service available to Connecticut, New York, and northern New Jersey.

In July of 1953, the Southwestern Region office was opened in College Station, TX, for service to golf courses in Arkansas, Kansas, Louisiana, Missouri, New Mexico, Texas, and Oklahoma. Dr. Marvin H. Ferguson was named the Southwestern Director and served also as the National Research Coordinator of the Green Section. Less than a year later a fifth Green Section office opened in Tifton, GA, to provide the Regional Turf Service to the states of Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee. B. P. Robinson served as the Southeastern Director for these eight Southern states.

Charles K. Hallowell joined the Green Section staff as Mid-Atlantic Regional Director when the Turf Service was further

expanded in April 1955. This Beltsville, MD, office serviced golf courses in Delaware, the District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia. William H. Bengeyfield, Green Section National Director from 1982 to 1990, joined the staff in 1954, serving as an agronomist in all five regional offices during his first year. In 1955, Bill succeeded Charles Wilson as Western Region Director.

The Regional Turf Service was available to all member clubs in 1957, when an office was opened in Chicago to service the remaining 13 states. The new Mid-Continent Region encompassed both the Chicago office, which included the midwestern states, as well as the College Station, Texas, office.

The initial fees for a Regional Turf Service visit were established at:

	Less Than 18 Holes	18 to 27 Holes	More Than 27 Holes
1. Service fee, including travel expenses	\$ 58	\$ 78	\$ 98
2. Appropriation to research	15	20	25
3. Subscription to <i>USGA Journal and Turf Management</i>	2	2	2
Total fees	\$ 75	\$100	\$125

For areas of the country not serviced by a regional office, the Green Section made advisory visits for a fee of \$50 per day, plus travel and living expenses.

When the service was started in 1953, the USGA strongly suggested that green chairmen and golf course superintendents make the cost of the Green Section Regional Turf Service a permanent item in their club's annual budget. The initial announcement of the service stated, "We feel confident that the returns will far outweigh the expense." Forty years later, we still do!

The Green Section Record Marks Its 30th Anniversary

The USGA Green Section has recorded and published "information of value respecting proper maintenance and upkeep of golf courses" since 1921, but May 1963 marked the debut of what golf course superintendents and course officials everywhere have come to know as the *USGA Green Section Record*. More than 180 issues later, it continues to provide the game of golf with pertinent information and a unique perspective on the maintenance and management of golf courses.

Over the past 72 years, Green Section publications have taken several forms. From 1921 through 1933, *The Bulletin of the Green Section* published a tremendous amount of research and cultural management information. *Turf Culture* was begun in 1936 and appeared sporadically during the late 1930s and then more regularly from 1939 until 1942. Another publication, based on a newsletter format, was introduced in 1940 and was called *Timely Turf Topics*. It contained short articles and notes of current interest and was published more frequently than *Turf Culture*. In 1948, USGA publications were consolidated into the *USGA Journal* combining *Timely Turf Topics*, changing names in 1950 to *USGA Journal and Turf Management*. This format and name continued until Vol. 1, No. 1 of the *USGA Green Section Record* appeared in 1963.

The May 1963 issue of the *Record* was dedicated to "one of the most urgent problems of our day" — TRAFFIC. Dr. Marvin H. Ferguson was the *Record's* first editor and served in that capacity until 1967. He was followed by William H. Bengeyfield, who served as editor from 1967 to 1978 and again from 1982 to 1990. Issues from 1978 to 1982 were edited by Alexander M. Radko.

The *Record* continues today as a bi-monthly publication, offering articles with the latest information on research, turfgrass culture, golf course management, and environmental issues. A feature that has main-

tained its popularity since the first issue in 1963 is "Turf Twisters," which always has appeared on the back cover of the magazine. It offers readers quick tips on dealing with nagging little turf problems, and many readers tell us it is the first thing they look for when they receive the magazine. Did you know that the titles of the three turf twisters, when read together from the top down, always have offered the observant reader a quick extra message? Look for it, and let us know how we can make the *USGA Green Section Record* even better for the next 30 years!



Keith A. Happ

Keith A. Happ Joins Green Section Staff

The Green Section has named Keith A. Happ, CGCS, as agronomist in its Mid-Atlantic Region. Keith joins Agronomist Bob Brame and Director Stanley Zontek in visiting TAS clubs in the Mid-Atlantic states, including Pennsylvania, Ohio, West Virginia, Maryland, Delaware, Kentucky, Virginia, and the District of Columbia.

Keith joins the staff with a broad background in the turfgrass industry. He was golf course superintendent at Legend Lake Golf Club in Chardon, Ohio, where he also was an active member of the Northern Ohio Golf Course Superintendents Association. As a member of its board of directors, Keith served as chairman of the public relations committee and co-chairman of the editorial committee. He was a member of the Ohio Turf Foundation and the Golf Course Superintendents Association of America.

Keith received his business management degree from John Carol University in University Heights, Ohio. In 1992, he completed his B.S. degree in agronomy from Ohio State University in Columbus. Keith has relocated to West Chester, Pennsylvania, with his wife, Mary Beth, and their four-year-old son, Christopher. The Green Section welcomes Keith and his family to the USGA.

Five Golf Courses Cited as Certified Audubon Cooperative Sanctuaries

Kapalua Bay Course in Maui, Hawaii; St. Charles Country Club, in St. Charles, Illinois; Prairie Dunes Country Club, in Hutchinson, Kansas; Aurora Country Club, in Aurora, Illinois; and Tampa Palms Golf and Country Club, in Tampa, Florida, have been named the first "Certified Audubon Cooperative Sanctuaries" in the Audubon Cooperative Sanctuary Program for Golf Courses (ACSP).

The ACSP was initiated in 1990 to enhance wildlife habitat on golf courses, encourage active participation in conservation programs, recognize golf courses and course officials for their environmentally responsible activities, and educate the public and the golfing community about the benefits of golf courses. The program is sponsored in part by a grant from the USGA and is administered by the Audubon Society of New York State. More than 750 golf courses currently are registered and involved in the ACSP.

The Certified Audubon Cooperative Sanctuary designation recognizes outstanding environmental programs at golf courses that successfully have met certification requirements in seven categories. After joining the ACSP, golf courses can become involved in environmental planning, public involvement, integrated pest management, wildlife food enhancement, wildlife cover enhancement, water conservation, and water enhancement projects. Golf courses that successfully meet the certification requirements in all seven categories are awarded Certified Audubon Cooperative Sanctuary status.

The USGA commends superintendent Peter Leuzinger of St. Charles CC; Short Honma, golf maintenance director at the Kapalua Bay Course; P. Stan George, superintendent at Prairie Dunes; Aurora CC superintendent John Gurke; and Greg Plotner, superintendent at Tampa Palms, for their environmental leadership in establishing their golf courses as Certified Audubon Sanctuaries.

For information on how to involve your course in the Audubon Cooperative Sanctuary Program, contact the Audubon Society of New York State (518-767-9051) or the USGA (908-234-2300).

TURF TWISTERS

WEED-FREE PONDS

Question: My golf course uses effluent water for irrigation. The additional nutrients in the water cause many problems with algae growth in the storage ponds and ornamental lakes. What can I do to control the algae and maintain reasonable water quality in the lakes? (Nevada)

Answer: Your program must take several approaches. First, be sure that additional nutrients are not added to the lakes through fertilizer applications. Keep broadcast spreaders at least 15 to 20 yards away from lakes, and apply fertilizers with drop spreaders near the lakes. Second, provide adequate water circulation so that there are no areas of stagnant water. Next, a combination of physical and chemical control methods can be implemented. Investigate ozone injection, which has been reported to be very effective.

CAN ENHANCE

Question: One of the hottest items in our area is the new lightweight roller. I understand the potential danger of compaction, the uncertainty concerning the frequency of use, and the long-term effects from using lightweight rollers, yet do they really increase putting green speeds? Just how safe is a rolling program? (Virginia)

Answer: In concept, the rolling of greens is safe if done wisely. Without question, you can gain 12 to 18 inches with the Stimpmeter from the use of lightweight rollers. However, this increased speed is very short-lived (sometimes 12 to 18 hours). If you do not raise mowing heights, increase aeration, and topdress regularly, turf loss could occur. There continues to be concern about compaction over both the short and long term. These questions will be answered with time, so at this point a conservative approach would be wise. When used sparingly (two times a week) during the growing season, lightweight rollers smooth the putting surface, increase putting green speed, produce firmness and consistency, and have the potential of being a beneficial tool in a well-rounded putting green maintenance program. Rolling greens, as with any tool, can be used or abused.

GOLF COURSE QUALITY

Question: Our golfers are obsessed with planting trees in every available open area on the course. Several plantings planned for the future are located quite close to greens and tees. How can I persuade them to keep trees away from these critical areas? (Illinois)

Answer: There is no denying that well-placed trees can enhance the appearance and affect the playability of a golf course. On the other hand, the various problems associated with trees planted too close to greens and tees, including shade, root competition, and restricted air movement, are well documented. A 2-inch caliper cottonwood sapling, planted 15 feet from a green, may not appear to affect the putting surface for several years, but in time it will. Make an effort to determine the average mature height and crown width of tree species planned for use on the golf course. One useful reference is the *Manual of Woody Landscape Plants* by Michael A. Dirr, and there are many others. Armed with this information, you may be able to keep future tree plantings in their proper place.