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Green Section RECORD

-
- 1** Charles G. Wilson, USGA Green Section
1982 Award Recipient
-
- 2** The Art of Yesterday — The Science of Today
by William H. Bengueyfield
-
- 4** Water, Water, Everywhere?
by Patrick M. O'Brien
-
- 6** Something Better in Grasses
by James T. Snow
-
- 10** A Golf Course Superintendent's
Role in Good Golfing Turf
by Michael R. Bavier
-
- 12** Should A Green Committee Be Green?
by James B. Moncrief
-
- 14** Place the Emphasis on Playing Conditions
by William G. Buchanan
-
- 16** Spending A Little — Saving A Lot
by Stanley J. Zontek
-
- 18** Let's Waste A Little More
by Brian Silva
-
- 21** Green Construction:
The Right Materials Mixed Right
by Timothy G. Ansett
-
- 22** New Soils Laboratory Announced for
Green Section Specification Tests
-
- 23** Why Has Golf Course Design Changed?
by Richard P. Nugent
-
- 27** Has the Green Section Ever Made A Mistake?
by Donald D. Hoos
-
- 29** The Turf Advisory Service:
What It Can Do for Your Club in 1982
-
- Back
Cover** Turf Twisters
-

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1982 GREEN SECTION EDUCATION CONFERENCE

Charles G. Wilson, USGA Green Section 1982 Award Recipient

CHARLES G. WILSON, of Milwaukee, Wisconsin, the man who pioneered the Green Section Regional Turfgrass Service, in 1952, became the 22nd recipient of the USGA Green Section Award for distinguished service to golf through work with turfgrass.

Wilson received the bronze plaque commemorating the Award during the USGA Green Section Educational Conference, in New Orleans, Louisiana, in February. Stephen J. Horrell, of El Cajon, California, Chairman of the Green Section Award Committee, and Harry W. Easterly, Jr., Senior Executive Director of the USGA, made the presentation. The Green Section Conference was part of the week-long Golf Course Superintendents Association of America International Turfgrass Conference and Show. It was an especially fitting tribute to Charles Wilson, for he has long championed the role of the golf course superintendent.

Born in Port Jervis, New York, Wilson was graduated from the University of Maryland, in 1950, with a degree in agronomy. He joined the Green Section Staff as an undergraduate research assistant in the Beltsville, Maryland, office, in 1947. In 1952, he established the first regional Green Section office in Davis, California, and became the first full-time turfgrass consultant in the field. As a result of his tireless efforts in the western region, the Turf Advisory Service eventually established itself throughout the country. Today it serves over 1,300 USGA Member Clubs.

Wilson left the USGA in 1955 to become agronomist with the Sewerage Commission of the City of Milwaukee. Later, he became head agronomist,



(Left to right) Harry W. Easterly, Jr., USGA Executive Director; Charles G. Wilson, Green Section Award Recipient; Stephen J. Horrell, Green Section Committee Chairman.

sales manager, and, finally, director, succeeding O. J. Noer, in 1960. Wilson serves today as the research director of the O. J. Noer Foundation, Inc. He is a member of the American Society of Agronomy as well as the Golf Course Superintendents Association of America. He has been actively involved in the successful Wisconsin Turfgrass Conference, which he founded 16 years ago, in cooperation with the Wisconsin Golf Course Superintendents Association.

The literature of turfgrass management is far richer today for the contributions of Charlie Wilson throughout his career. He has written a chapter in

the *Turfgrass Science Monography*, published by the American Society of Agronomy. He has been the author and co-author of numerous bulletins, articles and papers dealing with all phases of turf culture throughout the United States and Canada.

As he received the Award, accompanied by his wife, Marion, Wilson said, "We are proud to have helped the grass to grow — for golf." The USGA is also proud to identify, celebrate, and hold up for emulation individuals, such as Charles G. Wilson, who exemplify outstanding dedication through their work with turfgrass.



An old sand-oil green of yesterday.

The Art of Yesterday – The Science of Today

by **WILLIAM H. BENGLEYFIELD**
National Director, USGA Green Section

IT IS ONE of the fascinating paradoxes of our profession. Turfgrass management — for golf — is indeed both an art *and* a science. It was always meant to be so.

The keeper-of-the-green profession has a heritage going back 400, perhaps 500 years. How much it has changed! Science has changed it. And yet, paradoxically, how little it has changed. It is still basically an art form. The thoughts that follow are mostly concerned with science, but my real message is about art.

Science and the Earthworm

Back in the 1930s, Dr. John Montieth, then Director of the Green Section, recalled golfers of that day continuously complained about earthworm casts on

the surface of greens. Invariably, they told him, the casts would deflect their putts away from the hole. Now, from a scientific and statistical point of view, he felt surely a ball would occasionally be deflected into the hole. Over the years, he never recalled hearing one complaint about this occurrence!

Science has long ago solved the earthworm problem — and many more. Weed control, disease devastation, better machinery, better fertilizers — we are all better off because of turfgrass science.

Science and the Stimpmeter

“Science” has even developed a little stick we now roll a ball down to test the speed of the green. The Stimpmeter is

designed to establish speed criteria — not to make every green lightning fast, virtually impossible to putt or to maintain a healthy turf. Man did that! Those who condemn the Stimpmeter overlook the fact that there is an art in using it. The speed of any particular set of greens must surely be at that level best suited for the membership and the conditions that prevail.

Science and Soils

Science has given us specifications for putting green construction. The Green Section Specifications, written in the early 1960s, are officially entitled, “A Method of Putting Green Construction.” No one in a responsible position with the Green Section ever said or claimed

they would produce the perfect fool-proof green. Someone else said that. But science produced the data. It is up to us to execute, to use the data, to make it work. An artist does that.

Science and Research

Now a new era of research, to be sponsored by the USGA Green Section, lies just ahead. Conceived by Al Radko, a long-range, multi-million-dollar research project on minimal maintenance turfgrasses will soon be underway. The objective is to develop turfgrasses that will have greater winter hardiness, wear resistance, drought and temperature tolerance, disease and insect resistance, salt tolerance, require lower fertility levels, and still produce superior playing qualities. Grass plant selections in Asia and South Africa are now underway by U.S. scientists, sponsored by the Green Section. Once the work is complete, an intensive plant breeding program will begin. Genetic selections will be made by advanced computer analysis that cuts years off of previous plant breeding techniques. The full study will take at least 10 years. It will require an estimated outlay of \$5 million. It is an exciting undertaking, the largest of its kind in our history! It will need your help and your support.

Science and Computers

Computers have been mentioned and they are indeed a new "science." They are going to affect our professional and

private lives immeasurably in the immediate future. Dr. V. B. Youngner, University of California, Riverside, recently said, "Computers are an unbelievably fast and unbelievably accurate machine. They are also incredibly dumb. Man, on the other hand, is an extremely slow and inaccurate machine. However, he is brilliant! Bring these three forces together, i.e., speed, accuracy and brilliance, and there is no limit to what may be accomplished."

Notice, if you will, it is man's brilliance, his art that makes the difference. He makes the computer work.

And so it is in turfgrass management, in cooking, in driving an automobile, in just about any pursuit in life. You can have all the science in the world, but if you don't have that certain ability, that perception, that art, to bring it all together in the right manner:

If you don't have that "touch,"

You don't have very much!

Science and Irrigation

Science has also given us improved methods of irrigation. Now here is a topic we can all relate to as a science and an art. Who among us will disagree that automatic irrigation is not AUTOMATIC? Any type of irrigation is, at best, an inexact science. There are so many variables: wind, cloud cover, temperature, soil types, humidity, cutting height, type of grass, shade factors, etc. The more variables one

must deal with, the greater the "art" becomes. Good irrigation is indeed an art.

Science and Us

Perhaps one of the greatest gospels you and I can preach today in turfgrass management is that "green does not necessarily equal good." This story should be told over and over again, especially to American golfers.

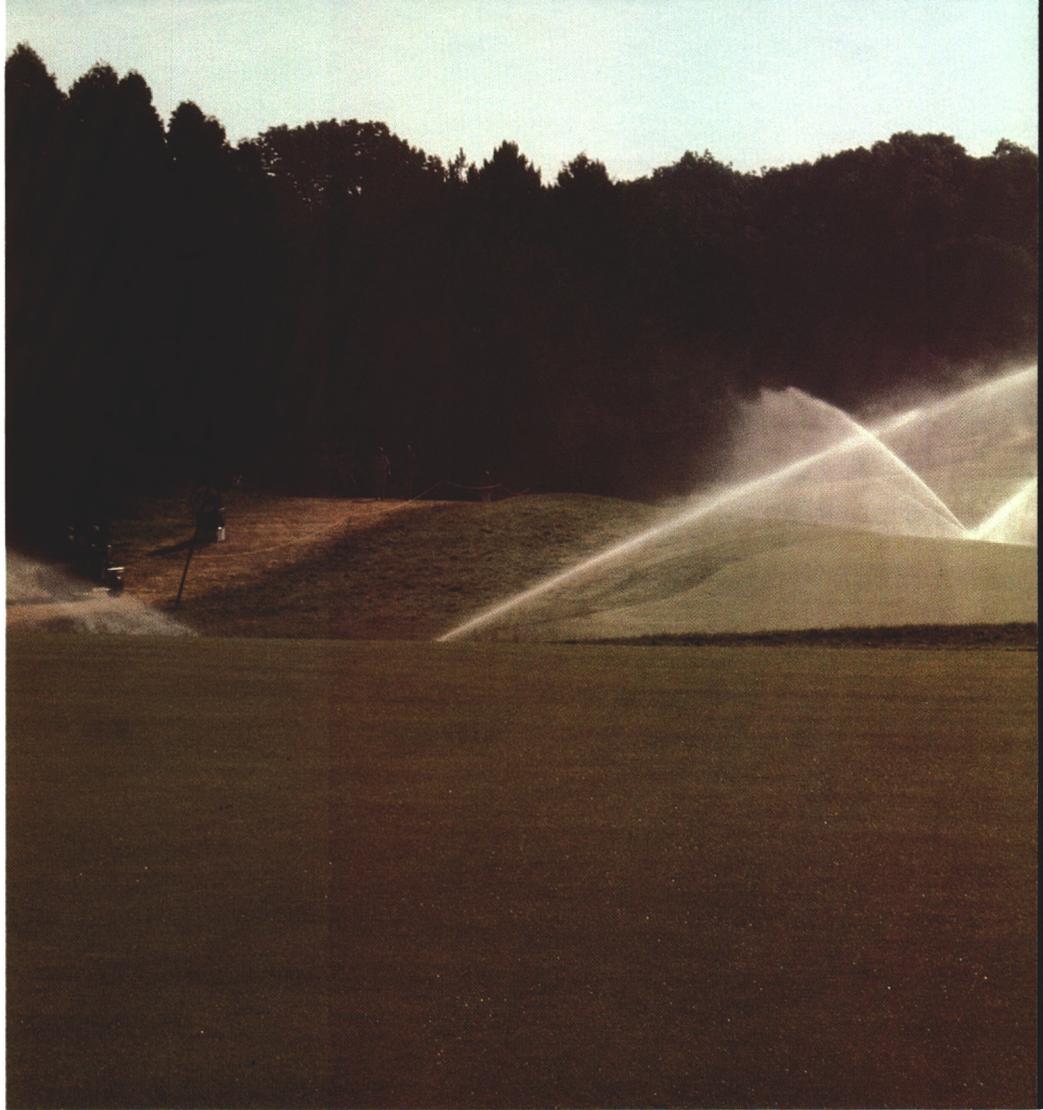
Now, I have heard the quick voices of dissent among us regarding this philosophy. There are always quick voices of dissent. But before we agree to argue about it, let's first be sure we understand what is being said. No one has said, "Green golf courses are bad!" That's foolishness. But the demand by some for a green, green, green golf course, overly watered, overly fertilized, not properly mowed for good playing conditions (but mowed instead for a good green appearance) does NOT make it a good golf course for golf.

Our concern, our job today is much the same as it was for the "keeper of the green" 500 years ago. It is to provide the best possible playing surfaces for the game of golf, not necessarily the greenest ones.

Science will help us immeasurably in our work. But it takes more than science. It takes that special, magical ingredient known as YOU. It is you who make it all come together. You make it happen. You are the artist. Please, don't ever forget that!

Rolling a ball down a stick: an art or a science?





Water, Water, Everywhere?

by **PATRICK M. O'BRIEN**
Agronomist, Mid-Atlantic Region, USGA Green Section

IT DOESN'T TAKE very long these days for the well to run dry! In many of the Northeastern and Mid-Atlantic states, 1980 and 1981 have been dry years, and, suddenly, we find water in short supply. People tend to forget that from 1972 to 1978, precipitation was plentiful in these states. Indeed, these were among the wettest years on record. And now, two consecutive dry years cause golf course superintendents to be concerned.

In 1981, some golf courses experienced irrigation restrictions. Fairway irrigation was not permitted in some areas. This may be the sign of the future for many of us. Because of the ever-increasing

costs and demand for clean water because of population growth and for industrial use, more and more golf clubs are investigating the possibility of reducing fairway acreage, reducing fairway irrigation, and encouraging drought-tolerant grasses.

Many clubs were surprised at how their permanent fairway grasses played and survived last year with no irrigation. On golf courses with bentgrass fairways (cut at $\frac{3}{4}$ -inch in the summer), one of the major problems of the golf superintendent was mower injury, particularly at the perimeters of the fairway where the mowers turn. The damage was alleviated by using lighter mowing equipment. *Poa annua*, with poor heat



Do bentgrass turning areas take a beating?

and drought tolerance, did not survive. The loss of *Poa annua* is always the biggest shock to members. Those golf courses having large amounts of *Poa* in their fairways would be wise to encourage permanent grasses, right now, for the future.

The effect of lighter mowing equipment on cool-season grasses deserves further evaluation. Will lighter mowing equipment actually reduce water requirements of grass? It's worth looking into. Grasses maintained on perimeters of fairways with lighter mowers seem to withstand heat and water stress much better during the summer. Permanent grasses also seem encouraged by lighter mowers.

THOSE CLUBS WITH water restrictions found a saving in their golf course operation budget. Less fungicides, insecticides, and fertilizers were required. At one club, constantly bothered by Japanese beetle grubs, no insecticide applications were required

in 1981. Brown patch, normally a problem on bentgrass fairways in these areas, did not require any fungicide sprayings. Dollarspot, however, did strike; it required normal spray applications at most clubs. The water bill at clubs with restrictions was, of course, much less than in 1980. A club in Philadelphia, with bentgrass fairways, saved 11.5 million gallons of water, worth about \$10,000.

Non-irrigated Kentucky bluegrass fairways in these areas, cut at $\frac{3}{4}$ -inch, also came through the summer in good condition. *Fusarium roseum* and the loss of *Poa annua* were the major concerns. Tillering of the Kentucky bluegrass into the weak areas was very noticeable from mid-July through September.

On golf courses with large numbers of trees adjacent to the fairway, tree root pruning can be very effective in "saving" the water for the grass plant. A trenching machine, rotary hoe, or a homemade tree root pruner can work wonders.

All grasses require water for survival. However, as was observed in areas of the Northeast and Middle-Atlantic regions last year, fairway grasses can and should be maintained using minimal amounts of water. Many clubs learned a valuable lesson. None of us should forget it! We can still produce good golfing turf today with less water.

As to the future, improved turf-producing grasses with low water requirements are needed. Researchers will soon be concentrating in this and other important areas with research grants from the USGA Green Section. The turfgrass industry is not the cause of the water shortage problem. Rather, we are part of the answer. We have the land for the application of effluent water and thus are able to use it, filter it and return it to the potable underground supply. But until research can provide us with new grasses, we must take steps now to manage irrigation water more carefully and use those grasses already available for the job at hand.

Something Better in Grasses

by JAMES T. SNOW

Senior Agronomist, Northeastern Region, USGA Green Section

“THE BREEDING and selection of truly outstanding grass varieties is one of the greatest needs of the turfgrass industry.” This is how Dr. C. Reed Funk, well-known turfgrass breeder at Rutgers University, describes the search for something better in grasses.

Many of the important steps in the history of golf course maintenance have coincided with the introduction of improved turfgrass cultivars. The game of golf itself has been responsible, to a great degree, for the search for better grasses. The establishment of the USGA Green Section, in 1920, spurred the development of improved grass types. In conjunction with the United States Department of Agriculture, the Green Section established plots of the so-called better grasses at the Arlington Turf Gardens in 1921. Since that time, many improved cultivars have been developed, and today, the standards of playability on golf courses throughout the world have improved significantly.

If you need further convincing, consider this statement by Piper and Oakley in their book *Turf for Golf Courses*, published in 1917:

“Kentucky bluegrass is an ideal grass in the North for fairways, and not rarely putting greens are made up largely or almost wholly of this grass, especially where lime is used as a fertilizer.”

Following is a brief discussion of each of the five major turfgrasses used on golf courses today — bentgrass, Kentucky bluegrass, perennial ryegrass, bermudagrass, and zoysia. A historical perspective on each grass is included and is followed by the need for future development within each group.

Bentgrass

Historically, because of its prominent use on putting greens from the time golf was introduced into this country, bentgrass for many years received the most attention in turfgrass selection and

improvement. In the years prior to World War I, seed from southern Germany was used in the establishment of putting greens. It was called South German mixed bent and contained a small percentage of creeping bent, a certain percentage of velvet bent, with the remainder a mixture of colonial or non-creeping types. After several years, the turf which developed from seed would begin to appear mottled or patchy because of the vegetative spread of certain strains within the green. The surface of the green was not always uniform, since certain types performed well while others performed poorly.

The first step in improvement came with the selection of turf from the most vigorous and best-looking patches on the older South German bent greens. This began about 1910. Bentgrass vegetative propagation began at the old USGA-USDA Arlington, Virginia, Test Gardens, in 1921. In 1924, Dr. John Montieth published an article naming seven strains of vegetative bentgrass, including Metropolitan, Washington, Columbia, and Virginia. In 1931, a summary of performance trials indicated that Metropolitan, Washington, and Seaside were the finest bentgrasses available at that time.

Forty experimental greens were established by the Green Section in different parts of the country during 1939 and 1940. Each green had 12 different bentgrasses established in wedge-shaped areas, thereby leading to their name, “pie greens.” Each grass was given a letter and number designation to hide its identity, and superintendents and golfers were asked to putt and rate them according to their performance. In a 1944 summary of the rating on the 40 greens, four grasses were consistently near the top: C-1 (later named Arlington), C-19 (later named Congressional), C-7 (later named Cohansey), and C-15 (later named Toronto). The C-1/C-19 combination

became very popular, and it is still propagated on golf courses today, while currently the use of C-15 is being threatened by a serious and difficult-to-control disease.

Arlington (C-1) was considered by many to be the finest of them all. It was selected for its resistance to heat and drought, disease tolerance and its great wear resistance. Its tendency to be grainy was one of the reasons for mixing it with Congressional (C-19), which was characterized by a pleasing color, good texture and the ability to green up early in the spring and remain green until late fall.

In 1946, Dr. Jesse DeFrance, Dr. Fred V. Grau and Professor H. Burton Musser met and discussed the future of the development of bentgrasses for putting greens. It was agreed that an effort should be made to produce seed of creeping bents which would provide a turf superior to that available from Seaside creeping bent and the seeded colonial types. As a result, 18 of the best-performing strains from the USGA-USDA experimental plots now at Beltsville, Maryland, were sent to Professor Musser at Penn State.

In 1954, Penncross creeping bentgrass was released. The release of an improved seeded creeping bent was an important step forward. Seeded cultivars are vegetatively propagated grasses. Compared to Seaside bent, Penncross was more aggressive, more dense, had much better resistance to several diseases and was less prone to segregation into mottled patches.

In 1958 a search was again begun at Penn State for another high-quality seeded bentgrass. The main objectives now were development of a broad genetic base without gross segregation, excellent putting quality, vigor to compete favorably with *Poa annua* but curtailed compared to Penncross, favorable disease resistance, and good commercial seed yields. After 20 years

of work and evaluation, Penneagle creeping bentgrass was released by Dr. Joseph Duich, of Penn State, in 1978. In addition to meeting most of the stated objectives, tests have shown that Penneagle also provides earlier spring greenup and superior low-nitrogen performance.

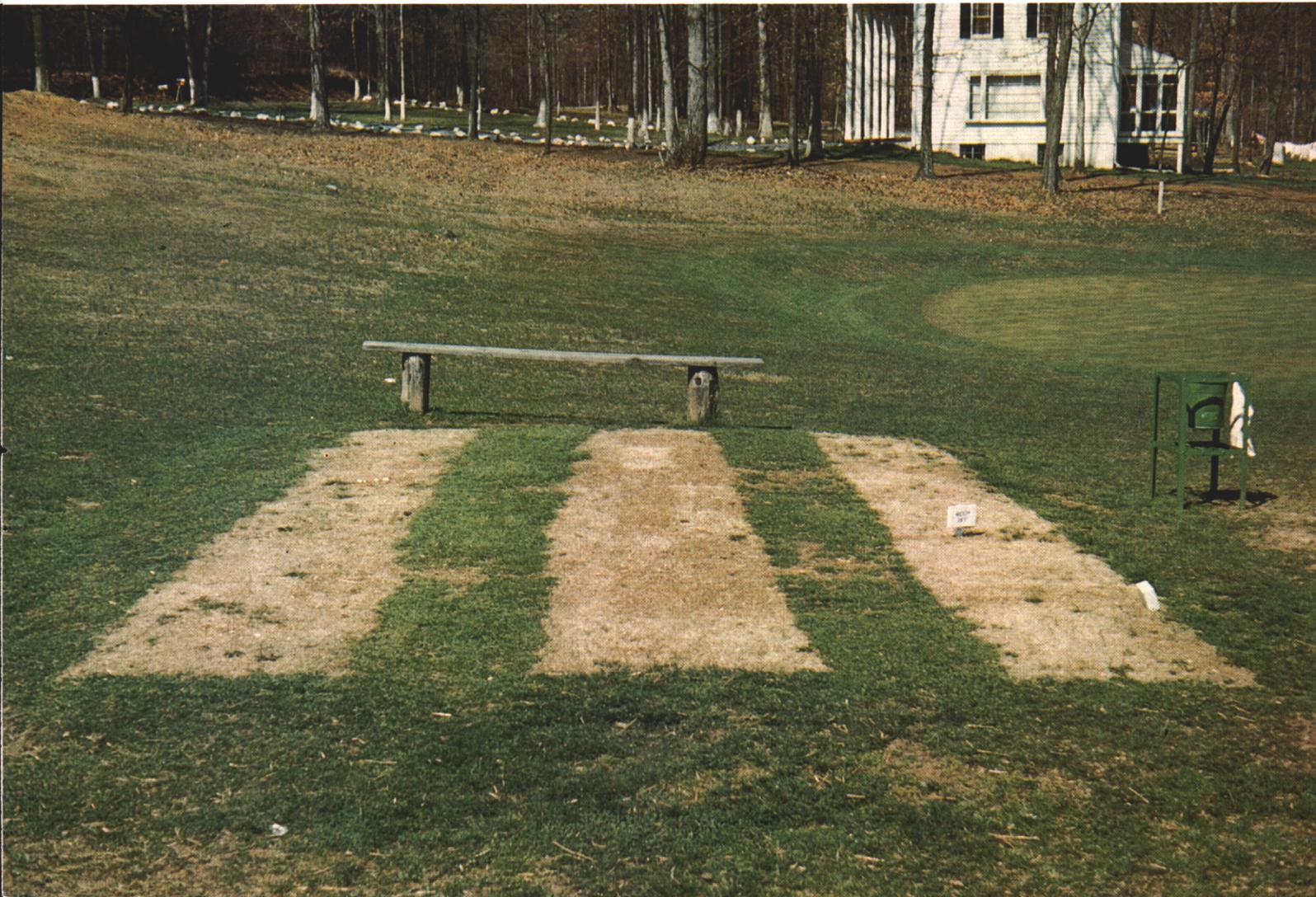
Looking to the future, one of the important needs is the development of a superior bentgrass for fairway use. Existing colonial types offer poor competition for *Poa annua*, and the creeping types tend to thatch quickly at the higher cutting height. They are also prone to scalping and drought injury. At Penn State, Dr. Duich has been selecting rhizomatous colonial bentgrasses with an eye toward fairway use. Someday such a grass might compete well with *Poa annua* while at the same

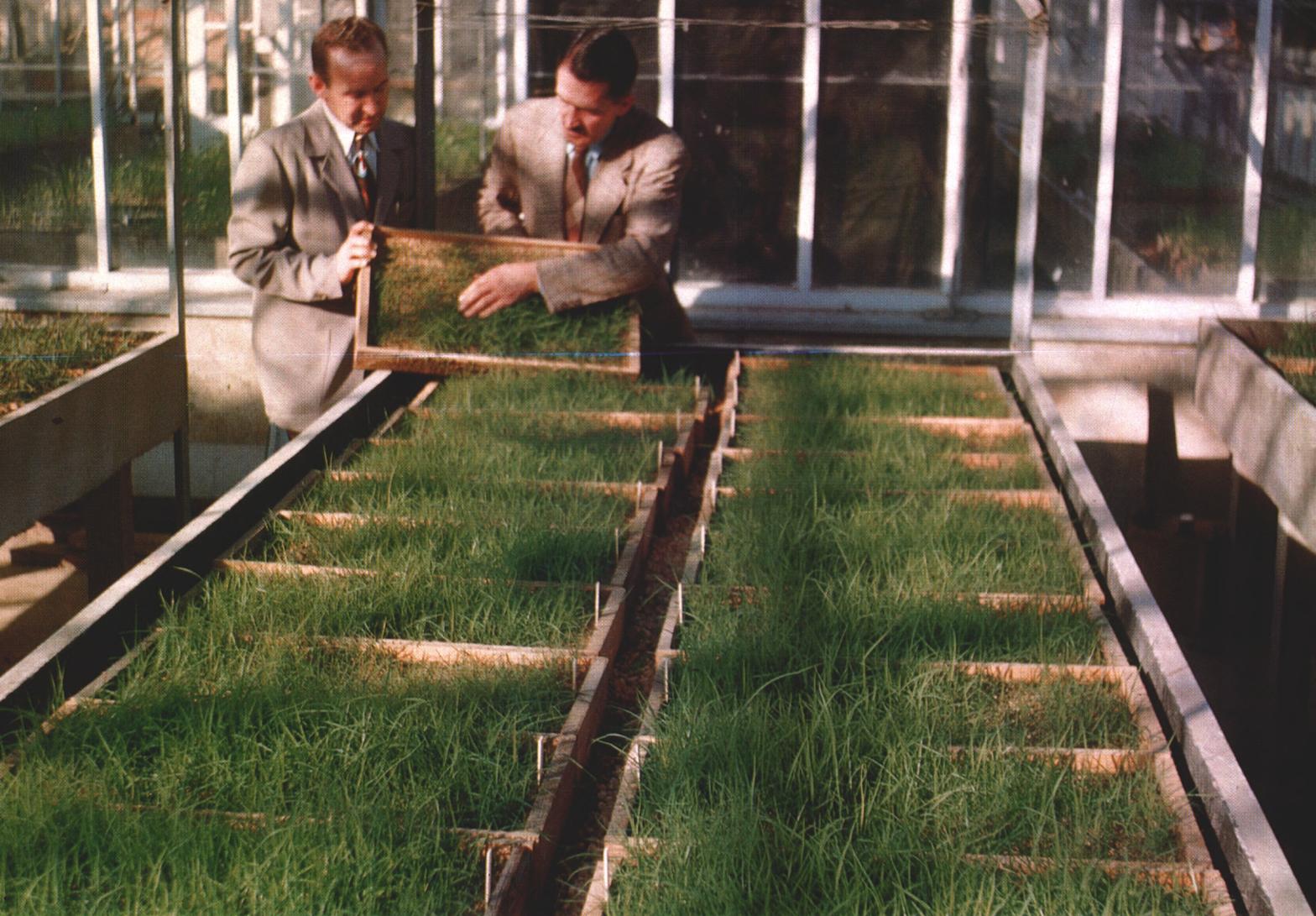
time be deeply rooted, more drought tolerant and more persistent than today's types. Still another goal will be to increase the heat tolerance and summer performance of the bentgrasses so they may be more fully utilized in the South.

Kentucky bluegrass

Kentucky bluegrasses were limited for many years by their susceptibility to disease and their poor summer performance under high-maintenance cultural regimes. The introduction of Merion Kentucky bluegrass, in 1947, was perhaps the single greatest step forward in the improvement of the bluegrasses. It provided a dense, vigorous turf which would thrive under intensive management and which was resistant to the melting-out stage of leaf spot disease.

Early bermudagrass test strips taken by Dr. John Monteith, Jr., in 1939. Left to right: U-1, U-2, U-3 bermuda.





(Above) Zoysia seedling work underway in the early 1950s.

(Right) A patchy creeping bentgrass green. Purple color is old Washington type.



Merion was the "Cadillac" of bluegrasses for many years, until a number of other improved cultivars were developed in the late 1960s and 1970s. The availability of a large number of superior Kentucky bluegrasses today is a desirable situation. Since each one is genetically different and has its own unique strong points, they can be blended to give wider adaptation and more dependable performance. And, there is some safety in just having a number of good cultivars together in one mix.

In spite of the gains made in Kentucky bluegrass improvement, it needs many more for the future. Superior cultivars are needed that will tolerate close mowing and provide better competition for *Poa annua* on tees and fairways. Bluegrasses that exhibit good resistance to diseases and insects, tolerate heat, drought and shade, and that are adapted to saline soils are now in demand. Cultivars that provide good quality turf under low-maintenance conditions must also be investigated.

Perennial ryegrass

The extensive use of perennial ryegrass on golf courses has become a recent phenomenon. As long ago as 1917, Piper and Oakley stated, "For golf purposes, perennial ryegrass has no higher value than Italian (annual) ryegrass. On fairways it is not objectionable, but there are few conditions under which other grasses are not more desirable."

More than 30 years later, Professor Musser (*Turf Management*, 1950) could do no better in his statement, "Its value in mixtures for permanent turf in the North is questionable."

It really wasn't until 1967, with the release of the cultivar Manhattan by Dr. C. Reed Funk, of Rutgers, that the potential of the perennial ryegrasses began to be realized. Since then, dozens of improved cultivars have been introduced, opening the door to greatly increased utilization on golf course fairways and for overseeding dormant bermudagrass turf in the South.

The improved turf-type perennial ryegrasses available today exhibit improved color, shade tolerance, winter hardiness, heat tolerance, disease resistance, mowing characteristics and better turf density and texture compared to common perennial ryegrass. However, turfgrass breeders can look ahead with many objectives in mind, including the

need for even greater disease resistance, winter hardiness and tolerance to close mowing. In addition, cultivars with a more diminutive growth habit must be sought so that perennial ryegrass can be used more effectively in mixtures with Kentucky bluegrass and other turf species.

Bermudagrass

Bermudagrass is believed to have been brought to this country in 1751, but it wasn't until 1918 that selections of the species were made for turf characteristics. This work was initiated by Dr. D. V. Piper, of the USDA. Though bermudagrass was used extensively on golf courses in the South at that time, Piper and Oakley (1917) stated that "Bermuda putting greens have in general not been altogether satisfactory . . . (but) hope lies in finding a variety of bermuda that is fine in texture."

The first major improved selection of bermudagrass was released in 1947 by the USGA Green Section and was called U-3. It came from Savannah, Georgia, and is known there as Halls bermuda. Its excellent low-temperature hardiness makes it popular even today in the upper South.

In 1952 the first of the famous "Tif" series of bermudagrasses was released by Dr. Glenn Burton, of the Georgia AES. Named Tiflawn, this cultivar offered vigorous growth and excellent wear tolerance, making it popular for sports fields, recreational areas and lawns.

A number of improved bermudagrass cultivars have since been released from experiment stations in Georgia, Florida, Texas, California, and elsewhere. Of special significance to golf courses is the introduction of Tifgreen, in 1956, a cultivar with fine texture, high shoot density and low growth habit. These characteristics made Tifgreen the first high-quality bermudagrass for putting greens, fulfilling the hope of Piper and Oakley. The release of this and other cultivars, including Tifdwarf, in 1965, have filled a significant gap in the development of quality playing conditions on putting greens in the South.

In looking ahead, bermudagrass breeding efforts will be focusing on such important characteristics as cold hardiness, pest resistance, earlier spring greenup, reduced thatching tendency, tolerance to salt and pesticides, and ability to withstand the application of

brackish water or sewage effluent for irrigation purposes.

Zoysiagrass

It has been said that the story of zoysiagrass improvement is the story of Meyer zoysia. Released jointly by the USGA Green Section and the USDA, in 1951, as a finer textured strain of *Zoysia japonica*, Meyer zoysia remains today one of the best available cultivars in its range of adaptation. It was selected at the Arlington Test Gardens in 1941 and was further evaluated at Arlington and later at the Beltsville Turf Gardens until its release. Meyer zoysia was named after Frank N. Meyer, a plant explorer who collected zoysia seed in Korea and brought it to the United States in 1906. Useful on home lawns, athletic fields, playgrounds, parks and cemeteries, Meyer zoysia is also the primary cultivar being used on golf course tees and fairways in the transition zone.

One of the real problems with the use of zoysiagrass on golf courses has been its very slow rate of establishment. Future breeding and selection efforts will be geared toward improving the seed production, establishment, and recuperative rate, developing better cold hardiness, pest resistance, spring greenup and fall color retention, and improving the texture and consistency of this grass.

The outlook for improving bermudagrass, zoysia and other warm-season grasses through breeding and selection looks very promising. Several prominent turfgrass researchers are planning trips to Asia and Africa to search for bermuda and zoysia strains which show promise in fulfilling some of the needs of these grasses.

In Conclusion

Many advancements have been made in the past 60 years in the development of improved turfgrass cultivars for use on golf courses and elsewhere. Although today's cultivars have many weaknesses, the potential for further improvement is greater than ever before, due to an expanding knowledge of genetics and the development of new breeding techniques. Since the cost of maintaining golf courses continues to increase, the search for something better in grasses is indeed one of the greatest needs in the turfgrass industry today.

A Golf Course Superintendent's Role in Good Golfing Turf

by **MICHAEL R. BAVIER**, CGCS, Inverness Golf Club, Illinois
Past President, GCSAA

ONLY THOSE GOLF course superintendents who consistently have good golfing turf will be around to play a future role at their golf facilities. The others will be looking for work. The golf course superintendent, more than ever before, must produce a course that is playable day in and day out. It has been said, and generally agreed, that the golf course is the most important single part of every golf club operation. Granted, many clubs have excellent food services and other niceties that go along with a super facility, but the golfer, who is the mainstay of the club, demands a good course. He enjoys playing the course for whatever reason, and, in most instances, he is proud of it. A similar reaction probably is felt by public fee golfers. They are not members of a club, but they deserve and enjoy playing a well-conditioned course. That's where our role as professional turfgrass people comes into play. We must maintain high standards and make our courses as playable and enjoyable as possible.

The way we have gone about this has changed over the years. Not long ago we pulled hoses and sprinklers around to water greens, tees, and sometimes fairways. We are now blessed with computer-controlled irrigation systems to apply the proper amount of water at the proper time. This has helped considerably in the management of our courses. Hopefully, the golfers have noticed it as well. In fact, a number of studies have been conducted recently that show that with automatic systems, 50 percent less water is used than with a manual system.

The selection of chemicals and fertilizers for turfgrasses has improved tremendously over the years. We now have a specific chemical to control

snowmold, pythium, and just about any other disease, unless, of course, you had C-15 dieback at your course last year! Fertilizers are so varied today that you can pick one that has slow release nitrogen, another with fast release, water soluble, water insoluble, etc. Our role has changed in that the turf manager must know what product is best for each specific situation. Added to this are other responsibilities, such as improvements in machinery, how to run each one properly, and how to maintain each expensive piece. Our role continues to become more involved, but our goal still stands — to produce good turf for the golfer.

THE TREMENDOUS variety of grasses that have come on the market in the last several years has helped many of us improve the turf at our clubs. We now select the variety that best fits the need, one with the desired texture or color; a strain that is resistant to a certain disease; one that is heat tolerant; one that stands up under a lot of traffic. We now have the opportunity to pick the type of grass for a specific situation.

For example, in the Palm Springs, California, area, improved perennial ryegrass is used almost exclusively today in overseeding programs. Just a few years ago, annual rye was used because the new perennial hybrids were not available. In striving for better playing conditions, the new improved perennial breed was developed and given a chance. As it looks now, very little annual ryegrass will be used on the western desert courses for overseeding in the years ahead.

The cost of the different ryegrass overseeding programs is very comparable. At first glance, when one

compares the cost per pound of annual ryegrass seed versus perennial rye, one finds a big difference! However, the number of seeds per pound must be taken into consideration. Less fertilizer is also needed for the perennials. Perhaps the greatest difference between the two grasses is the ability of the perennial to withstand traffic. Thus, we have produced a higher-quality turf, desired by the golfer at a cost that is quite comparable.

An incident that has had a lot of publicity during the past year, the C-15 problem, has ruined more good golf greens than one wants to remember. Through the collective funding of the Golf Course Superintendents Association of America, the United States Golf Association, and the Chicago District Golf Association, a team was put together to investigate the cause of C-15 dieback. Though much has been learned, concrete information is yet unavailable from the team or from any other outside agents.

Few courses in the Midwest have much C-15 Toronto bentgrass left in their greens. Superintendents in the area have either seeded or sodded their C-15 greens with one of the improved seed-type bentgrasses. One quickly realizes that adjustments have to be made in this business. In a crisis situation like the C-15 or in a non-crisis situation like the ryegrasses, the superintendent must adjust and make the best of the problems that confront him.

TURF MANAGERS who accept problems and meet challenges as they come forth will always do well. Those who stay attuned to new techniques and continue their educational process, either through classroom train-

ing or practical experience will, in most cases, be able to cope with the ever-changing role the golf course superintendent plays in growing fine turf.

You must continue to use all the information available to you. Take advantage of the opportunities that are offered. Use the reference material that the GCSAA has available. Call upon

the USGA Green Section. Investigate each avenue of approach. Try different ways. Be open minded. Ask a friend for ideas. Your role is ever-changing because the future is ever-changing. Manage change by keeping up with it. Your entire future will be enhanced tremendously if you will adopt this outlook.





Should A Green Committee Be Green?

by **JAMES B. MONCRIEF**
Director, Southeastern Region, USGA Green Section

IN 1961, over 50 percent of the golf clubs in the United States were private clubs. Today, this percentage is lower, and more and more golf courses are owned and operated by municipalities, individuals, and/or corporations. Some clubs are run by a general manager. This story, however, is directed to those clubs where the green chairman, the green committee and superintendent manage the golf course. Regardless of the type of club or the type of organization, there is no substitute for the most competent superintendent one can find.

Most clubs were formed to have a golf course, and they are judged by their course, its layout, and condition. If it weren't for golf, there would be little

reason to have all the other amenities associated with most modern country clubs today. The green committee is perhaps the most important committee of all, since it is charged with the greatest asset and one of the major operating expenses of the club. Green committeemen should have great pride in serving, in the challenge, and in the rewards they can bring to their fellow members.

The Green Chairman and His Committee

The green committee should be one of the most important and most active in the club. Selection of a proper chairman is most important, and considerable emphasis should be placed on the position. The committee chairman

should be a member of the Board of Directors. This has certain advantages for all concerned; i.e., it will be easier to keep the Board more informed and more authoritative in justifying the budget. The chairman should be an active golfer (not necessarily a low handicapper), with a working knowledge of the Rules of Golf. He must serve at least three to five years in this capacity in order to carry out planned policies and assure progress. He is not expected to be an agronomist, but he should help the superintendent in every possible way. Many green chairmen and committee members may be quite knowledgeable about lawn grasses, but they should guard against becoming "professional agronomists" on the committee.

(Opposite page) Authority to close the golf course during adverse weather by green chairman and/or superintendent can prevent loss of grass.

(Below) The superintendent should take the green chairman to turfgrass educational meetings.



This can be dangerous. They should be mature and flexible enough to recognize and support the superintendent as the turfgrass expert on the course. After all, that's the job they hired him for.

Green committee members should be selected by the chairman, and they should have similar or basically the same aims for the turf management effort at the club. If he does not choose them, the chairman should at least approve the committee. Members should have an appreciation of maintenance problems or be willing to learn about them. Many members will serve only if they are spared the unpleasantness of dealing with member complaints. Be sure to select committeemen who are willing to serve indefinitely. It's a bad policy to have a constant turnover of committee members. Short-term committees do not always significantly contribute to long-range goals.

The larger the committee, the greater the possibility of confusion. A small committee of three to four is usually more satisfactory. The group, including the superintendent, should have frequent meetings, and inspection tours of the course provide an opportunity for first-hand observation. Questions can be asked and problems clarified on the

spot. The green chairman should be the liaison person between the golf course superintendent, the club members, and the Board of Directors. The superintendent should report directly to the green chairman.

The green chairman should also handle complaints, communication between the committee, the superintendent, and the membership. It is best not to overlook any complaint, because it can become a major problem overnight. The club newsletter is an excellent means of keeping the membership informed and keeping complaints to a minimum. It can be a real boost for public relations. The committee should keep the Board well informed. "No surprises" is a good philosophy.

Tournaments are a pressing problem at many clubs, and the green chairman must have a voice in their scheduling. Equally essential is keeping the superintendent informed of these events. Indeed, the chairman and the superintendent should be a team. Nothing can be more important when dealing with budgets, policies, fringe benefits, salaries, and retirements. The chairman should delegate authority to the superintendent to close the course when necessary. This authority would include the control of golf carts when weather conditions justify.

The committee should have a portfolio containing maps of the entire course. Many courses have scale maps showing detailed outlines of each hole. Aerial photos are most helpful and give permanent records of all areas of the golf course.

Budgeting

Budgeting is another area where the committee can aid the golf maintenance program. The committee needs to establish certain standards, certain expectations and then provide an adequate budget to achieve those goals. Keeping a close record of each piece of equipment can be extremely helpful in determining when it would be best to replace it.

Once a budget item is presented and accepted, it shouldn't be taken away later. The budget, however, should be kept in estimated cost. Any budget has to be flexible enough to make changes for emergencies or price fluctuations.

When renovation of a golf course is undertaken, outside help should be brought in whenever it is needed. An architect, or any other person with needed expertise, will provide invaluable assistance to the green committee and the superintendent. Experts will also save money in the long run. The super-

intendent should be encouraged to voice an opinion of progress and the type of job the outside agency is doing, such as weaknesses or omissions in construction. The lowest bidder often is not the best choice to rebuild or remodel the golf course.

When planning, take advantage of an outside agency such as the USGA Green Section. It has the latest information on every subject pertaining to turfgrass management on the golf course.

Superintendent Qualifications and Duties

The best decision any green committee can make is to hire a competent superintendent. He should be knowledgeable in fields such as entomology, pathology, herbicides, nutrition, irrigation, and other specialties. The superintendent today must keep the course at a higher standard than in years past. He can keep abreast of new developments by attending turfgrass conferences, local and national, and should be a member of the superintendents' organizations.

The course itself will benefit from a well-informed and educated superintendent. Most today are attending two- to three-year turf management courses, and many of them finish with a college degree. The superintendent should be encouraged to attend meetings — national, state, and local — and the chairman should accompany him whenever it is possible. The Team — the superintendent and green committee chairman — should play golf together, and the superintendent should be encouraged to play and know the game.

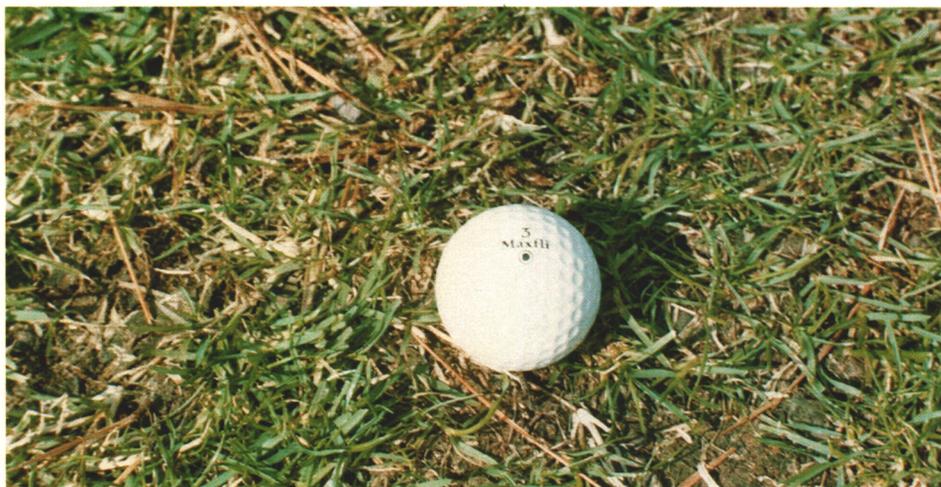
As to contracts, a written one has certain advantages over an oral agreement. Club officials change frequently, and the superintendent is not always recognized for what he has accomplished under other club officials.

The fastest way a superintendent can lose control of his employees is to have other people giving them orders. Where the general manager concept is not in force, the superintendent should answer to the green chairman only. A superintendent or chairman cannot be an appeaser to past criticism. He cannot be thin-skinned and allow petty statements to upset him. The golfer thinks of today's play; the committee and superintendent have to concentrate on having better turf for the many tomorrows.

Members of the green committee should have pride in their course, because it is a reflection on the entire club operation if the course is not in good condition. The green committee should not be green.

Place the Emphasis on Playing Conditions

by WILLIAM G. BUCHANAN
Director, Mid-Atlantic Region, USGA Green Section



Although thin, a closely mown turf can provide a good playing surface.

IT IS NOT unreasonable to say golf course conditioning has made tremendous progress during the past 25 years. Just how much progress may be measured in a number of different ways. For example, glance through the pages of an old golf magazine and note the playing conditions of yesteryear. Never has the golfer had better playing turf than he has today.

Not many years ago, sand greens really were sand greens; i.e., the putting surface was actually made of sand with oil mixed in as a binder. Old pictures frequently show a player addressing his ball on a fairway, but you will only be able to see the tops of his shoes. The rest of his footwear is hidden by grass. We have all seen pictures of old golf courses lacking in turfgrass uniformity, whether on greens, tees, fairways or roughs. Closer study shows unkempt bunkers, dry or moisture stress turf, weeds, and of all things, players and caddies actually walking the course!

Golf course managers today maintain a grass cover that would defy the imagination of players in the early 1920s. Tees today are mostly level.

Fairways are closely and frequently mowed. The rough, relatively speaking, offers almost no obstacle at all. The bunkers are meticulously groomed. Putting surfaces are beyond belief. Not only are the putting surfaces grass, but they are uniform stands of grass covering the entire playing area. The greens are closely cropped, grain has been mostly brought under control, and the hole location is changed many times a week.

These changes in golf course conditioning have also brought about changes in the Rules of Golf. No longer is a player required to play over pitch marks made by the impact of a shot to the putting surface. No longer is the stymie rule in effect. Yet today's players want to take the Rules even further. They want to be permitted to move a ball to a preferred lie and, seemingly, to eliminate any possibility of luck playing a role in their score.

Not only have changes in the conditioning of the course and Rules "improved" the game, but the instruction and equipment that is available to the players today have made equal strides. Almost every modern invention, in

some way or another, is now used to benefit the golfer — computers, videotapes, exercise equipment, special training diets, and even psychiatrists are now in the game.

SCIENTIFIC GOLF equipment has made great advances in the quality of the instruments used to play the game. Investment cast irons, heel-toe weighted woods, metal-headed "woods," frequency-matched light steel shafts (combined with non-slip power grips), and balls that go farther, fly higher and last longer have all contributed, theoretically at least, to the game's progress and enjoyment. The golf cart surely falls in this category.

But have all of these "advances" actually added to the character and real enjoyment of the game? That would be hard for one to believe if one took into account the crescendo of complaints heard today. Winter Rules and preferred lies are still in demand. Calls for irrigating greens until the poorest shot played to them will hold are very popular. Roughs are "monsters" and fairways should have plenty of grass so the ball may be scooped. Without these qualities, some players return to the clubhouse and exclaim, "I play golf to enjoy myself — not to be embarrassed by it!" It does not matter how hard turf management people may try, they probably will not succeed in pleasing such players because the traditional game was not intended to be enjoyable using these criteria.

The game of golf is basically a game of skill. Some golfers are better at it than others. Some individuals work harder at refining their skills than others. The old adage, "The longer the player practices, the luckier he seems to get," is perhaps lost on today's casual golfer. And then there is, and always will be, the undeniable element of luck involved in this game. The "rub of the green" is still in effect.

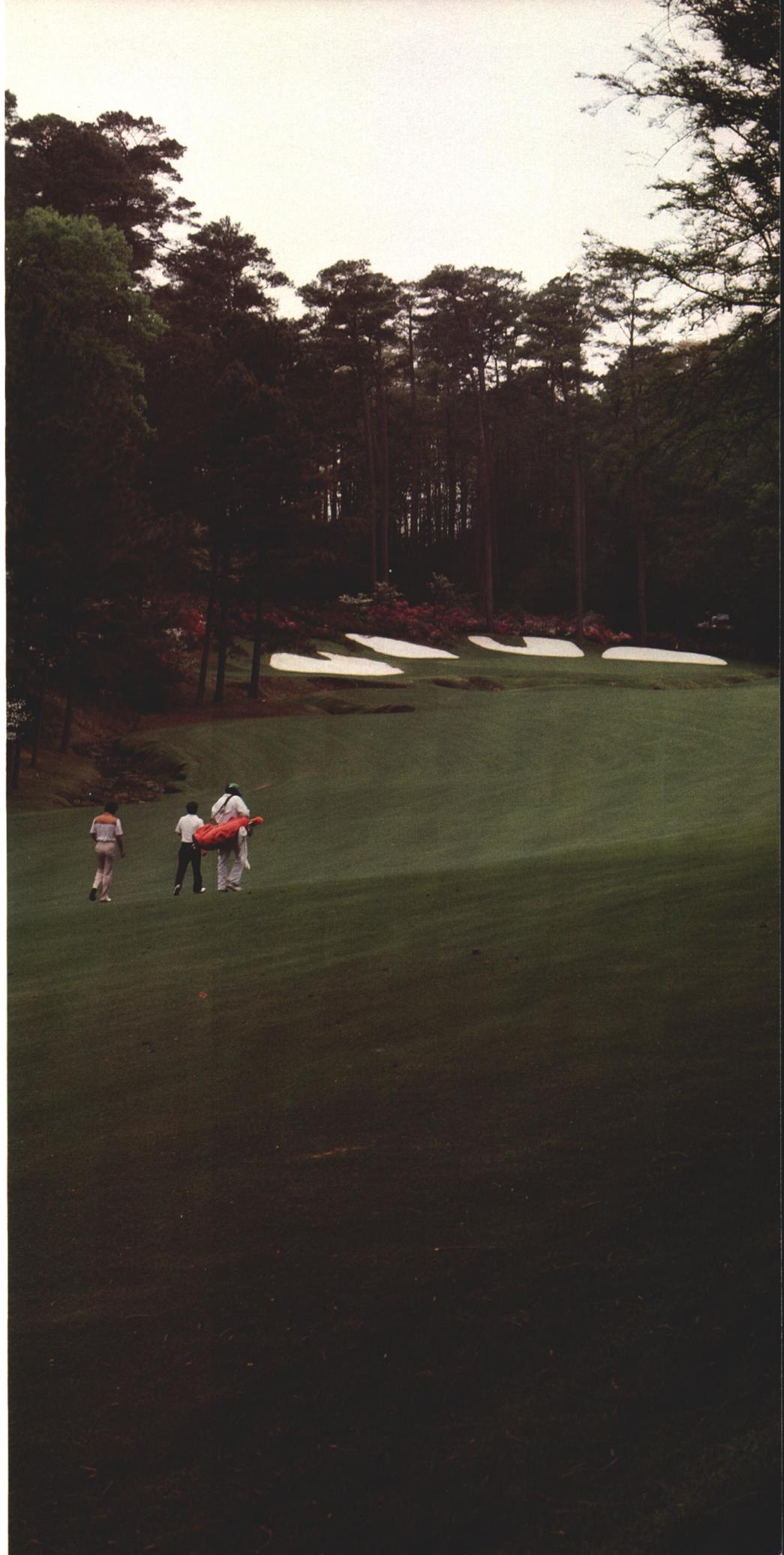
THERE ARE a number of ways to make the game more enjoyable for its participants. The USGA, for one, has developed a handicap system for players. The system is not designed to give one player an advantage over another (skill does that), but to allow players of differing abilities to play competitively against the course as well as one another.

The club golf professional can add tremendously to each player's enjoyment of the game. Through his teaching and encouragement, the pro can not only improve the player's shotmaking skills and abilities, but also provide greater interest and understanding of the Rules of Golf, handicapping, and the player's actual participation in competitive matches.

Certainly, every player enjoys being out of doors as much as he enjoys the condition of the course as it relates to the game. Many competitors will tell you the most important outside element in any game of golf is the condition of the course itself. Playing conditions dictate how equitable the stroke allotment is in the final score. A very soft, overly wet playing surface will reward a poorly played shot. Soft conditions also make all golf courses play long, and this surely does not benefit the high-handicap player. Long grass, as an excuse for preferred lies, encourages all players to hit fliers. Indeed, golf courses that are overly watered and maintained under the philosophy "it has to be green to be good," actually reduce the requirement of skill and the true enjoyment of the game.

Maintaining a golf course with firm, level tees, uniform closely mown fairway turf, rough grass mowed high enough to insure a reward for the fairway shot, and greens firm and fast enough to reward a well-played approach shot and well-stroked putt are all part of this game of skill. The golf course superintendent and grounds committee can have a tremendous influence on the standard of play. Every golfer on your course this year will be influenced by what you do with course conditioning. It affects every shot and every other phase of this skillful game. A round of golf can be many things. However, they will all be more enjoyable with your emphasis on better playing conditions in 1982.

Playing conditions are as important for everyday play as they are for tournament play.





Spending A Little - Saving A Lot

by **STANLEY J. ZONTEK**
Director, North Central Region, USGA Green Section

GOLF MAINTENANCE efficiency, American style, has never been easy. Demands for constant, high-quality playing conditions coupled with ever-restricting budgets and higher costs for essential supplies, places the superintendent right in the middle of the vice's grip. Seemingly, he has no escape.

Rising labor costs have caused reductions in manpower on many

courses over the last decade. To compensate, the superintendent turned to greater mechanization and thereby increased the worker's productivity. Men and machinery, in the right combinations, offer, if not an escape, at least some relief from the ever-tightening vice. The triplex putting green mower, multi-unit fairway gang mowers, and mechanical sand rakes are just a few of the pieces of equipment

that have helped turfgrass managers keep ahead of the game.

For a successful future, it will be even more essential for them to carefully analyze where the labor dollars are being spent **and** what pieces of equipment are now available to better accomplish the task. We will find we must Spend A Little (money) to Save A Lot (of time).



A green after hand mowers have been integrated into the mowing of the green. A good example of "Spending a Little Extra" for better turf.

But there is another aspect of spending a little to save a lot: it is spending time to properly train a golf course worker. Entire educational programs can be devoted to this subject. However, as there is increased emphasis on mechanization, there **must** also be corresponding emphasis on crew training. Remember, your workmen are operating expensive machines — \$20,000 worth or more — while accomplishing an important function that will either positively or negatively reflect on the appearance and playability of your golf turf. If the job is properly done, the course will look and play well.

As an agronomist with the USGA Green Section's Turf Advisory Service, I have the opportunity to see many different golf courses each year. The best maintained courses are those that

enjoy a high level of mechanization and an effectively trained crew. A golf course superintendent cannot do all the tasks on the course himself (even though he may want to). The workforce must be an extension of the superintendent's philosophy of golf course maintenance. This can only be accomplished through efficient crew training and motivation. Let your men know why and how you want a job done. Then, listen to what they have to say. Crew training and communication are a two-way street. Spend A Little (time to listen) and Save A Lot (of aggravation).

GOOD COMMUNICATION, motivation, and a pleasant working environment encourage an employee to be conscientious and have pride in his work. It takes that extra bit of caring to

transform a routine job into an important, effective one. Again, Spending A Little (time and effort) and Saving A Lot (in redoing the job).

Nevertheless, the cry for lower maintenance costs and increased operation efficiency is often reversed by the very same members of a particular golf club. And they have every right to out-vote and overpower themselves! For example, mechanization (in certain applications) may get the job done more efficiently, but it does not always produce the highest possible quality golfing turf. More and more golf courses are going back to hand mowing (i.e., using walking mowers) of putting greens, especially when seasonal labor is available. If not complete hand mowing, at least integrating hand and triplex mowers is now in increasing demand by private club members. On limited areas such as putting greens, this trade-off of efficiency for quality is apparently justified in their minds. They are willing to pay for it anyway!

An even greater contradiction, however, is now taking place on some golf courses in the northeast and central regions of this country. Here, recently, some clubs are mowing their fairways with triplex mowers and, in some instances, even collecting the clippings from them! While this operation is both labor and equipment intensive, the results in better fairway golfing turf have been spectacular. Again, these members seem willing to sacrifice cost efficiency for quality playing surfaces. It is a choice for each individual golf club to make. Surely, the turfgrass manager must not be taken to task for the increased cost of maintenance.

Each golf course is unique. Each must be maintained a little differently. All must balance men, machinery, materials and natural resources to produce quality golfing turf within a budget. Appropriate mechanization, automation, and continuous crew training are all essential elements. And then there are individual decisions each club must make and each turf manager must follow. Spend A Little to Save A Lot is worth remembering.

Let's Waste A Little More

by **BRIAN SILVA**
Agronomist, Northeastern Region, USGA Green Section

THAT GOLF COURSE maintenance costs have increased dramatically over the past two decades requires little amplification. Published figures show these costs to have risen by 350 percent since 1960. That we've come to accept such ever-increasing costs is illustrated by recent petroleum industry estimates of a 6- to 7-cent increase in the price of a gallon of gasoline in 1982 are greeted with optimism because this represents "only" a 5 percent increase.

With each annual upward move in maintenance costs, most courses find their operations threatened to various degrees. The greatest challenge the golf industry will face in the future revolves around its ability to react to these

economic problems in a manner that will allow the game to remain within the financial grasp of the common man. Failure in this regard will permit the regression of the game back to the status of the early part of this century when it was a diversion for the elite.

Considering the economic conditions, a question regarding the suitability of the title "Let's Waste A Little More" seems well in order. The title refers to the designation of areas within a golf course that receive reduced levels of maintenance. In some instances, these areas have been referred to as waste areas.

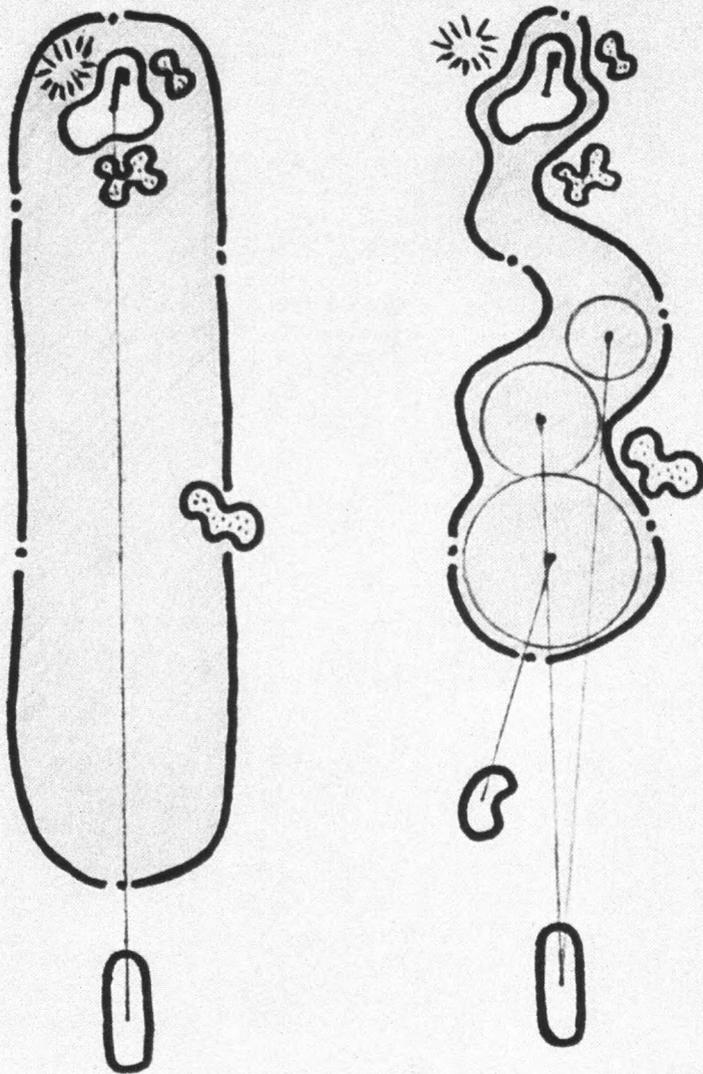
A good number of older, established courses contain such areas, and many of these courses are considered among

the nation's finest. The National Golf Links of America, Pine Valley, and Pinehurst Number 2 are three that come to mind. These courses contain significant areas that are markedly unkempt compared to the excessively manicured, every-grass-blade-in-place look of most contemporary golf courses. These three courses harken us back to an earlier day in the history of golf and are, in many ways, reminiscent of the more natural Scottish linksland courses.

The respective architects of these three classic courses, Charles Blair Macdonald, George Crump and Donald Ross, left natural areas in an attempt to mimic the land where the game was born. Their intent was also to emphasize the inherent qualities of the sites on

Waste areas at Tournament Players Club, Florida.





Turning a lot (of maintenance) into a little.

which these courses were constructed, not necessarily to reduce future maintenance costs. Anyone who has played them knows that these natural areas allow for interesting strategic and, in some cases, penal possibilities. Furthermore, the waste areas on these golf courses provide an historical reference to the cost-conscious contemporary superintendent.

At the other end of the spectrum, new golf courses are being designed and constructed with a good deal of emphasis on future maintenance costs. The new courses seek to control costs by reducing total acreage requiring high maintenance. This concept of increased "waste areas" is perhaps best illustrated by the Players Club, in Ponte Vedra, Florida. The Players Club is characterized by large expanses of sand along the sides of fairways. On some holes, this sand continues on to border putting greens. Fairway acreage is reduced, resulting in maintenance savings.

Some are quick to point out that a portion of this savings will be required to maintain the unusual features around the greens at the Players Club. However, one is reminded of the old adage about crawling before walking, and the Players Club could well play a contributing role in the introduction of a new chapter in the history of golf course design.

Such changes in design philosophy and standard maintenance are more easily initiated and find quicker acceptance at a new course. The rough and ragged areas at Pine Valley are readily accepted because, well, that's what Pine Valley is all about. Initiating similar changes on existing courses, however, is far more difficult.

Years of intense grooming have fostered a high level of maintenance expectations. The degree of difficulty associated with bringing about these changes may appear overwhelming, and were it not for one fact, would provide sufficient justification for many to cast

aside this initiative. That fact is the alternative to economizing.

With this alternative in mind, let's consider a process by which a significant change in the maintenance practices and philosophies of an existing course can be brought about. An absolute prerequisite to the success of this process is an active communication system between the superintendent and club officials, and ultimately, each individual member. The desired goal, a marked savings in maintenance expenses resulting from a reduction in the total acreage on a golf course that is regularly maintained, has to be achieved slowly. It is dependent upon an educational program implemented by the finance committee, green committee and the superintendent. The superintendent must develop the facts and figures regarding the projected savings and present this material in a way that is difficult for the club to reject.

THE FIRST STEP in this process involves the development of an accurate map of the course, drawn to scale. Many a golf superintendent has maps of his course, but for this case, these maps may not possess the required degree of accuracy. The time and expense involved in obtaining and transferring an aerial survey of the course into map form will be worth the effort. The map developed in this step can be used for additional purposes, including master plans for irrigation, drainage, cart paths, landscape planting and the like.

With scaled maps in hand, the club should engage a qualified golf course architect. The architect, with help from the superintendent and club professional, and with factors such as topography, prevailing winds, aesthetics and strategy considered, can begin to develop a scheme of contour mowing for the fairways. Contour mowing will result in multiple fairway landing areas offering progressively smaller target areas and requiring greater accuracy as one moves farther from the tee. Additionally, the fairway cut will not begin closer than a distance of approximately 165 yards from that area of the tee serving the average golfer.

With the contour mowing plan developed, steps should be taken to make allowances for the women golfers at the club. If the women's markers are merely placed at the front of the single tee on a hole, the carry required to reach the beginning of the fairway cut will probably be too much. In the long run, the only logical solution would be the



The natural hills of Shinnecock Hills, New York.

design and construction of a properly positioned women's tee. The all-too-frequent response to this problem is the gross elongation of the fairway. Our goal here is to decrease maintenance expenses, and this goal may well require an initial capital expenditure for tee construction.

With these steps completed, the plan for contour mowing can be put into practice. By this time, the lines of communication must be fully operative. Questions, comments and complaints, especially with regard to "recontoured" handicaps, will be common. However, experience has shown that properly informed members will adjust quickly to the change and will actually benefit when they play other courses because they have had to develop a more accurate game on their home course. Contour mowing adds greatly to the strategy of the game, playing interest of the course, and aesthetics. Also, per-acre savings of upwards of \$500 have been noted for fairway areas converted to intermediate rough.

A FURTHER REDUCTION in maintenance costs can now be achieved by the final step in this process. Selected areas maintained as intermediate rough can now be converted to areas of deep rough or waste areas. These waste areas should necessarily be well removed from the normal line of play on a hole. This is not to say that they will not receive golfer traffic. Again, the importance of communication is paramount. The trade-off is between a member's occasional lost ball and a club's financial stability based on these cost-saving measures.

A process of natural selection will occur in the areas converted to intermediate rough and waste areas. These areas, by design, should receive less water, fertilizer and total maintenance. A population shift toward grasses and other plants able to sustain themselves under lower levels of maintenance will occur. This process may require assistance in the form of overseeding, as plants of this type may have been totally eliminated by years of intense maintenance.

The plant population in the waste areas can be quite diverse, including native grasses, ground covers and other plant materials indigenous to the particular environment. Depending on plant composition, these areas may require cutting a couple of times per year in order to keep trees and shrubs under control.

There are many unresolved questions concerning these low-maintenance areas. The answers will only be found through experience. The steps outlined here can be adapted and altered to fit the particulars of your situation.

The economics of the day dictate that positive steps be taken towards maintenance cost stabilization. It has taken a good many years to stray from the natural courses on which the game of golf was developed. There has to be an acceptable middle ground between our overly groomed golf courses and the old, "native" style courses of the past.

We have to take that first step towards that middle ground. Let's waste a little more!

Green Construction: The Right Materials Mixed Right

by **TIMOTHY G. ANSETT**
Agronomist, Western Region, USGA Green Section

UNFORTUNATELY, and despite the current knowledge of soil physical properties, many rebuilt greens continue to have a poor performance record. This is due, in many cases, to the failure of the soil mix to withstand traffic compaction and support sufficient turf root systems. This results in another rebuilding program, perhaps with a similar outcome, or intensive aeration and topdressing in an attempt to modify the original soil profile and its characteristics. The expense of rebuilding, or intensive aeration and topdressing, can and should be avoided.

Although green construction may fail for a number of reasons, two main points will be emphasized here:

1. Through laboratory analysis and recommendation of proposed construction materials, the successful performance of a soil mixture can be predicted.

2. Even with laboratory analysis and recommendation of materials, if the materials are not mixed conscientiously (uniformly and in specified proportions), poor performance of the soil mix is likely. Simple enough, but these points are too often overlooked.

USGA Green Section Specifications for Putting Green Construction require a soil mixture to have designated characteristics relating to infiltration and percolation capacity, porosity, bulk density, water retention capacity, and particle size. Soil mixtures actually meeting USGA specifications have performed well in the field. Without thorough laboratory analysis, however, it is impossible to determine if a mixture will possess the desired characteristics. The myth still persists that an individual can simply observe and feel materials pass through his fingers and thereby determine a successful green mix. True, that individual may happen to designate a successful mix, but it is only by coincidence, not a result of mystical powers or scientific technique. Who among us can accurately predict particle

size analysis from observing a mix, not to mention predicting the actual porosity and bulk density, which are dependent on the interrelationship of various particle sizes? If you want to be sure of the performance of a green mix, insist on laboratory analysis of representative samples of prospective materials. Along with analysis, a uniform supply of each material required to complete the actual green construction is essential. If no laboratory analysis is made, the future performance of the green mix cannot be predicted.

Once the proper ratio of materials has been determined, it becomes extremely important to mix them in the designated proportions. A common failure at this point is the substitution of a new

material for one designated. Substitution of untested materials will only jeopardize the performance of the mixture. If the tested materials are no longer available, new materials need to be tested and revised proper proportions determined. Using the tested materials in the designated proportions is just as important as uniform mixing of the materials.

There are several recommended ways of metering the component materials, but in the final analysis, the result depends on the competence of the workers doing the mixing. If they are not conscientious and informed, the field mixture will never be recognizable as the recommended laboratory soil mix. Whether the materials are metered

USGA Green Section Specifications for Soil Mixtures Used for Golf Greens

PARTICLE SIZE ANALYSIS

Size Fraction	Particle Diameter	Tolerances
gravel	greater than 3mm	0
fine gravel	2-3mm	Max. 10% above 1mm
very coarse sand	1-2mm	less than 3% fine gravel
coarse sand	0.5-1mm	Min. 65% between 0.25 and 1mm
medium sand	0.25-0.5mm	
fine sand	0.10-0.25mm	Max. 25% below 0.25mm
very fine sand	0.05-0.10mm	
silt	0.002-0.05mm	less than 5% silt
clay	less than 0.002mm	less than 3% clay

BULK DENSITY

(gm/cc)

1.25-1.45 ideal
1.20 is minimum
1.60 is maximum

INFILTRATION RATE

(after compaction at 40cm of water)

4-6 inches per hour is ideal
10 inches per hour is recommended maximum
2 inches per hour is minimum for bermudagrass
3 inches per hour is minimum for bentgrass

POROSITY

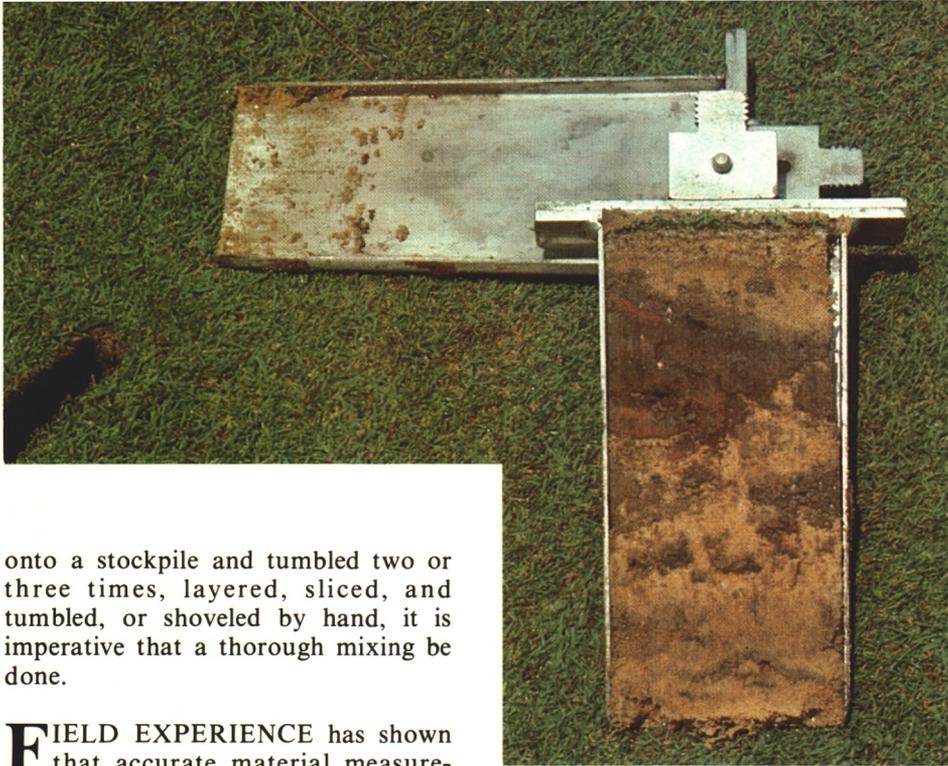
(after compaction
at 40 cm of water)

Total 40-55%
Non-capillary minimum 15%

WATER RETENTION

(at a tension of 40 cm of water)

12-25% by weight



A typical result of on-site mixing: lack of uniformity.

onto a stockpile and tumbled two or three times, layered, sliced, and tumbled, or shoveled by hand, it is imperative that a thorough mixing be done.

FIELD EXPERIENCE has shown that accurate material measurement and subsequent thorough mixing can best be accomplished off-site. On-site mixing consistently produces pockets of non-mixed components and fails to evenly distribute the component materials through the depth of the profile. Unless the component materials are evenly distributed through the entire soil depth, the proper proportion has not been obtained.

Most professionals in the golf turf management field probably accept, in principle, the importance of laboratory analysis and conscientious mixing for successful green construction. Unfortunately, when the time comes actually to build a green, laboratory analysis and conscientious mixing are often-times neglected.

Time and expense are typical reasons given for not testing construction materials or for casually mixing materials on-site. Yet, under examination, these reasons are certainly not justified. The cost of laboratory analysis is small in comparison with overall construction costs. If the submitted materials are not acceptable and then more expensive alternative materials are found acceptable, isn't the additional expense preferable to a poorly performing green mix? Similarly, because uniform mixing is essential and off-site mixing best accomplishes uniform mixing, isn't the additional expense justified?

Laboratory analysis and conscientious mixing will unquestionably require more detailed planning and timing of green construction. An acceptable green mix must be sought well in advance of the construction date. Even if the decision to build a green is made

unexpectedly, the time required for laboratory analysis must be taken. Do not compromise the success of the green construction project just to save time.

Since the golf course superintendent will ultimately be charged with providing quality putting turf, he must be involved and concerned with the green construction project. The superintendent should insist on laboratory analysis and conscientious mixing. Yes, it will probably take additional time and money to accomplish these steps. Failure to take them will most likely result in an unsuccessful project. What will that mean to the club and the superintendent? Make that effort to obtain the right materials — then mix them right. Success is worth it!

Note: For further information on green construction, the reader is referred to "Refining the Green Section Specifications for Putting Green Construction." (*USGA Green Section Record*, May, 1973, a USGA Publication)

New Soils Laboratory Announced for Green Section Specification Tests

WE ARE HAPPY to announce that arrangements have been made with Dr. Marvin H. Ferguson's Agri-Systems Laboratory, Bryan, Texas, to conduct all future physical soil analysis requirements for USGA Green Section Specifications greens. Dr. Ferguson was instrumental in developing the Specifications in the early 1960s; he has over 20 years of laboratory and field experience.

A physical soil analysis is an essential part of the Green Section Specification program. The laboratory will require at least two gallons of the sand and one gallon each of the soil and organic matter to be used in the topmix. All materials should be packaged separately and securely. Strong plastic bags inside cardboard cartons or metal cans are most satisfactory. Do not put moist soil or sand in a paper bag — it rarely arrives intact. When materials arrive broken and mixed, the laboratory must request more material. This sort of delay can be inconvenient, aggravating and time consuming.

Paper labels packaged with moist materials deteriorate rapidly. It is a good idea to use plastic labels inside the package and also to mark the outside of the packages. The more information you can send, the better.

For fastest delivery, use Greyhound Express, if available. United Parcel Service system is also effective. If samples are sent by mail, allow double the estimated time for delivery. Please allow two weeks for testing purposes once the material arrives at the lab.

Address all materials to:

Attn: Dr. M. H. Ferguson
Agri-Systems Inc.
2 Sunny Lane (UPS)
P.O. Box 3757 (US Mail)
Bryan, TX 77805
Telephone (713) 846-6543

For complete details regarding the Green Section Specifications for Putting Green Construction, please contact the nearest Green Section Regional Office listed inside the front cover.



Why Has Golf Course Design Changed?

by **RICHARD P. NUGENT**

President, American Society of Golf Course Architects

THE GOLF COURSE co-exists in a time-and-space relationship with the players, their concepts, and their equipment. This relationship is in a continuous state of change. If the golf course architect is to be successful, he must design for his time and place, while retaining the values and traditions of the game.

Golf, of course, relies on tradition more than any other game. Nobody invented golf — it evolved.

The linksland along the Scottish seacoast provided the first important

playing fields from which our concepts of the golf course evolved. Golf was first played along these common grounds. Indeed, St. Andrews and Royal Troon still play on public lands.

Early on, the formalized golf course, as we know it today, did not exist. Match play was the order of the day and was played in various locations on however many holes there happened to be. Leith and Musselburgh had five each, Perth had six, North Berwick seven, Prestwick 12, St. Andrews 22, and Montrose 25.

The first golf club — “The Honourable Company of Edinburgh Golfers” — was established in 1744 and played on the Links of Leith, where the holes measured 414, 461, 426, 495, and 435 yards; adjusted for today’s equipment, these distances would be roughly equivalent to 600 yards.

Two events combined to shape the game in the late 1700s.

1. The golfers of St. Andrews achieved the reputation of being the pace setters and unofficial authorities on the game — largely a result of a



Royal Dornoch, Scotland.

tourist promotion. The Society of St. Andrews Golfers put up a trophy in the form of a silver club for open competition.

2. The success of this contest established St. Andrews as *the* premier golfing town, and when the Society changed its course from 22 to 18 holes in 1764 — other clubs followed suit. Hence — 18 holes became the “correct” number for a full course.

THE EQUIPMENT and playing techniques of the early players dictated courses suited to low-trajectory shots. The oldest surviving set of clubs consists of six woods and two irons.

Of all the various changes and modifications of equipment, the changes and

modifications to the golf ball have had the most impact on golf course design. The early balls were wooden, and as long as this was the case, the game changed very little. In the early 1600s the featherie — a sewn leather hide ball stuffed with feathers — was introduced. Upon becoming wet, the leather shrank and became quite hard while the ball retained its lightness and ability to become airborne. These balls were able to travel higher and farther than wooden balls. Distance records are not accurate, but we can assume that a good player could drive a ball 200 yards. It is recorded that on a frosty morning in 1636, a schoolmaster playing the Old Course at St. Andrews hit a drive measured at 361 yards. He had a following wind.



In the mid-1800s, gutta percha — a rubber-like substance — began being molded into golf balls. These cheaper, more durable balls began to be favored by the thrifty Scots. This ball became very hard, and wooden clubs began to be replaced by iron-headed clubs. In 1898, in the United States, a Cleveland chemist named Coburn Haskell invented a method of making golf balls by winding rubber thread under tension around a central core.

The last decade has seen the introduction of covered solid balls with new dimple patterns.

In the late 1800s golf came to the United States and flourished.

In 1894 representatives of leading clubs were brought together to form an association to conduct open and amateur

championships. Thus the United States Golf Association was born. Interestingly, the Royal and Ancient Golf Club of St. Andrews was not invested with the management of the open and amateur championships in the British Isles until 1919.

By 1931, there were 283 public courses in the United States and golf was established as a game for everyone. The quality of courses built to accommodate the expansion of golf was a significant factor in the rise of American golf. American golf course architects, while looking to the old Scottish and English courses for inspiration, used the old courses as a point of departure and concentrated on an analytical approach resulting in more strategic design concepts.

IN AMERICA, the architects had the land and opportunity to effect the evolutionary concepts emerging in golf. The courses designed by the American architects reflected the new attitudes, the use of better equipment, and improved methods of construction and maintenance.

As the equipment changed, the design changed to reflect these improvements. Other developments have also caused modifications in the design of courses:

1. The use of the wooden tee and the concept of teeing grounds. Originally the practice was to tee up the ball within a club's length of the hole just completed.
2. The introduction of the riding golf cart in the 1950s.

3. The use of mechanized power maintenance equipment wherein design has been modified to accommodate this equipment, such as:

a. Irregularly shaped tees with ample turning radius for triplex mowers.

b. Adequate space between greens and greenside bunkers to allow for turning off the putting surface of mechanized mowing equipment.

c. Small sand bunkers designed for hand maintenance have been replaced with larger bunkers designed to accommodate power rakes.

d. Side slopes must not be too steep for large riding mowers.

4. Television brought the game into America's living rooms in the 1950s. The

nation's households were exposed to the world's finest courses and greatest players. This stimulated a great new growth of the game.

5. In the 1960s, the universities began producing great numbers of highly qualified turf management professionals who quickly established high standards of golf course maintenance.

Today we can look around us and see that: our population is living longer — senior golf is a growing segment of the game; juniors must attend school longer and need more opportunities to take up the game; women are changing roles in society and definitely making an impact on a game which was previously a predominately male preserve; and the work week is being shortened with more and longer vacations.

Golf has a tremendous opportunity to be a major factor in solving the recreational needs of our population. However, there are also problems: inflation, unemployment, high interest and an ever-decreasing supply of potable water for irrigation. However, problems are opportunities in work clothes. If golf is to survive and prosper, courses must be designed for family play where all classes of players can be accommodated. Courses must be designed to be water- and energy-efficient.

Time moves on — circumstances change — the game changes — and the courses must also change. It is up to us to act as stewards of the game and protect the characteristics and traditions of golf.

The Cardinal bunker, Prestwick Golf Club, Scotland.





One's education is never complete.

Has the Green Section Ever Made A Mistake?

by **DONALD D. HOOS**
Director, Western Region, USGA Green Section

These remarks were made on January 4, 1924, by Dr. C. V. Piper, the first Director of the USGA Green Section.

“I WANT TO EXPLAIN briefly what the Green Section is, since I find there is a great deal of apprehension in regard to it. It is a cooperative organization of golf clubs, who supply the funds through their annual dues.

“The objectives of the Green Section are purely altruistic. We are trying to help the golf clubs for their own benefit and for the public. One of my economist friends tells me this is all wrong. He says, ‘You know, the function of the

rich is to get all the money they can from the bourgeoisie and the proletariat, who are not able to use it intelligently; therefore, whenever there is a chance to pry money from the idle rich, that is the proper thing to do.’ He says, ‘Let these fellows get all the money out of the golf course that they can.’

“We do not take that point of view at all. We have learned that the average golf club is only a few jumps ahead of the sheriff, and that the clubs are not as rich as they are said to be. Some men in business, in dealing with golf courses, do not seem to understand this fully. Most of the clubs do, and I think they realize we are working for their benefit.

The best asset of a business house is satisfied customers, and a lot of the golf clubs have not been satisfied with the dealings they have had with some business houses.

“Lloyd George told a story the other day that I thought was very clever, a story of Theodore Roosevelt that I had not heard before. Roosevelt remarked, ‘It is very strange that whenever I say “Thou shalt not steal” there is a panic in Wall Street.’

“Now we have never accused any businessmen dealing with golf courses of being crooked. We never mention favorably or unfavorably, in correspondence or otherwise, the name of any



firm doing business with golf clubs. We lean backwards to try and be absolutely fair to everyone. If we have anything to say, it is made in the form of a general statement, but some people apparently take these general statements home and say, 'Well, this means me; those fellows are after me.' Well, of course, we are not to blame for that. We certainly have never mentioned any firm as being crooked or as using unethical methods. We suspect that some have probably done so and we want them to quit it.

"The Green Section, for its further growth and development, depends upon people who are the members of the Green Section. A whole lot of clubs in the country are not members, and the only explanation we can make is that they do not understand what it is all about. I find that to be the case very frequently. They simply do not understand that here is an organization that is working for the benefit of the golf club, has nothing to gain, no ulterior motive, except working for the progress and good of golf.

"Now I want to make it clear that there is still an enormous amount of work for the Green Section to do, and I cannot see that it is ever going to end — not alone in the matter of investigation, but also in the matter of education. Education is notoriously a long and slow process. For example, after practically every paper that has been given here, you have asked questions galore; in other words, you are after education. We are trying to put forth nothing until we have a pretty convincing argument that it is correct. And in this very complex problem of greenkeeping it is very easy to reach erroneous conclusions. You have had a couple of demonstrations of that.

"Now, in closing, I want to thank all the Green Section members for the support they have given in the past. Golf clubs have been very highly appreciative. We have letters of the most complimentary sort, which, of course, add to our pleasure in giving service. We do not claim to be infallible. We realize we are dealing with very complex problems and we listen to

suggestions. We want every greenkeeper to experiment on his own account; he may discover some very valuable things. The field is wide open, and we want to encourage investigation in every way, which is the only road to advancement."

THE HISTORY OF the Green Section is one of service and working for the benefit of golf clubs and the professional advancement of the golf course superintendent. There are no ulterior motives here, nothing to gain except the progress and improvement of golfing turf. Education and the development of new information must never cease.

The Green Section still needs your support through your use of the Turfgrass Advisory Service. For a sub-

scription fee of \$500 annually, your club may receive a full one-half day visit from the highly skilled and trained Green Section agronomist in your region. His visit and following report will provide the latest research information, turfgrass management techniques, insight and an invaluable, sound reference source for the turfgrass management program at your golf club.

Has the Green Section ever made a mistake? Of course we have, just as everyone else. But there's no need for anyone to repeat the same mistakes over again. Use the Green Section's 60 years of experience in research and tens of thousands of on-site visits to golf courses throughout the Western World. We can help in providing your course with better golfing turf. We always have.

The Turf Advisory Service: What It Can Do for Your Club in 1982

The USGA Green Section Turf Advisory Service has a new look, a new dimension and a new direction for 1982 and beyond. As noted elsewhere in this issue, the Green Section has just embarked upon the largest and most significant turfgrass research and plant breeding project in the history of turfgrass management! The thrust will be toward development of minimal-maintenance turfgrasses for all golf courses in the future. It is a multi-million-dollar, long-range effort to provide excellent playing surfaces at lower costs. If it is to be successful, the Green Section needs your support.

Subscribing to the Turf Advisory Service is the best way to support and encourage the Green Section program. For an annual fee of \$500 (less than one-quarter of one percent

of most golf maintenance budgets today), your club will receive a full half-day, on-the-spot visit from an experienced, highly trained and qualified Green Section agronomist in your region. Each visit is followed by a full report covering the recommendations offered (based on the latest research information), reviewing proven turf management techniques and offering sound, invaluable insight for a solid turfgrass management program at your club. It is the best buy in golf management today.

Full details are available from your regional Green Section office. The address may be found inside the front cover of this issue. Your club will be doing something great for itself — for you — for all of golf. The Green Section in 1982!

(Opposite page) Science is a part of turfgrass management.

TURF TWISTERS

WHEN YOU CAN'T FIND ANYONE IN AUGUST

Question: Why do so many turf people favor *Poa annua*? (New Jersey)

Answer: We're not sure turf people do favor this grass, although many golfers feel it is the greatest for about six weeks every spring. By mid-July they are not so sure and by mid-August, you can't find anyone who exclaimed its virtues three months earlier! Actually, turf growers live with *Poa annua* because it is so prevalent and there is no foolproof way of preventing it. However, the right combinations of irrigation, herbicide applications, aeration timing, sulfur use, soil pH control, fertilization, overseeding, and persistence over the years, have been known to yield success.

FLOWERS WILL BRIGHTEN YOUR DAY

Question: There are several areas around our course where we would like to plant flowers. Some of these areas are located in light to medium shade. What flowers will do best in this situation? (Massachusetts)

Answer: The three most popular annual flowers for use in the shade are impatiens, begonias, and coleus. Other useful flowering plants tolerant to shade include browallia, lobelia, myosotis, sweet alyssum, and torenia. When planting flower beds, be sure to space the plants close together (6 to 12 inches). Improper spacing is a frequent cause of disappointing flower beds.

THOUGH THE PARKING LOT IS SALTED

Question: My golf course gets considerable runoff from our parking lot, and this winter we used tremendous quantities of salt to control ice. Is gypsum still the best material to counter the effects of sodium in the soil? (Wisconsin)

Answer: Yes, it is. About 40 to 50 pounds per 1,000 square feet per application is the best way to start this spring.

THE ROLLER IS HERE TO STAY

Question: Should I roll my bumpy putting greens in the spring?

Answer: A light rolling of greens after the winter's heaving action is usually a good practice. However, rolling wet, saturated putting green soils under any circumstances is not recommended.