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Green Section RECORD



Green Section Award



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Cover Photo:

*Green Section Award presentation —
(Left to right) Harry W. Easterly, Jr.;
Alexander M. Radko, recipient;
George M. Bard; William C. Campbell.*

1983 GREEN SECTION EDUCATION CONFERENCE

Alexander M. Radko, USGA Green Section 1983 Award Recipient

"I AM BOTH proud and humble to receive the Green Section Award." These were the words of Alexander M. Radko, former National Director of the USGA Green Section, the recipient of the 1983 USGA Green Section Award. This honor is given annually by the USGA for distinguished service to golf through work with turfgrass. Radko was the 23rd recipient.

Radko received the award during the 27th annual USGA Green Section Educational Conference, at the Georgia World Congress Center, in Atlanta, Georgia, in late February. The presentation was made by William C. Campbell, President of the USGA; George M. Bard, of Rolling Meadows, Illinois, Chairman of the Green Section Award Committee; and Harry W. Easterly, Jr., Senior Executive Director of the USGA. The Green Section Conference was held in conjunction with and at the invitation of the Golf Course Superintendents Association's International Turfgrass Conference and Show. The morning program attracted over 700 golf course superintendents and club officials from throughout the world.

"A leader of national prominence, a dedicated educator, a professional with great personal character," are a few of the words used to describe Al Radko during the ceremonies. His 35-year career with the Green Section was marked by many outstanding contributions to the study of turfgrass management.

He joined the Green Section Staff in 1947 while he was completing studies leading to a Bachelor of Science degree at the University of Maryland. Hired by Dr. Fred V. Grau, then the Green Section Director, Al Radko rose from Research Assistant, Agronomist, Eastern Regional Director, and finally National Director of the USGA Green Section. He served as the National Research Director,



(Left to right) Harry W. Easterly, Jr., USGA Executive Director; Alexander M. Radko, Green Section Award Recipient; George M. Bard, Green Section Award Committee Chairman; William C. Campbell, USGA President, at Green Section Award presentation.

administering the Green Section Research and Education Fund, the largest private turfgrass research fund in the United States. He was editor of the *Green Section Record* for five years and was a contributor as well as a primary editor of the USGA's latest book, *Turf Management for Golf Courses*, by Dr. James B. Beard.

In the early 1950s, Radko was given responsibility of building and then caring for a putting green on the White House lawn, a gift from the USGA to President Eisenhower, an avid golfer. Radko also served golf in Japan following World War II. He was in charge of the rebuilding and rehabilitation of several golf courses there to be used by U.S. occupational forces. One of his pupils, Pete

Nakamura, was later to become one of Japan's greatest golfers.

Born in Yonkers, New York, Radko was introduced to the game by his brother, who asked him to caddy for him at the Sunningdale Country Club, near Yonkers.

"From the cobblestone streets of Yonkers to the beautiful green grass of Sunningdale was too much of a contrast to resist," Radko recalled.

Radko's career has been truly one of steady, far-reaching leadership. He has been an immensely valuable and generous servant in the world of golf. His name — as the 1983 recipient of the Green Section Award — will bring even greater honor to those who receive it in future years.

Golf Courses of The Future

by FRANK HANNIGAN

Director, Special Projects, USGA

MY SENSE of satisfaction at being invited to participate in this panel was somewhat modified by a lukewarm personal reaction to its four topics.

Here's how I come down on the four:

- I can't even define the *natural look*, so that surely has nothing to do with me.

- *Target-area mowing*: does it reduce costs? How would I know? No one trusts me enough to put me on a club's Green Committee.

- As for the other two — *gallery architecture* and *television considerations* — I find those subjects to be inconsequential. They have little to do with genuine golf, and are of interest only because they have a patina of glamor. Therefore, they are, perhaps, unworthy of your undivided attention.

But — that doesn't mean I don't hold opinions and prejudices on the subjects assigned to this panel. More than that, I got excused from jury duty in order to be here today — from the Superior Court of New Jersey's Hunterdon County. Therefore, I am legally committed to pontificate. *Thus*:

Gallery Architecture — This comes to us courtesy of media attention devoted to a creature we have come to know as "stadium golf." That's a catchy title. It's very marketable. The end product is dramatic, and the sponsors undoubtedly perform a service by enabling more of their customers to see more strokes.

In the final analysis, however, I find all the talk about "stadium golf" to be a great deal about very little.

You see, for golf to succeed as theater (and that's what stadium golf is all about), an audience is required.

But it doesn't much matter whether that audience is 4,000 or 14,000 or 40,000. All that's necessary is that the audience be large enough to surround a green, to be involved, interested, appreciative — in brief, to play its role as an audience.

Remember, on this level of golf — theatrical golf — the primary audience

is no longer on the premises. The primary audience is the television audience. And it's counted in millions, not in thousands.

A Nielsen television rating of 5, so-so for golf, means that the sets in about four million homes are tuned in during any minute of the program.

This audience of millions, the primary audience for theatrical golf, is *influenced* by the look and sound of the audience on the site. If Mr. Aoki had holed his wedge shot in Hawaii with no one to witness it except players and caddies, it would not have seemed nearly so dramatic and gratifying to the television audience. For the shot to be sensational, it had to be validated by a live audience.

But 4,000 surrounding a green will do that quite nicely, thank you, and there's no need to bulldoze half the state of Florida from point A to point B in order to create an illusion.

So while it's possible that 15 or 20 "stadium" courses will eventually be built in this country, the motivation is "marketing." It's harmless, but it has nothing to do with what goes on where *you* work — and that's where real golf is at.

The Natural Look — As I said, I don't quite know what it means, but I expect to be enlightened by Paul Voykin.

Where I'm lucky enough to play golf, it appears that what nature had in mind for those 125 or so acres was many hardwood trees, some low and swampy areas, uncountable varieties of weeds, and impenetrable thickets of things with thorns on them.

Someone had to outwit the hell out of nature in order to create a marvelous golf course in Bernardsville, New Jersey.

Target Area Mowing — Does It Cut Costs? — I hope so because golf, which was never cheap to begin with, has become far too expensive.

As I understand target mowing, which sounds good, it is the antithesis of parkland golf, of mowing everything "through the green" either at one height

or, even worse, of cutting fairways in straight lines — The Runway Look.

Wall-to-wall turf, even lush and healthy turf, cut at a ½ or ¾ of an inch, is boring.

Straight lines should have no place in golf. They belong in tennis, bowling and a number of other minor sports.

Television Considerations — What looks good on the screen are vividly contrasting colors and dramatic vertical shapes.

Pebble Beach, as the 1982 U.S. Open Championship surely proved, is the ultimate television golf course. That's because of the eight holes adjacent to the cliffs, the beach, the ocean, the sea lions, the otters, and the wind surfers.

Unfortunately, television isn't very good at revealing much of the game's subtleties, particularly on and around the putting greens. It's a two-dimensional medium — one that tends to make everything come out flat.

But it's up to television to do the best it can with whatever courses are available. This year the U.S. Open goes back to good old Oakmont, outside Pittsburgh. Instead of the Pacific Ocean and otters, we're going to give you the Pennsylvania Turnpike, the original ugly American superhighway. As most of you know, 11 holes are on one side of the Turnpike and seven are on the other side.

But that's okay. Oakmont is a singular course in American golf, in terms of both its architecture and history. And we will reveal Oakmont better than it's ever been before.

There will be three cameras on platforms and ladder-towers 80 to 100 feet high which will offer wonderful looks of the countryside as well as the Turnpike. You'll see that extraordinary picture of the ball in flight beneath the camera — a trademark of our coverage. And we'll also give you very tight shots from cameras mounted on tripods alongside the greens, again something you get only on our telecasts. These just might show something of the unique character of the justly famous Oakmont greens.

So let television work its electronic marvels on the courses *as they are* and don't fall into the trap of trying to design, or redesign courses, for television. The end products would be stereotypes.

Again, think of the numbers and the perspective. We're talking about 40 courses in any given year which entertain televised golf tournaments. The proper concern of this Conference is 12,000 courses.

THERE IS, though, one television consideration that does happen to coincide with my feelings as a golfer, not as a pseudo-television person, about a disturbing trend in the way courses are built and maintained.

That has to do with trees. Trees are the bane of golf television directors. Quite simply, they get in the way. For example, we will not be able to do a very good job showing you the par-3 8th hole at Oakmont this June. There's no decent location for a high camera directly behind the green, which is set off by huge evergreens.

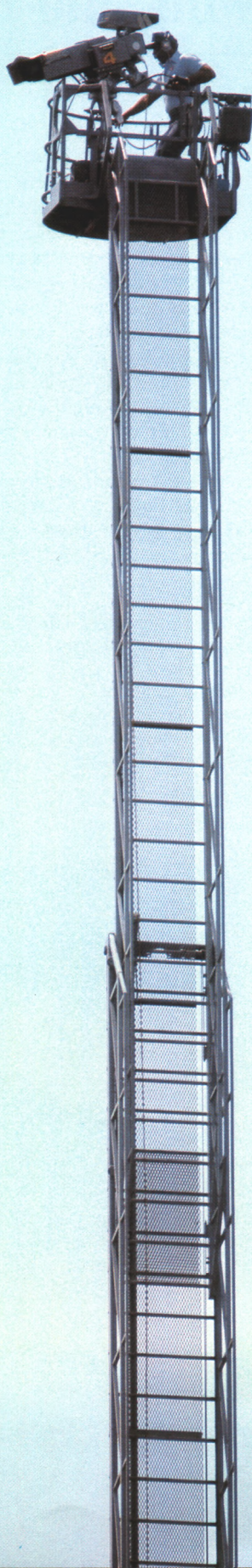
But forget television and camera angles. We've become victims of the arboretum syndrome. There are too many trees on golf courses and too many trees in the wrong places.

By wrong places, I mean approximate to targets. There's something very wrong in suffering an unplayable lie under a blue spruce when you miss the green on a 440-yard par-4 by 30 feet.

Besides, too many trees tend to obscure the beauty of the game. They block out the sky, they rob us of the perspective of the roll and pitch of the land itself, they interfere with what were intended to be uninterrupted vistas from way out on the course back up to a stately clubhouse — they diminish the panorama of golf.

The contemporary and mindless appeal of trees is remarkable. Any one of you could walk into the men's grille at one of your courses on Wednesday at lunch time and announce that you were taking up a collection for one of your men whose left leg had been nearly severed at the knee that morning by a chainsaw. The reaction, at best, is going to be mild annoyance. One member, probably a doctor since it's a Wednesday, is likely to suggest that your guy should walk it off.

But go into the same grille and say that you can get a terrific deal on 100 moraine locusts and people will throw money at you.



Green committees over the years have treated courses like organic crossword puzzles by filling in all the blank spaces with trees. So I hope we'll be a little more careful about trees in the future.

SPEAKING OF the future, I'd like to see more attention spent on the location of the short tees and, where it's practical, to think about inserting a fourth and very short set of tee markers — shorter than those we now think of as the women's tees.

Joe Moresco, an excellent club professional at the Woodmere Club near New York City, has been arguing effectively that the existing women's tees on most courses are irrelevant for the average woman golfer whose drive never exceeds 150 yards and who, consequently, never reaches a green of a 300-yard hole in two.

Perhaps, as a long-range goal, we might even think about eliminating the very label "women's tees." Golfers should simply gravitate toward those teeing areas they feel most comfortable playing.

Most senior men golfers, who play a disproportionate amount of golf in this country, should be playing courses that are less than 6,000 yards long. In many cases, the existing women's tees are perfect for golfers whose drives average 150 to 175 yards. But "real men," alas, are loathe to go forward to play on something called "women's tees." So let's think about not calling them women's tees anymore.

OVERALL, I tend to think that the selection of topics like "gallery architecture" and "TV considerations" confirm the suspicion that we've spent too much of our time, effort and money in an inane quest for something called a "championship course" in a foolish attempt to satisfy the macho instincts of less than 1% of the golfers. Too little of our talents have been directed at satisfying and pleasing the 99.5% — whose game it is.

We tend to forget that golf is a sport for participation. It is a spectator sport only secondarily. The relatively few golfers who thrive on the professional tours, both male and female, are the fortunate beneficiaries of a love for the game by the average player whose handicap is 17, if he's a male, and 30, if she's a female.

Television crews work from high places.

The money for the pro tours and the U.S. Open Championship, in defiance of gravity, trickles *up* from amateur golfers.

It's not at all like the big-money spectator sports. Imagine, if you will, that big-money football was abolished. Assume that the pro leagues are outlawed and that the colleges and universities are made to treat football as a game, rather than as a business.

It's quite possible, even likely, that football would become extinct within a decade. Soccer might replace football as the primary sport in elementary and high schools — without the commercial spectacle and example of big-money football.

But imagine the same situation in golf. Suppose the existing pro tours dissolved. Would any of you give up golf? Would your members stop playing golf? Of course not.

Within five years, *new* pro tours would sprout, seeded by amateurs. Within 10 years they'd be thriving, and they'd be building stadium golf courses, and proclaiming them the wave of the future all over again.

The wave of the future in architecture?

I sort of wish it was more like some of the seepage of the past.

I am hopelessly nostalgic when it comes to golf course architecture whose Golden Age, as I see it, took place in a period that began at about the time of World War I and ended, with a thud, at the onset of the Great Depression.

As evidence, look at the list of America's 100 Greatest Courses compiled and revised every other year by the magazine *Golf Digest*.

Of the top 10 in the last revision, not one of the courses honored is less than 48 years old.

Of the top 20, only two were built after 1940.

Of the top 50, I believe only 15 were built after World War II.

Something's wrong here, of course. It may be that what is wrong are the perceptions of the *Golf Digest* selectors, of whom I happen to be one, but I think not. If anything, I think the selectors and editors lean over backwards to try to give modern courses a break.

So this, at least as I see it, is not the golden age of golf course architecture.

It is, however, the golden age of golf course maintenance. Anyone who doesn't see that courses are better cared for than they were 10, 25, 50 years ago, simply isn't paying attention.

Some Thoughts on Target-Area Mowing and Maintenance Costs

by JAMES A. WYLLIE, President, GCSAA, and
CGCS, Bayview Country Club, Ontario, Canada

I WOULD LIKE to preface my views about golf courses of the future by telling of my recent experiences in recontouring the fairways at Bayview Country Club as we converted fairways from *Poa* to bentgrass. I would also like to comment on target-area mowing, which we have implemented on a few of our fairways. Finally, I would like to share a few of my thoughts on the stadium-type architecture that is being discussed today.

While preparing for the fairway renovation program at Bayview, I came upon an article by Jack Snyder, the President of the American Society of Golf Course Architects.

On existing golf courses, indiscriminate change in mowing patterns without taking into account the aesthetic and strategic factors would be risky at best. It must be done with a golf course architect, the club professional, and with the golf superintendent — as a team.

It was after reading this article that we at Bayview hired Robert Moote, of Toronto, a golf course architect. Bob visited our club often and presented a plan of how the finished product would look. We all agreed it was acceptable.

At this time I became involved with target-area mowing. We had decided to renovate our fairways by removing all *Poa annua* and converting to bentgrass. This would require us to kill off all existing grasses and then overseed with a 50/50 mixture of Pennncross and Penneagle bent.

Two days before the spraying was to take place, the team staked out the fairways for the new contours. The stakes were set at approximately 25-foot intervals, and I personally sprayed the herbicide as the new contours were established (*Figure 1*, June, 1982).

As to specifics, the fairways were sprayed with two liters per acre of the herbicide Roundup. It was applied using a Broyhill sprayer mounted on a

Figure 1.



Cushman Truckster. We mixed four liters in 100 gallons of water. The Cushman was driven in first gear, high range at 1,800 rpm. After a five- to seven-day waiting period, we cut in the bentgrass seed with a Rogers seeder, going in two directions and applying 20 pounds per acre in both directions. Figures 2 and 3, showing the progressive results, were taken in August and October, 1982, respectively.

As to the maintenance of the fairways, we plan to mow with triplex units in 1983. This will allow for the removal of the clippings from fairways. Hopefully, this will, along with good bentgrass growing practices, keep out the *Poa*.

The question has often been raised, "Are most private clubs really interested in holding costs down, or are they more interested in playability, enjoyment, and added beauty to their golf course?"

When I made the renovation presentation to my club, one of the selling points was that we would eventually reduce costs in maintaining fairways. Any worthy superintendent is constantly aware of rising costs required to maintain a golf course today, but with the competition that many of our clubs have become involved in, the cost of some of the niceties and the costs to provide them are sometimes thrown to the wind. Yes, I believe most clubs are very aware of the costs of maintenance, but their respective wants and demands cause the costs to rise. In answer to the above question then, I honestly think that most clubs would like to keep costs down, but their personal demands make it literally impossible!

IN REGARD to triplex mowing of fairways, I believe the increased costs are offset by the decrease in fertilizer and irrigation requirements resulting from bentgrass fairways. These two cost factors roughly negate each other, leaving us with a net gain shown by the improved playing conditions we have provided.

Ken Wright, the superintendent at the National Club, in Ontario, has been target mowing his fairways for the past year. Ken feels the capital cost of three triplex mowers against one 7-gang tractor unit is almost equal. He spent 770 manhours cutting in 1981 with seven units and spent 1,450 hours with triplex units in 1982. This approximately doubled the labor cost. In addition, he feels his maintenance on the triplex equipment was considerably higher.



Figure 2.



Figure 3.

The fuel costs were about the same in all cases. Therefore, Ken feels it is costing him approximately \$7,800 extra to cut fairways with triplex units. His water and fertilizer costs will not be known until he has results from two full years of this operation.

Regarding the natural look, or British look, I personally feel it is fantastic, but I do not believe it fits into most clubs. For example, a high percentage of golf courses today are built in conjunction with real estate projects where back yards are adjacent to fairways. How do you explain to your neighbor that the foot-long grass beside his manicured

lawn is "the natural look"? They won't buy it, and most of them are members at these clubs. The natural look is also a problem for the average golfer. He does not stand a chance once his ball leaves the fairway. This may be fine for tournament or resort-type operations, but definitely is not acceptable at most private or pay-as-you-play clubs.

As another example, take sand bunkers that are supposed to have a natural look (Figure 4). We all know the only natural thing that will happen here is that when the rains wash the sand down it will be shoveled back naturally by hand labor. Ample artificial drainage

must also be provided or this bunker will be a pond every time it rains.

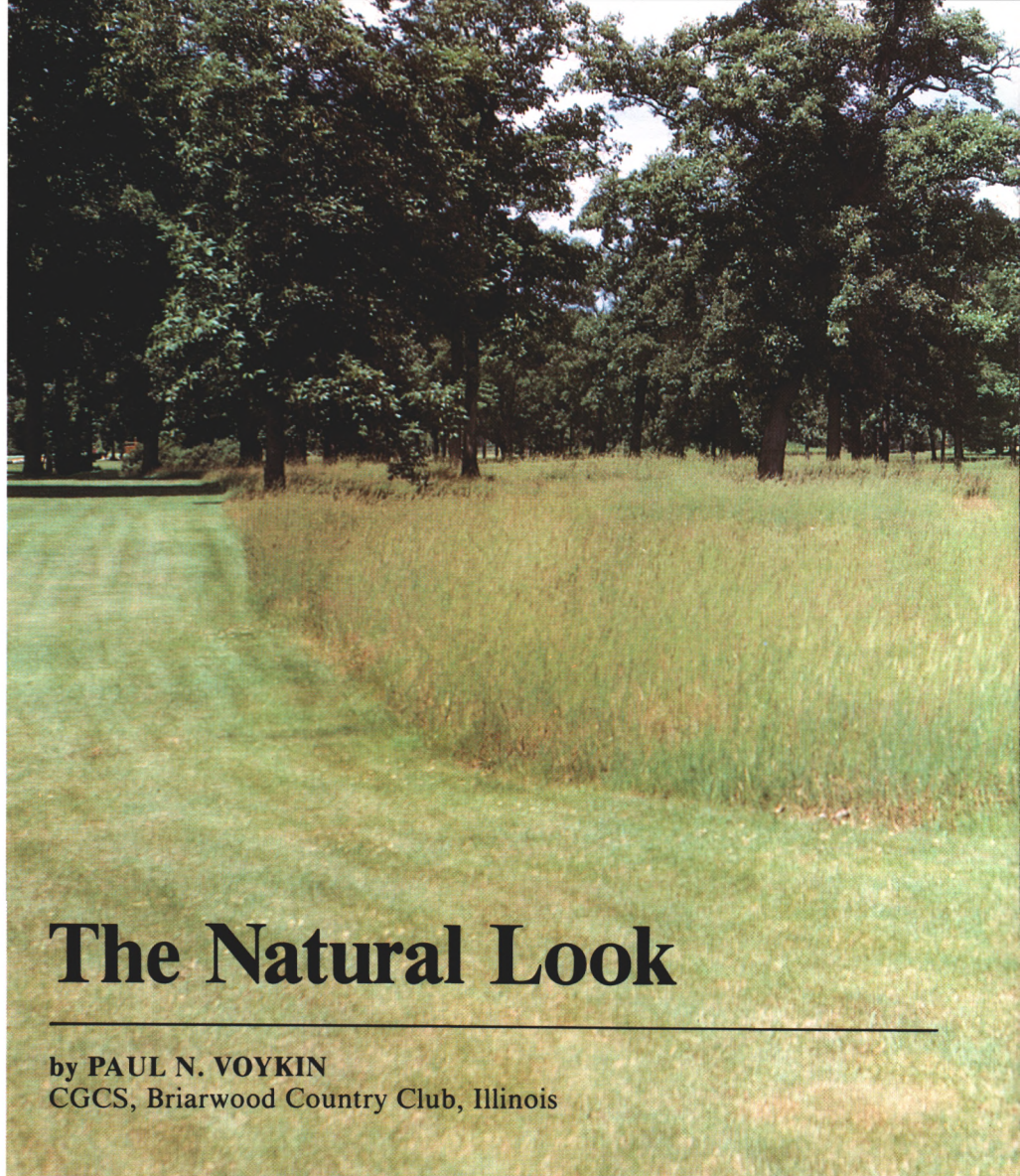
Probably the best natural, modern golf course that takes the spectator into consideration is The Glen Abbey, in Oakville, Ontario. Even here, where the natural berms have been used, not enough care was taken to prevent the surface runoff from ending up on the fairways. The Tournament Players Club, in Jacksonville, Florida, is also a fine golf course, but it does not have that natural look, i.e., having been there since time began. It is a labyrinth of drainage pipes from the so-called natural hazards. A true natural look uses the terrain as it was naturally created.

I would like to quote golf architect Robert Moote.

What do we actually mean by the natural look? If we mean only allowing the existing or important vegetation to return to its natural state, then I feel the degree of naturalization is dependent on the type of course, i.e., subdivision, country club, or tournament course. On the other hand, I first think of the natural look as having the topography dictate the green, tee, landing, and water areas. This has been done by architects since the game began, whether consciously or subconsciously. Therefore, I do not think the natural look is a fad. Even on plateau sites, water and trees dictate design. I admit, on occasion, sites have been leveled in subdivision development. Nevertheless, I think we are reverting to the old style of architecture.

I always make use of exciting topography. With contour mowing, we are strategically refining the variable-sized landing areas and with small target greens and shorter-length courses, we are placing more emphasis on finesse and accurate shot-making. This is important with the rising cost of construction and, even if the cost of maintenance is not a factor, *efficiency is*. One final point to ponder in the natural look; do we, the golf course architects, want to be stereotyped? I think not.

All of the problems — the maze of drainage pipes, the natural bunkers, the lack of surface drainage and the vast amount of hand work — fall on the shoulders of the golf course superintendent. If your club wants an unnatural natural look, then be prepared to pay for it in higher maintenance costs. On the other hand, the true natural golf course, built on a native links terrain, can be beautiful and, at the same time, quite economical to maintain.



The Natural Look

by PAUL N. VOYKIN
CGCS, Briarwood Country Club, Illinois

Figure 4.





ABOUT A DOZEN years ago I gave a talk in New York for the USGA Green Section entitled "Overgrooming is Overspending." Since then, I've enjoyed giving the same talk many times, both in the USA and in Canada. *Golf Digest* published the story, and some have said it was one of the early chronicles suggesting out-of-the-way areas on golf courses be permitted to grow wild. At first, many of my associates dismissed the thought; some probably placed it in the "crazy file."

All of this started 12 to 15 years ago. We were then in the era of The Great

(Left) The rough is one area most superintendents overgroom. At Briarwood, we stopped mowing out-of-the-way areas a long time ago.

(Below) Birds and other wild animals feel safe in our natural areas.



We used to mow lake edges and the banks with rotaries almost into the water. Now we leave the banks to nature and the long grass also stops a few golf balls from jumping into the lake.



Society! Gas was 40 cents a gallon. Parts for our machinery were relatively cheap and equipment cost 70 percent less than it does today. And so were supplies like fertilizers, chemicals, and other maintenance items. But all that has changed. OPEC arrived, ecological concern and demands have increased, and inflation now rules our lives. In 1982, unemployment and Chapter 11 bankruptcy filings grabbed the headlines. Overgrooming is no longer a speech made by a Chicago greenkeeper. It is now a national golf course concern.

Permit me to quote from an article that appeared in the November, 1982, issue of the *Bullshead*, a publication of the Midwest Golf Course Superintendents Association. The author is Jack Snyder, President of the American Society of Golf Course Architects and a former golf course superintendent himself:

Today we are suggesting the establishment of new mowing patterns and heights that reduce the acreage that must be cut frequently. This is in line with the time-tested philosophy of the Scots, who developed the game from its early beginnings to the game we recognize today. Golf will gradually move back to a more natural game, one that takes advantage of native materials and relies less on wall-to-wall turf.

Next is a statement from Arnold Palmer in a recent issue of *Golf Management*, the GCSAA magazine:

Even some of the famous courses have subtly reduced well-maintained fairway areas to 50, 30, and even 20 acres. Sure, we like the looks of lush, well-maintained courses. Who doesn't? But the choice may soon be to have less manicured courses or not have them at all! I think some form of the "Scottish look" is inevitable.

The procession of wall-to-wall grooming has peaked. Ecological concern, inflation, and high maintenance costs have dictated the end of the costly and excessive manicuring to all areas of the golf course. Energy and natural resources have become too precious to be used with abandon. The natural look is in whether you agree with it or not.

Let's ask ourselves — do we create? Are we artists who work with the natural world, or are we just indiscriminate caretakers who mow the grass from end to end with our expensive equipment, labor, and upkeep? The great international architect Mies Vander Roe once profoundly remarked, "Less is more." Think about it.

The Game - and the Golf Course Superintendent

by WILLIAM C. CAMPBELL
President, USGA

ASK YOU, what is more important to any golf club or course, or to those who play there, than a friendly understanding by the golfers of the course superintendent's role, their recognition of his various problems, and their appreciation of his contributions to their enjoyment of the game?

To encourage that understanding, recognition, and appreciation, I would like to tell what I think most golfers should know about their course superintendent and what he does for their course and for them, because I greatly respect the superintendent's role and I doubt that he gets the credit that he deserves. I want to do something about it.

As past Chairman of the USGA Green Section Committee, and having been on and off the Executive Committee for the past 20 years, I am confident that the USGA shares my views. Here they are, in no particular order; some are obvious, but I'll list them anyway:

- The golf course superintendent is charged with the responsibility for the care of the most important asset that a club possesses, which is the golf course itself.

- The superintendent's job is difficult at best, and even worse at times, in that his results are influenced by weather and other factors beyond his control, and complicated by human nature.

- The superintendent's performance cannot be quantified. His expenditures can be checked against the budget, but there is no Stimpmeter or other numerical means to measure how successful or unsuccessful, or how lucky or unlucky, he has been in caring for his course.

- The final test is the degree of satisfaction of those who play his course — which is such a subjective consideration that the superintendent simply cannot please all of the people all of the time. For example, I happen to like firm, fast greens and closely cut fairways, regardless of color, whereas my wife may prefer soft greens of medium pace and lush,

green fairways — but that's because she is better at tennis than golf.

- For these and other reasons, everyone who plays at his course should give the superintendent the benefit of any doubt. After all, he certainly knows more about the golf course than they do as a group, and probably more than any one person who plays there — unless, that is, the superintendent has the disadvantage of not himself being a golfer, or of not playing occasionally on the course for which he is responsible. The superintendent should be a golfer — not necessarily a good one, like Bob Mitchell of The Greenbrier or Bill Whitaker of Seminole — but a regular player of the game who understands and respects it. I happen to be a member of both of those clubs, and I know that their courses' outstanding playing characteristics have been enhanced by Bob's and Bill's expert knowledge and love of the game even more than by the demonstrated ability of each of them to play it well. Bob Mitchell is a former President of the Golf Course Superintendents Association. He is now Director of Grounds at The Greenbrier and a regular competitor in the West Virginia Amateur. Bill Whitaker is a past National Lefthanders Champion and former regular Army sergeant who handles his men effectively. Bill studies Seminole's greens by Stimpmeter readings, but also by his own putting practice as he checks various greens after they have been mowed — which may be why he puts so well, at least on smooth, fast surfaces, like Seminole's. The superintendent's personal involvement in the game will be well known to the golfers at his course. You can be sure that Messrs. Mitchell and Whitaker, as outstanding superintendents, have even more credibility because they are respected also as golfers.

- Recently I was pleased to learn that when the board of my home club, in Huntington, West Virginia, was search-

ing for a superintendent, they were able to recruit Dean Watkins from nearby Berry Hills, in Charleston, who not only plays the game reasonably well, but is also President of the West Virginia Section of the GCSAA.

- I think the superintendent should have a continuity of contact with someone representing the club's board or its ownership who ideally should have some knowledge of agronomy, but certainly a love for the game and an abiding interest in good course conditions. Such a green or course committee chairman should not be replaced so long as he is responsibly discharging his duties and the course shows it. His most important function may be to communicate with the superintendent and to support him. The superintendent has a lonely job and he needs someone in authority with whom to discuss things and even vent his frustrations, which are inevitable.

- At best, however, club boards come and go, and sooner or later the green or course committee chairman may go, too, while the superintendent is still there. Because of this turnover of club officials, it is up to the superintendent from year to year to assert the strongest single influence on the playability of his course. Other things being equal, his essential role as keeper of the playing standards makes the critical difference in any comparison of golf courses and, in the end, of superintendents. I would bet that at the courses with the best playability, the superintendents either play golf there regularly or at least are serious students of the game as well as of their own profession.

- The most successful superintendents keep up with developments of the game and their profession by using all available resources. They are active in their professional associations at various levels, they attend educational programs and field days, and they patronize the USGA Green Section Turf Advisory Service or some other competent tech-

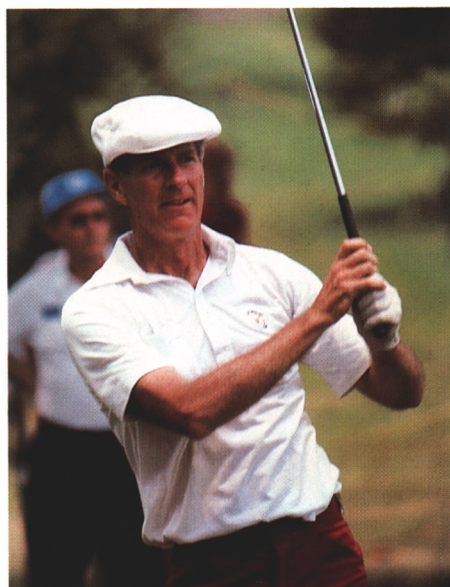
nical consulting service — though I am obviously partial to the TAS and don't know that any other consultant can match the Green Section's variety of services. Also, I know all the USGA Green Section personnel and have a high regard for their abilities and dedication. Whichever consultant is retained, I hope and trust that he won't be intimidated by the superintendent or otherwise inhibited from making his most objective and constructive professional observations and suggestions. Anything less than a completely honest assessment by the consultant is an unconscionable waste of everyone's time and money and, in the long run, is unproductive for all concerned.

- Golfers should be made aware of the superintendent's managerial and technical skills and responsibilities. Few of them appreciate that he is responsible for 100 or more acres of valuable property, a six-figure budget, a six-figure equipment inventory, and a crew from a half-dozen to two dozen or more workers. In addition, he must have technical competence in the art and science of turfgrass management — a complicated and changing field, which is why his education must be a never-ending process. That's another reason why, if I were a superintendent, I wouldn't risk trying to go it alone without the periodic second opinion of a competent consultant, if for no other reason than preventive maintenance.

- So the superintendent is a manager of men, money, and turf — really a master of all trades and a daily problem-solver in a multitude of technical and professional skills. He must be a specialist in all of the wide categories of turfgrass management. His job is inevitably one of "crisis management," as well as careful planning for each day, week, month, and year. He must be a budget expert, purchasing agent, diplomat, and personnel manager, capable of dealing effectively with people of all levels, from minimum wage employees to club officials and members. He must be a keen observer of Nature (as well as of human nature), a chemist and a practical scientist, and in this respect, too, his role is changing. No longer can he get by with limited tools or supplies or scientific knowledge; in the modern world he needs better equipment and must be sophisticated in its use. As we all know, he will soon have to be a computer person as well.

- As suggested before, the superintendent is caught between those of us

who like so-called "championship" conditions and those who prefer more forgiving conditions. I doubt that the resulting cross fire of criticism is always a valid indicator of how people really feel. No one wants impossible or unreasonable course conditions, but neither would most golfers want to play on a course without difficulties. If the secret of the game's appeal is that you cannot



William C. Campbell

conquer it (or yourself), it follows that if course conditions are too undemanding, part of the fun is lost. How else can you explain the lure of Pine Valley or Oakmont? Preserve golf's essential challenge and the game will prosper.

- The superintendent can exert a critical influence on the game just by his philosophy of golf course maintenance and by his adherence to it. If he is sincerely interested in maintaining a proper playing surface for the game itself, his club members will gradually accept the conditions, and in the process they will become better players. What a happy coincidence that golf course conditions making for a more challenging game can also make for better turf, and vice versa!

- I fear that many courses have ironically become victims of technical advances such as with irrigation systems, in that these "improvements" too often have led to severe problems in turfgrass management. Likewise the over-use of chemicals, such as fertilizers and herbicides, softens grass growth and weakens its performance in stress periods. As a

result of over-stimulation of turfgrass in the spring, it becomes necessary to apply water more frequently during the summer. Once the soil is saturated, susceptibility to disease increases, as does the incidence of crabgrass. So golf course playing standards can suffer from a vicious cycle; it begins with the misuse of turf management techniques that can cause more problems than are normally caused by Nature. This pattern of mismanagement afflicts all grasses, cool-season and warm-season alike.

- So as we all look ahead, let us hope that our golf course maintenance programs will be directed more towards quality playing conditions than simply towards aesthetics. This will call for a greater understanding by golf club members and public course players, along with course superintendents.

ISALUTE the superintendent — and so does the USGA, which has long served the superintendent's role and his cause. Let us count some of the ways:

- (1) The TAS directly supports the professional knowledge and the professional image of the golf course superintendent.

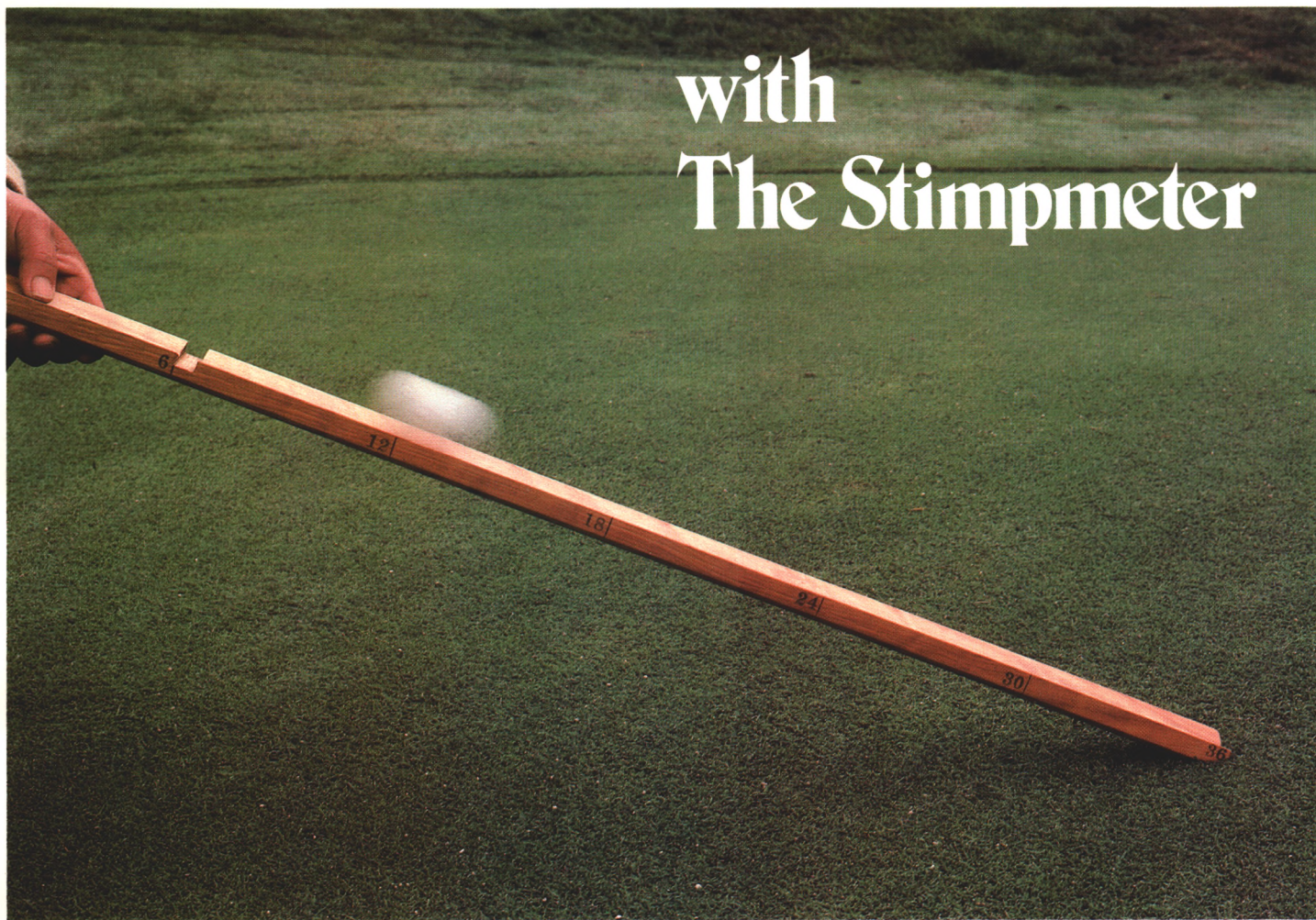
- (2) The superintendent's scientific ability and professionalism have been elevated to a higher plane also by the Green Section's support over the past 60 years of turfgrass research.

- (3) The GCSAA Championship Trophy, which is presented each year to the winner of the Golf Course Superintendents' Tournament as a gift from the USGA, is a replica of the U.S. Open Championship Trophy, and this is a form of recognition symbolizing the importance of the golf course superintendent in the USGA's scheme of things and, indeed, his importance to the game of golf.

But the USGA could and should do more — and will, I assure you — to encourage club members, club officials, and golf officials in general to recognize the essential role played by a competent superintendent who maintains a fine course and protects the proper playing standards of the game. Meanwhile I would appreciate — and the USGA would, too — suggestions from the GCSAA or from any individual golf course superintendent, as to how else we can help you to do an even better job, or to make it easier for you, or to shine upon you a light that I know you deserve. We all serve golf in our own ways, but we must work together for the good of the game that we all love.

Ups and Downs . . .

with The Stimpmeter



How It All Began

by **FRANK W. THOMAS**
Technical Director, USGA

IN EARLY 1976, Al Radko, then National Director of the Green Section, requested that an instrument be developed to measure the speed and hardness of greens. I designed four different instruments, each with an intricate ball release mechanism. These were all relatively complex designs with built-in potential for operator error.

I was not satisfied, and so I looked at the Stimpmeter, a device invented in the mid-1930s by Ed Stimpson of Massachusetts. The concept he had was good. However, it had the same potential for operator error. I decided to modify his

design and had 15 of them built. The changes included a more precisely cut ball release notch, a V-shaped rather than round-bottomed chute, and an increase in the length of the device to develop enough roll that significant differences in green speed were measurable.

These first wooden prototypes of the re-designed Stimpmeter were used in 35 states, and the speeds of thousands of greens were measured with the device. Greens were also measured at five or six USGA championships. Based on the tests and with Stimpson's permission,

the USGA decided to manufacture the Stimp-meter. There is no doubt in my mind that the Stimp-meter is the simplest, most accurate and operator-independent instrument we have to measure the speed of greens.

The principal purpose of the Stimp-meter is to allow golf course superintendents to evaluate the effect that different cutting heights, frequency of cut, winter feeding or other putting green management treatments will have on the speed of the green. On the other hand, one can say the Stimp-meter may become a measure of effectiveness of certain agronomic treatments, and can be referred to on a national standardized basis.

A second purpose of the Stimp-meter is to provide the green superintendent with a precise method of preparing the greens on a golf course for either membership play or competition play. He may want to have consistency in green speed or even design certain inconsistencies into greens. Some greens may need to be faster in some areas than others. With the Stimp-meter, he has this capability and does not have to rely on experience with regard to his impression of slow or fast. He can then plan his work accordingly.

The introduction of the Stimp-meter was also meant to be an early warning system. Why do the greens suddenly become slower or faster? The effect of the Stimp-meter as a diagnostic tool needs to be evaluated based on data, which, if properly documented and analyzed, would show certain correlations between speed changes and potential problems.

The Stimp-meter is a tool that can be used to prepare greens for specific speeds. "Prepare" means gradual preparation to achieve certain goals, not traumatic last-minute action that may cause undue stress. In many cases, due to the grass type, climatic conditions or the undulation of certain greens, one may want to reduce the speed of the greens, or at least maintain certain maximum speeds for those conditions.

The Stimp-meter was not designed to be a speedometer. This was, in fact, one of the major fears, and because we understood that it would inevitably be used this way, we tried to limit its use by allowing only golf course superintendents and our Green Section agronomists to have access to a Stimp-meter.

Fast greens are not always good greens; although, generally, the faster

the green, the truer the putting surface. Those same features that slow the ball are also those that deflect the ball. Based on experience, we have found that a green speed in the neighborhood of 9½ to 10½ feet provides an excellent putting surface for most championships. Greens with extreme slope need to be less than 10 feet, and flat greens may be greater than 10 feet. However, any green faster than 11½ feet should be considered too fast for some championship play and dangerous for the long life of the green if proper attention is not given.

THE STIMPMETER is here to stay, we believe. Let's not misuse it! Rather, let us develop and promote the potential benefits it has to offer. A new

instrument called an impact tester is now in the development stages. Once again, however, if it reaches the wrong hands, it may also be misused. The method of introduction must be carefully considered.

Tools to measure the quality of a green, from a player's point of view, will inevitably lead to sterilizing golf courses. This may be the curse of any new piece of equipment developed for the use of the golf course superintendent. He should have the ability to control the playing conditions of a golf course through good, sound agronomic management. He should not have to endure playing conditions that control him to the extent of having detrimental effects on the course.

A New Turf Menace

by JULIUS ALBAUGH

Superintendent, Westmoreland C.C., Illinois

THE STIMPMETER has been cursed and discussed by golf course superintendents since its conception, and the controversy has grown with time. It has been a prime item of discussion during casual conversations, and at a meeting of golf course superintendents in Illinois in December of 1981, the Stimp-meter was discussed at length.

I am not saying that what has happened with the Stimp-meter was its original purpose, but rather I am pointing out what has happened because of its existence. First, let's take the issue of the Stimp-meter and the low-handicap golf club member. Agreed, the Stimp-meter was meant as a tool for the golf course superintendent, but it has happened that the golfer himself has acquired the instrument.

The following story may seem far-fetched, but it actually happened in the northern suburbs of Chicago a few years ago. A member of the Grounds and Green Committee of a neighboring country club heard about the Stimp-meter. He purchased the device along

with charts and tables. Instantly he felt he was an expert on judging the quality of putting turf. He began to experiment with his new toy at his home course, recording readings of putting green speed. After he had acquired many readings on his own greens, he decided to trespass on neighboring golf courses to compare Stimp-meter readings. I heard the fellow had visited my golf course, but I missed him! At a neighboring club he was confronted by the golf course superintendent and was lucky he was not shot!

In his spare time he visited a club or two a day, some in the mornings, others at night. He made some readings after a heavy rain, others under the driest of conditions. He did not know if the green had been mowed that day or double cut. He did not know the turf-grass variety or the height of cut. He did not know anything except how to roll a ball down an aluminum bar. When he had finished his readings, he compiled his so-called expert data and proceeded to hassle the golf course superintendent at his home golf course. It took some time, but the golf course superintendent

was finally able to put the Stimp-meter-packing trespasser in his place.

This is a perfect example of how the Stimp-meter has put some golf course superintendents under undue stress. The Stimp-meter in the hands of the amateur is a troublesome device. The tool permits development of the opinion that with it one can automatically become a judge of quality putting turf. With the published tables of green speeds, to some, a standard for putting green speed is established. The device gives the user a means to compare one green to another or greens on different golf courses to one another. What is lacking is a knowledge of turfgrass science. Many factors determine the reasons for variances in in green speed. How many golfers understand that to maintain faster greens requires a higher operating budget? Frequently the golf course superintendent is placed in a defensive situation. An attempt to explain these factors was made in an article printed in the July/August, 1982, issue of the GREEN SECTION RECORD. Perhaps if this article had appeared earlier the present controversy would have been averted.

As a professional turfgrass manager, I know that one cannot expect the same from every putting green. Greens differ widely on a single 18-hole golf course. Different greens often have different soil mixtures, different turfgrass varieties, and different exposures to the elements. One can take any single turfgrass variety and grow it on a USGA soil mix, a 1-1-1 soil mix, or on a soil mix containing a high percentage of clay and there will be a great variety of responses to various weather conditions. Take the putting green bentgrass varieties Washington, Penn-cross, Congressional, Penneagle, Evansville, or the old South German mixture. They all differ to a degree in their response to height of cut, ability to withstand wet, hot, humid conditions and their reaction to stress. Many of the older golf courses do not have the same variety of turf on all greens; they have three greens of one variety, six of another, and nine of still another. You cannot standardize them and expect a club to shoot for a uniform Stimp-meter reading on all greens at all times. To do so may well be at the expense of quality turf, unless management practices are altered. In other cases, the complete rebuilding of greens may be necessary to assure faster greens and quality turf.

It is common in the Chicago area for golf course superintendents to strive to

maintain uniform, smooth, true, and *green* putting surfaces. We alter our management practices to the turfgrass variety, soil, and weather conditions. We may raise the height of cut during hot, humid weather to avoid scalping. We irrigate to maintain a uniform moisture level. We follow preventive fungicide programs and strive to maintain a healthy turf. Our fertility practices are based on just enough nutrients to provide continual recovery from player damage. We topdress, aerify, spike, verticut, comb, and brush as needed to assure the best possible putting surface. These practices are not based on Stimp-meter readings but, instead, on our agronomic background and on our ability to provide our membership with a uniform, true, healthy, and *green* putting surface. Ninety-five percent of the members at my club are not color blind; they can tell brown from green!

NEXT WE COME to actual turf abuse from too much emphasis on Stimp-meter readings. Over the years I have received a number of comments from members at my club concerning television coverage of championship golf events. These people were concerned and wondered what was wrong with the greens on many of the golf courses that hosted USGA and PGA events. They noticed the brown turf. This condition stood out well on the television coverage of the U.S. Women's Open, which was held in the Chicago area in 1981. As I understand it, on the Monday of the tournament week, the golf course superintendent was told to cut the greens according to the desired Stimp-meter readings for tournament play. It made no difference that the area had received a heavy rainfall the night before. He was instructed to go ahead, get that desired Stimp-meter reading. "Mow the greens; mow them again. We want speed!"

The results — SCALP!

Neighboring golf course superintendents that day listened to their knowledge of putting green turf and not to a Stimp-meter-packing tournament official. Most golf course superintendents in the Chicago area that day did not mow their greens because of the wet soil conditions, and their greens stayed *green*! To me this offers an excellent example of turfgrass abuse by the Stimp-meter. Common sense and agronomic and greenkeeping knowledge were put aside in order to establish a set Stimp-meter reading. True, not all greens were scalped that

day. Not all were the same — different grasses, different soils. The sad part is that the majority of the greens shown on television were the greens that were scalped the most.

Was this fair to the membership of the host club to have this view shown of their club? Was it fair to them to be forced to play on recovering greens for the rest of the season? Being a golf course superintendent myself, I can imagine how the host superintendent felt; his heart was most likely broken. Yet the Stimp-meter is called a useful tool.

I feel fortunate. I have not personally been confronted with the Stimp-meter. But I see it as an instrument that is doing harm to the golf course superintendent. This harm has come in the promotion of the Stimp-meter, the placing of it into the hands of the sidewalk superintendent, and the unfortunate logic that the faster the putting surface, the better, even if the turf will not tolerate it.

It seems unfair to me that so much emphasis is placed on the requirements of the low-handicap golfer. Sure the touring pro and the under 5-handicap golfer claim they putt better on faster greens. But it seems to me that 90 percent of the membership at 99 percent of the golf courses do not fit into this class. The majority of the golfers like a putt that they feel they can control. It makes the game more enjoyable for them. Most golfers also love the color green. Brown makes them feel that something is wrong. Brown goes with trouble; the more brown the member of a golf club sees, the more trouble the superintendent is in. There is that old saying of golf course superintendents: "When the grass is green, you are a hero; when it is brown, you are a bum!" This old saying still holds true today in the eyes of the average club member.

The USGA has been beneficial for the golf course superintendent over the years. I have read the GREEN SECTION RECORD for over 19 years and still look forward to each issue. I have had problems, and the articles have helped me solve them. But this Stimp-meter business is not in the best interest of the golf course superintendent, and it is not being received well. As it is, the golf course putting green is the most intensely cultivated crop in the world. Nowhere do we find a plant continually put under such stress, and now we have the Stimp-meter to stress our golfing turf further. I cannot help but feel that Stimp-meters are anti-grass.

It's a Good Tool - Use with Caution and Restraint

by **ROBERT V. MITCHELL**
CGCS, The Greenbrier, West Virginia

PROBABLY in 1935 when Edward S. Stimpson developed his idea of the stick to measure, with comparative accuracy, the speed of a putting green, it caused no hardship on anyone, and probably wasn't used very extensively either.

But in the mid-1970s, when the USGA Green Section resurrected this tool and made it available to its Green Section subscribers, I was apprehensive. Writing to Al Radko and Carl Schwartzkof, I discussed these concerns. The fears had to do with competition of speed of greens — between clubs with nothing else in common except that both have nine or 18 putting greens; no regard to budgets, terrain, soil, variety of grasses,

climate, amount of traffic, etc. Additionally, I posed the question, "What makes the golfer, professional or amateur, believe he can strike the ball so perfectly each time that he would know whether one green speed is different from another?"

All of the factors mentioned have a definite bearing on putting green quality and, closely akin, to putting green speed. Agronomic principles must be followed to produce quality putting greens. This was borne out in the symposium on fast greens in Milwaukee a few years ago.

At the January, 1983, Virginia Turf-grass Conference, a panel of seven discussed "Putting Green Management for Quality and Speed." In essence, all

agreed that only good management will produce quality putting green turf, which in itself includes reasonably fast greens. To obtain tournament fast greens (10'6" and up), quality must be present! Thus it is impossible to distinguish between the two. I believe we would agree that only to lower the height of cut to gain faster speeds would surely cause dead grass. Therefore, before we can yield to the urge to quicken the speed of our greens, we *must* have produced superior turf that is agronomically sound to achieve and retain good grass conditions.

The Stimpmeter was used by USGA officials to control green speed at the 1976 U.S. Open, played at the Atlanta

Uniform fertilizer applications are essential for uniform putting green speeds.



Athletic Club, and publicized to a degree. Sports commentators wrote about it in newspapers and magazines and broadcast it on television, and the contest was on. Repeatedly we hear how fast greens are, and the process of comparing one with another has materialized. Surely it has caused problems to some grass and undoubtedly to those caring for it.

In spite of these prospective problems for some, we have found a way to use the Stimpmeter to our advantage on our three golf courses at The Greenbrier. If viewed objectively, I feel it may benefit your operation as well. I would like to discuss some of the positive factors you might consider.

We devised a simple mimeographed sheet to be completed by our three foremen. Each foreman takes a Stimpmeter reading daily on two of his greens, making certain notations. These notations are: number of the green, the weather, time of day, and whether it is wet or dry. He then checks two different greens on successive days until all 18 have been measured. This procedure is repeated throughout the season.

We have found certain truisms. Our courses will never be the same because of different types of bentgrasses and soil mixes used in their construction. All greens on the same course will seldom putt at the same speed. The location or setting of each green and how it is subjected to wind and sun cause it to be different. The amount of contamination, such as *Poa annua*, will cause a difference. Greens are always slower during the spring and in wet weather. Greens, generally speaking, are faster in the fall. There is a definite influence on speed following most maintenance practices.

We have tried to fine tune our management practices to produce the least amount of change possible. Fine tuning includes frequent light vertical mowing every two weeks instead of heavy monthly vertical mowings. We also mow our greens seven days a week instead of six or less. Frequent light topdressings are accomplished every three or four weeks instead of three or four times annually. Light, frequent fertilizer applications are made and provide slow, steady growth and recovery from player damage. We water as infrequently as the grass will allow, but enough to retain

color and resiliency to hold a well-executed shot. We avoid frequent saturations. It is essential to mechanically check and service green mowers daily as opposed to a haphazard schedule. And there are other points. But please note that these same procedures will also produce the quality turf so necessary to answer the demands of today's golfer and, at the same time, permit us close mowing.

ROUTINELY recording the Stimpmeter speeds daily forces us to react to any large differences. There is a reason! Find it! Correct it! Without a doubt, our biggest culprit is the mower. We have found that we spend approximately four times the number of hours (and expense) on putting green mower maintenance than we did only a few years ago. Machines must be right! Sharp! And set accurately! Operators must be instructed on proper mowing techniques.

What does all this mean? We are using the Stimpmeter as a tool to measure our maintenance practices in a very positive way. The result: a finer putting surface for our golfers. It is probably true that 90 percent of America's golfers score best on slow greens. But from my 30-plus years as a superintendent, I believe even they prefer fast greens. Perhaps this is true because they feel they are playing on the same surfaces that the professionals expect and enjoy.

I personally like fast greens and always have. For years now, I have marveled at the guy who can have good turf and a dense, uniform stand of bentgrass that is as slick as a pool table. But to me, an ideal putting speed is between 8 and 9 feet. According to the USGA Stimpmeter pamphlet, this is "medium" under tournament conditions. But it is "fast" for regular play. I know that an 8- to 9-foot speed at The Greenbrier creates good comments from our guests and believe they remember us, and to some degree, for our greens!

I believe the USGA Green Section did us a favor in making the Stimpmeter available. We have another tool to help us do a better job. And in our effort to produce better grass for better golf, we need all the help we can get! True, the Stimpmeter created a lot of attention both by me and others, but it caused us to look at it, to investigate its potential



(Above) Delmonte rake removing excessive thatch from a green. Heavy thatch affects green speed and putting consistency.

(Opposite page, top right) Some superintendents will add weights to their greens mowers for faster green speeds.

(Opposite page, bottom) A thin bedknife, a straight edge, a sharp mower and Wehle rollers add up to close cutting.



Up with The Stimpmeter

by **STANLEY J. ZONTEK**

Director, North-Central Region, USGA Green Section

an then to find a way to use it to our advantage. I do not believe club members should use it for comparing their greens with the neighbor's or with those on TV. Frankly, I feel we must use it ourselves to compare our own greens, one with another, trying for consistency, but not with other clubs in town or across the country. Further, I believe the USGA recognizes that the differences in golf course location, terrain, budgets, and personal desire will dictate conditions and ultimately green speed. Further, the USGA's attempt to promote consistency within the same course is the primary and ultimate goal, not necessarily to match or duplicate the speed attained at other courses.

I've used and appreciate the Stimp-meter, but I encourage caution and restraint, especially in trying to duplicate the speed of greens at so-called championship courses. Let's agree to use this tool for our benefit and ignore the remarks made on TV that create competition for speed, just for speed's sake.

What causes a golfer, professional or otherwise, to believe he can stroke a putt so consistently that he could ever declare one green is faster or slower than another?

IT STARTED OUT as a crude, wooden, homemade instrument to determine the rolling speed of a putting green. Like most inventions, it evolved from a rather simple idea, developed in the 1930s by Edward Stimpson, of Boston. Today, the Stimp-meter has become a controversial but very precise means of measuring putting green speed. In fact, Joseph M. Duich, of Penn State University, has detailed just how accurate the instrument is when properly handled. In carrying out field research to determine factors affecting putting green speed, Dr. Duich found Stimpmeter measurements statistically well below the accepted standard deviation figures commonly accepted for field research studies. Researchers have found the Stimpmeter to be an extraordinarily accurate device.

Accuracy, however, is not the basis of the contention swirling around the Stimpmeter. The problem lies in its improper use and misunderstanding of

its purpose. Julius Albaugh, superintendent at the Westmoreland Country Club, in Wilmette, Illinois, has written an article explaining the concerns of some superintendents over the misuse of the Stimpmeter. He has raised valid questions. His article appears in this issue of the *GREEN SECTION RECORD*, as well as in other periodicals throughout the country.

As with any tool used in golf course maintenance today, the Stimpmeter can either be used properly or it can be abused. When the USGA began to produce them in quantity, in 1976, Stimpmeters were given free of charge to golf course superintendents only at clubs subscribing to the Green Section's Turf Advisory Service. Today, they are available for a nominal charge of \$25, but sales are still restricted to golf course superintendents or golf clubs. They are not sold to individuals. It was never the USGA's intent to make them available to the general public. They

Too much water affects putting quality and eventually grass quality.



were and still are only intended for the turf management professional.

The Green Section agronomists and course superintendents alike realize that most golfers want to putt on good greens, i.e., consistent, smooth, true-rolling, and green putting surfaces. Most golfers prefer greens that are not too fast or exceedingly slow. No one, at least in the past 50 years, has advocated playing the game on brown, scalped greens.

It was inevitable, however, that once a means for accurately measuring green speed became available, there would also be the need to establish certain ranges (See *Table 1*). The published ranges have been developed from extensive surveys and tests made on putting greens throughout the United States under all kinds of conditions and over a period of several years. Measurements were made at championship sites as well. Thus, the general ranges for putting green speed were determined and are published as part of the instruction manual for each Stimpmeter.

Never has the Green Section attempted to standardize or dictate putting green speeds for its member clubs. That decision must be left to each individual golf club through its green committee and its course superintendent. We also point out that there is an important distinction between the reported speed ranges for regular membership play and tournament play.

We believe that putting greens can be maintained without too much extra work in the medium fast to fast range for regular membership play without unduly stressing the grass under most conditions. However, this decision still rests with each individual golf club and is directly influenced by the character of the course, the maintenance budget and the wants and desires of players at that facility. If you ever hear that the USGA Green Section advocates 10-foot or 11-foot green speeds, don't believe it! It isn't true.

Unfortunately, the spoken word tends to become oversimplified as it is passed from one to another. To most novices, faster greens simply mean lowering the cutting height. The lower the cut — the faster the green. Right? Wrong! There is far more to it than that. Without any question greens have been scalped from the desire to achieve fast putting surfaces. But it does not necessarily follow that fast putting surfaces require scalped greens. The difference lies in management, soils, grasses, budgets, climate, and other variables.

TABLE 1.
Speeds for Regular Membership Play

8'6"	Fast
7'6"	Medium-Fast
6'6"	Medium
5'6"	Medium-Slow
4'6"	Slow

Speeds for Tournament Play

10'6"	Fast
9'6"	Medium-Fast
8'6"	Medium
7'6"	Medium-Slow
6'6"	Slow

TODAY, as a result of research like Dr. Duich's and the practical experiences of golf course superintendents and the Green Section agronomists, there is a greater appreciation of what goes into preparing greens for modern championship play *without* scalping or killing the turf. It is only in the preparation for certain USGA Championships that specific putting green speeds are established by the USGA Championship Committee. The courses where such events are played now work very closely and carefully with Green Section agronomists over a period of several years to have their course in the best possible condition. These courses have a higher than average maintenance budget, and everything peaks, including the incredibly fast green speeds, for the one week of the Championship.

It is interesting to note green speeds from major championships during 1982. The green speeds for the U.S. Open, held at Pebble Beach, California, ranged from 9'6" to 10'. For the Masters Tournament (a non-USGA event), the green speeds were over 11' on the average. Most of the commentaries support the viewpoint that, for the U.S. Open, the speeds were very appropriate, whereas, for the undulating greens of Augusta National Golf Club, the speeds were very fast indeed. Perhaps the pendulum may now swing back from the very high putting green speeds of recent years and come closer to the speeds found in *Table 1*.

There is a need for the Stimpmeter. It has a place on our golf courses. Let's not bury it. Let us not permit the few who have misused or misunderstood the Stimpmeter to destroy its value to golf and the golf course superintendent. Rather, let us understand it and use it for its intended purposes. If the green committee chairman or the golf course superintendent comes under pressure from the membership because of improper use or interpretation of the Stimpmeter, immediately call the Green Section agronomist in your area. He understands and he can help. He is there to assist you, and he can provide important information as it relates to putting green speeds and other agronomic difficulties. Together, let us work toward our common goals of smooth, true, and consistent putting greens that are properly paced.

John Zoller, Kent Davis, and Bill Bengeyfield using the Stimpmeter at Monterey Peninsula Country Club.



The Soils Controversy - Mixes for Green Construction and Topdressing

by **MARVIN H. FERGUSON**

Former National Director, USGA Green Section

IN BUILDING and maintaining a golf green, there is one major objective: the green must provide a satisfactory surface for playing the game. The surface must be as free of blemishes as possible. It must hold a well-played approach shot without being severely marked, and it must allow a putt to roll true. These requirements are met by growing a dense, tight, well-mown turf on a firm, uniform soil.

These requirements are simple to state, but they are often quite difficult to provide. The turf manager begins to achieve his objective by choosing a grass that lends itself to the management techniques that must be imposed to produce a satisfactory playing surface. He then must strive to manipulate the environment so as to enhance the ability of the plant to grow under the conditions imposed upon it. The grass plant is an exceedingly complex organism, and an understanding of its needs is a necessary part of the turf manager's qualifications.

One major component of the grass plant's environment is the soil upon which it grows. Soil contributes four major factors to plant growth.

- The soil provides an anchor.
- The grass roots penetrate the soil mass and physically bind the grass to the soil.
- The soil provides nutrients, water and air.
- In addition to these needs of the plant, a soil for putting greens must also be stable and firm.

Let us examine each of these matters. Most soils will provide adequate support for the plant roots unless the soil is so dense that roots are physically impeded from penetrating the pore spaces.

Nutrients are an important function of soils in most plant growth situations. In the case of putting greens, the total area is relatively small, but the importance of the area justifies very intensive care. In this context, the total nutritional needs of the plant may be supplied by the addition of fertilizers.

Water and air are the other two factors supplied by the soil. Both are necessary for roots to function properly. Water acts as the solvent for nutrients; it is necessary for the maintenance of turgidity in leaves and other plant tissues. The transpiration of water through leaves tends to cool the leaf surfaces and the air immediately surrounding them.

Air (oxygen) must be present in the root environment for the roots to absorb water and nutrients. Without air the cell membranes of the root system become impermeable and uptake ceases. Water loss at the leaf surface without water uptake by the roots leads very quickly to wilting. "Wet wilt" or "scald" is the result.

These things that the soil contributes to plant growth are all related to the porosity of the soil. The roots that anchor the plant grow in the pore spaces between the soil particles. Available nutrients dissolved in water make up the soil solution. This soil solution, together with air, fills the pore spaces within the soil.

Porosity is one of the most important considerations in a putting green soil. In a good agricultural soil, the solid particles of matter occupy about 50 percent of the space. The remainder of the volume is voids or pore spaces. Normally, an agricultural soil will have large pores and small pores in about equal proportions. When the soil is well-drained, the large pores hold air and the small pores hold water. Such soils depend upon structural characteristics to maintain this water-and-air relationship. Loam soils will contain sand, silt, clay, and organic matter. These solids are aggregated into small clods or crumbs. The particles fit together to provide both large and small pores. The desirable arrangement of these crumbs or aggregates of soil is maintained by tillage practices.

While soils such as these are excellent from the standpoint of all the plant's

needs, they are rarely satisfactory on a golf green. Putting surfaces are subjected to traffic, which tends to press the particles together. As the solid particles are compressed, the individual particles become rearranged as the aggregates are crushed and flattened. Naturally total pore space is diminished. The large pores tend to be diminished disproportionately. Sometimes the small pores may actually increase as a percentage of total volume. This compaction then reduces the amount of space available for air, and because water drains more readily through the larger pores, the drainage characteristics of the soil are impaired.

THE RECOGNITION of the facts that have been stated led to an increased interest in the role of sand as a putting green medium. In 1953, the USGA Green Section established a research fellowship at Texas A&M University for the purpose of investigating the physical characteristics of putting green soils. Raymond Kunze was the first student to study under that program. He was followed by Leon Howard and Cecil Brooks.

In the course of these investigations, it became apparent that in order to compound a soil mixture that would be stable, the major component must be sand. Inasmuch as the maintenance of soil structure depends upon tillage, and because it is virtually impossible to provide adequate tillage on a golf green in play, it is obvious that texture of soil materials is the only reliable characteristic upon which stable porosity may be based.

One of the problems encountered in using high proportions of sand is the tendency of such mixtures to be droughty. They simply do not hold enough available water to keep grass from wilting on a hot day without frequent sprinkling. It was found that this problem could be mostly overcome by the use of layers of different texture at relatively deep

positions in the soil profile. In this case, a gravel blanket at a depth of 12 inches was used.

The gravel blanket serves a dual purpose. It acts as a safety valve to drain water rapidly from a green when the soil becomes saturated. Water moves laterally through the gravel to tile lines and then away from the green. On the other hand, water does not move readily from a sandy soil mixture into the gravel.

Because of the textural differences, water is held in the smaller pores of the sandy mixture until it saturates the zone above the interface. Only then will the gravitational force of the water overcome the tension exerted by the finer pores of the sand mixture. Then drainage occurs.

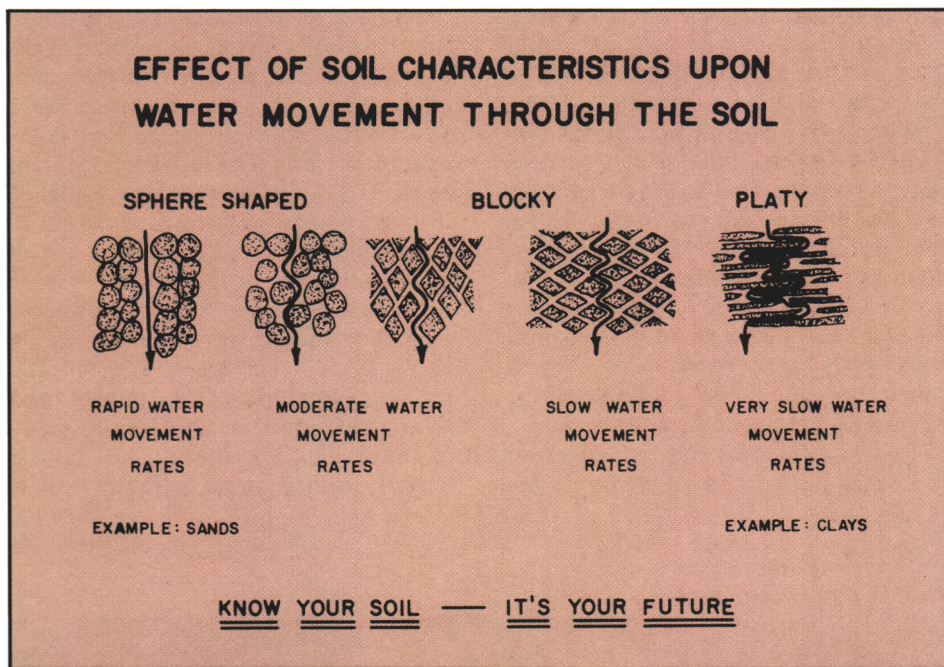
By making use of this phenomenon, it is possible to irrigate enough to wet the rootzone but not enough to cause

drainage to occur. Thus by use of a perched water table, the sandy mixture will hold more water than it normally would be capable of holding. Careful irrigation also serves to maintain the nutrients in the soil solutions of the rootzone. Only when heavy rains or heavy irrigation causes water to flow out through the tile lines will nutrients be leached.

When high sand mixtures first came to be used, a great deal of skepticism was voiced. More accurately, the issue became extremely controversial. As is usually the case, controversy led to investigations by numerous research organizations. Eventually it was found that the advantages of sand mixtures outweighed the disadvantages, and many of the golf course builders began to accept that concept.

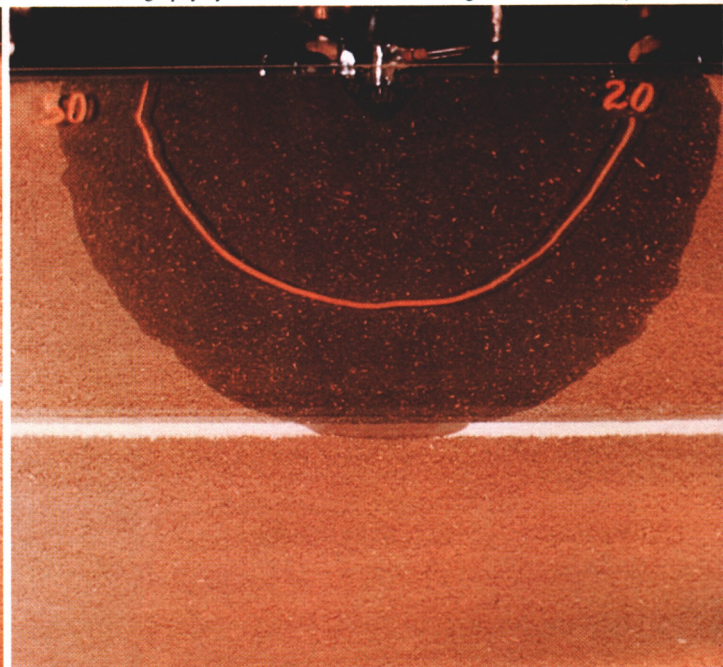
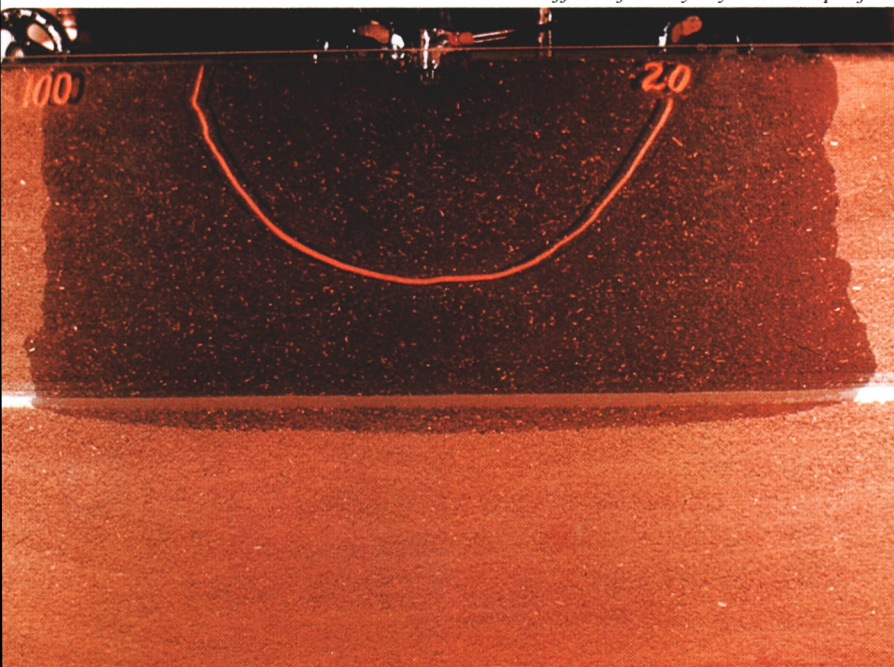
Unfortunately, in mixtures of sand, soil and peat, soil very often contained a great deal of silt, and it has been observed in the laboratory that silt tends to migrate downward through the sandy mix when water is passed through the profile. Builders have been advised that if only a high-silt-content soil is available, they should use only sand and organic matter. Another problem encountered by contractors is trying to uniformly mix a relatively small amount of soil with organic matter and sand.

After a substantial number of greens were built of sand and organic matter



Effect of a clay layer in soil profile.

Photography by WALTER H. GARDNER, Washington State University



and had been maintained for awhile without serious disadvantages, the trend toward the use of sand and organic matter alone has gained momentum. Impetus has been given to this trend by research work in California, which indicates that light, frequent topdressing with pure sand gives very good results.

In most locations, sand of suitable quality is available. A mixture of sand and organic matter is relatively easy to make. As the trend to more sand in the mixture has developed, the desire for rapid permeability has grown.

RAPID WATER movement in the soil depends upon the presence of a relatively high percentage of large pores. It is desirable to remove excess water from the soil surface quickly and to void the large pores so that air will be brought into the rootzone. However, it is questionable whether very high rates of permeability are either necessary or helpful. The upper range of permeability that has been suggested is about 10 inches per hour. Some contractors and architects have asked for even higher rates. Neither rainfall nor irrigation is ever likely to impose that kind of water transmission load on the soil. In the case of heavy rain or rapid precipitation rates from irrigation, much of the water is removed by surface drainage.

When a large part of the pore space is composed of pores large enough to facilitate very rapid water transmission, then the percentage of pores of capillary size is reduced. Water retention capacity declines when the percentage of capillary pores is reduced.

Both sizes of pores are important. Both depend upon particle sizes of materials incorporated into the mixture. When only sand and organic matter are used, then the choice of sand with suitable particle sizes is extremely important.

With the growing trend toward topdressing with pure sand, the question is being raised, "Why not build the green with pure sand?" A great many greens have been built completely of sand. After a few years they appear to be not much different from greens built of sand and organic matter. The stability of organic matter in the soil varies with the geographical and climatic conditions that exist. In the South, organic matter decomposes quite rapidly. Eventually, the amount of organic matter that exists depends upon the production and subsequent death of grass roots, stems, and such leaves as may come in contact

with the soil. In cooler regions, organic matter may increase as a percentage of the total rootzone medium, and its presence may result in a problem with spongy playing surfaces.

At the time of establishment, the inclusion of organic matter helps in several ways. It tends to provide some water-holding capacity, and it provides some cushioning effect. The surface is usually better for play while the grass is developing a suitable cushion. It is important that not too much organic matter be used. If more than about 20 percent, by volume, of organic matter is used, then playing surfaces tend to footprint and are not sufficiently firm.

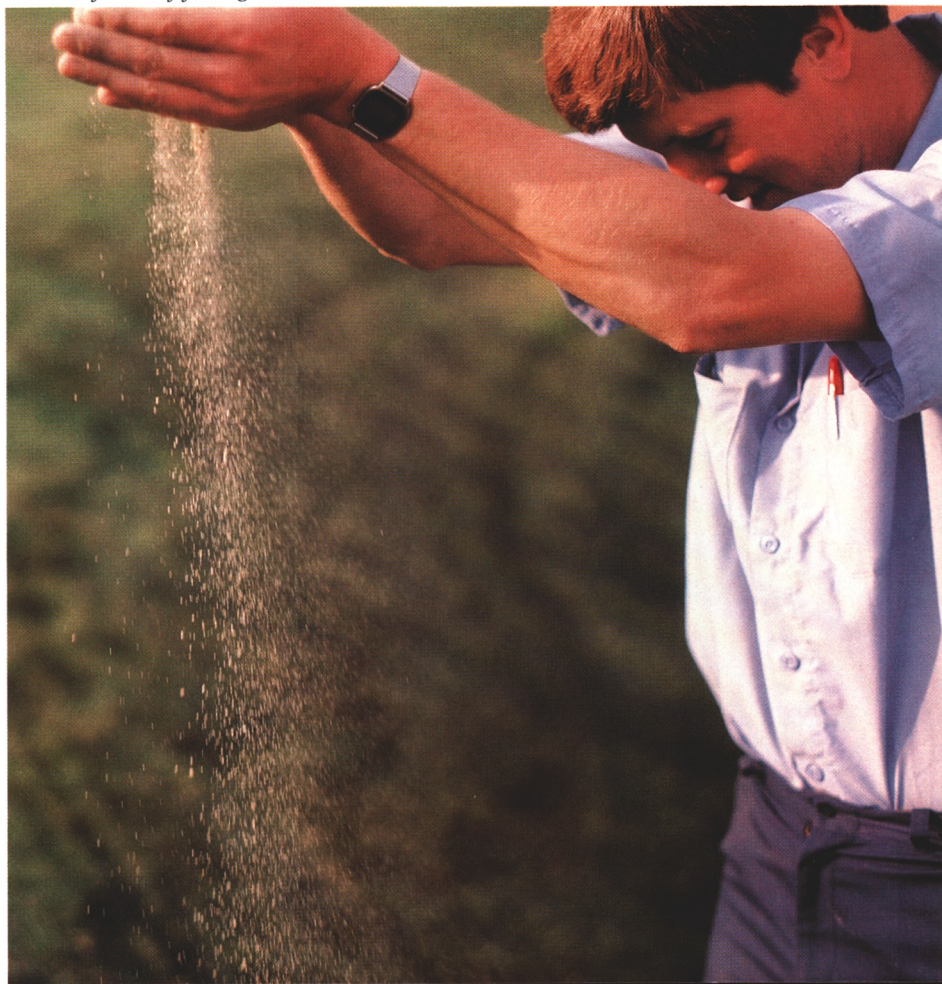
What does soil contribute to the mixture? If we discount the value of soil as a nutrient supplier and accept the premise that we are dealing essentially with a hydroponic type of nutrient supply, then the only contribution of soil is physical. In this case, the soil contributes more small pores to the mixture. It generally causes a decline in permeability and an increase in the water retention capacity of the soil.

Two other factors have an effect on the water and air relationships in the

soil. One is the condition of the surface of the green and the ability of water and air to infiltrate the soil. Permeability and infiltration are terms that are sometimes used interchangeably, but the phenomena they describe are quite different. Permeability is the term applied to the ability of the soil to permit the flow of water under saturated conditions. Infiltration applies to the ability of water to enter the soil. Greens with a good soil mixture with adequate permeability may not behave properly if topdressing or some other treatment has created an impermeable crust at the surface. Fortunately, it is usually within the capability of the golf course superintendent to correct a faulty situation that exists near the surface. It is much more difficult to correct faulty permeability, which is usually considered to involve the entire soil profile.

The other factor is layering. A layer near the surface may be extremely detrimental to the growth of putting green turf. Layers placed deeper in the profile may be helpful in that they may be used to enhance the water-holding capacity of the rootzone medium. The textural barrier formed when a sandy soil is

Tines drift out of falling sand.



placed over a gravel layer allows the use of a sand and organic matter mixture that would hold too little water if the barrier were absent. The perched water table provides a reservoir of available water, which would drain to a deeper region of the soil, out of reach of the roots if the mixture extended deeper.

IN SUMMARY, there has been a revolution in our thinking with respect to soil mixture for putting greens. The emphasis must be upon the matter of pore space and its effect upon the water and air relationships within the rootzone. Much research is needed in the area of sand particle sizes, amounts and quality of organic matter, and upon layers of different composition within the rootzone.

It may be possible to produce a mixture that contains optimal attributes for putting greens, but such a mixture would not likely be economically feasible. Through measurement of the physical characteristics of a rootzone mixture, it is now possible to compound a growth medium that works reasonably well through the use of materials that are available at a reasonable cost.



Airborne! Topdressing may be needed.



Particle size variability can be great in sands.



Organic matter. A small but important component of modern soil mixes.

For Good Golf and Good Turf — Use Less Water

by **JOHN A. ZOLLER**

Executive Director, Northern California Golf Association

Cypress Point "suffered" through the Great Drought of 1977. But did golf or our golf courses really suffer?



I GREW UP on a golf course located outside Hamilton, a small town in Ohio. My earliest recollection of going to the golf course was to tag along after my older brother, who had a summertime job of herding sheep on the course. I also have a second recollection. One day a passing motorist carelessly threw a cigarette out the car window, and a grass fire resulted that burned the entire golf course. Now, when you talk about not willingly wanting a brown golf course, I know what you mean!

Nevertheless, the game that we played in those days was significantly different from the game we play today. To be specific, the game then was played much more on the ground than in the air, while now the opposite is true. To illustrate this point, it was not unusual at

all for the stronger players to consistently drive the 350- to 400-yard holes, and, I assure you, the ball was not in the air this entire distance. I don't know if it still stands, but for a long time the record for the longest hole-in-one was something like 480 yards made by a baseball pitcher named Lou Kretlow, playing on a course in Oklahoma.

My first experience with a green golf course came when I went to school at Ohio State University and started playing on their magnificent Scarlet Course, which was designed by Alister MacKenzie. This was his last project; he passed away while the course was still under construction. Incidentally, up to this time I had never heard the words *Poa annua* or annual bluegrass, nor had I ever heard of a controversy on the "holding quality of a green." Now for me, the nature of the game changed. The Scarlet Course had a single-row, center-line irrigation system down the fairways and three or four quick coupler valves around the greens. The fairway valves were on 100-foot spacings with an enormous delivery capacity. I can tell you we could have put out the great Chicago Fire in about three minutes with this system. When the grass showed any stress or the greens became a little firm, out went the man with the sprinklers and on came the water. Now it was necessary to learn a completely new game. No longer did we land the ball 20 to 30 yards short of the green and bounce it in; the game became

Americanized. The good players learned to carry the ball a great distance in the air. Also, sad to say, we started hearing these new words in golf course maintenance: *Poa annua*, compaction, holding quality, and weed invasion.

The desire to create and maintain fence-to-fence, park-like conditions took over. More and more irrigation systems were designed to cover the entire acreage; and, in a way, the game became easier. Balls that were struck off-line would no longer roll to the water hazard or to the sand bunker or out-of-bounds but would hit the ground and stop.

As a personal opinion, I see nothing wrong with having areas of great contrast on a golf course. As a matter of fact, I think it gives a very striking effect. I adhere to the philosophy that the playing areas of the course, namely greens, tees and fairways, should be absolutely perfect, but the other areas should not be improved and should be very penal in nature.

At this point, I think the superintendent should understand that the way he maintains his golf course has a strong influence on how the game is played. There is no denying this responsibility; it is the reason why some clubs have a large percentage of low-handicap players while other clubs have very few. The quality and condition of the golf course produces good players.

The idea that a good fairway is one that is soft and covered with lush green



The non-irrigated fairways of yesteryear. Strong players might drive 400 yards.



grass is a misconception. Johnny Dawson is one of the finest amateur players this country has ever produced, and I have never forgotten a statement he made in addressing a meeting many years ago. He said that he could care less about the condition of the green he is hitting a shot to; what was more important was the condition of the fairway he is hitting the shot from. Give him a firm, tight, well-knit surface to hit from, and he can stop the ball on concrete. There is an excellent article entitled "Firm Greens: Best for You and Your Course," written by Robert Sommers, in the April, 1966, issue of GOLF JOURNAL. In this article, a number of prominent people in the game make some very good points. Henry Cotton, who won the British Open three times, said: "The influence of the unknowing member has become notorious in American golf. Unfortunately, there has been a tendency in recent years to produce softer conditions for play by encouraging more vigorous grass growth than is necessary. The production of fast-growing soft greens and fairways should be avoided. They result in unnecessary maintenance problems and are not really ideal for the game. The truly proficient golfer relies on backspin to stop his shot, not a hose."

William H. Bengeyfield is quoted as saying: "Too often the superintendent comes under heavy pressure to water the greens so that they will hold a shot. This unfortunate advice must frequently be followed. Wet greens are easily damaged by spikes, ball marks and mowing equipment. Shallow grass roots develop, annual bluegrass invades, and before long, all damaging consequences of poor water management catch up with the turf, the superintendent, and the membership."

I encourage everyone to get a copy of this article for his files — the comments are timeless.

SO FAR we have considered the effect of soft, lush playing conditions on how the game is played. Now let's look at the effect it has on maintenance. In some ways, the technology of the automatic irrigation system has been a major factor in the Americanization of golf. Rather than being certain as to how much water is required for greens, tees, or fairways each day, it becomes far too easy to push a pin or a button on an automatic controller and be assured that no part of the course will become too dry for another day. To make matters worse, the irrigation controllers have

the capabilities to be programmed for weeks in advance, so any superintendent who can do an effective job of irrigation for more than a day ahead of time has missed his calling. With ever-changing conditions and weather, daily monitoring of clocks and controllers is essential if we are to avoid becoming too heavily reliant on the automation of these systems.

It is safe to say that during the growing season, no single responsibility of the superintendent has a greater impact on maintenance budgets and practices than the amount of water he uses. At the basic level of this idea is the fact that in many areas, water and electrical power for pumping have become so expensive they can consume as much as 20 percent of a budget. Consider the amount of your maintenance budget that you could save by cutting back on the practices necessary to combat *Poa annua*, disease, weed encroachment, and compaction. Conservatively, your maintenance budget would be reduced by as much as 25 percent.

It's obvious that the ill effects of too much water can cost you a great deal in terms of money, but let's take a moment to look at this from the positive side: What are the desirable results of under-watering?

The best illustration of under-watering that I am aware of, since the courses like the one in Hamilton 40 or 50 years ago, were the courses in California during the drought we "suffered" through in 1977. I use quotation marks for the word "suffered" because, as you will understand in a moment, our golf courses didn't really suffer. How many of you have ever turned the water off on a fairway for an extended period during the warm months or have been unable to water your greens other than a small amount of hand watering? Obviously, if we made a radical move such as this with our Americanized country clubs and green committees, we wouldn't have a job for long. The point is that the best method of learning the advantages is by first-hand experience. Someone could speak to you all day about what occurs when the water is cut back, but until you actually see it happen, you probably wouldn't believe some of the positive things that take place.

What occurs first, when a fairway is put under stress, is that the *Poa annua* will disappear in a very short time. But what is most remarkable is how well the more drought-resistant strains hang on with practically no moisture at all. If this isn't enough incentive, other mois-

ture-loving weeds, such as daisies and clover, will be unable to survive, and no new seedlings will germinate under these conditions.

THE SAME BASIC pattern follows when the greens receive a minimum of water. The *Poa* begins to suffer while the bent becomes more aggressive and begins to fill in the voids. Another welcome benefit comes in the way of a lesser susceptibility to spike marking and heel prints. Remember, as mentioned before, the greens will still hold a well-struck iron shot — the backspin makes the ball hold, not a guy with a hose or irrigation clock.

Because of the more favorable variety of grasses and the lower moisture levels, you may also notice far less incidence of disease throughout the course, and with the rising costs of fungicides, we all know how important this can be.

I can't think of a single routine mowing practice that isn't made easier by avoiding wet spots and an overall soft condition. Areas that are scarred or rutted by mowing equipment and golf carts are no longer a problem with prudent watering.

The most significant aspect of all that we noticed during the drought was that our golfers enjoyed the game as much as ever. Ladies and senior men were thrilled with the added yardage on their shots while the better players found the tight, firm fairway lies ideal for hitting their approach shots to the greens. With the amount of backspin they could put on the ball, they could stop it even on the firmest of greens.

After this discussion, many people would argue that a greener golf course is aesthetically much more pleasing, and I agree that a drought condition is an extreme. But green is a poor excuse for overwatering. With proper levels of well-timed fertilization, the grass will maintain a very attractive color and will be much more durable and vigorous than a grass that gets its color primarily from water.

Certainly we have come a long way from that first course I played on in Ohio. Our knowledge and technology have taken us great lengths from having a brown, dry golf course. There must also be a happy medium; the part of the game we have lost can easily be found again. No one could suggest that this brown, dry course would provide the best in playability or looks, but at the same time, with prudent management, we can provide an aesthetically beautiful course suitable for good golf.



To Live — Grass Must Be Green

Grass must be green enough to support chlorophyll production.

by J. R. WATSON

Vice President, Agronomist, The Toro Company

HOW GREEN does a golf course have to be? This question may be answered, in part, by asking another: How essential is grass to the game of golf or, specifically, to your golf course?

And, to this question the answer is obvious. Not many, if any, new sand-oil green golf courses are being built. In fact, it is worth noting that there are probably fewer than 50 sand-oil green golf courses left in the United States, and the trend is toward fewer and fewer each year. They are converting to grass — four in Nebraska just last year!

Obviously our topic deals with grass — grass on the green, grass on the fairway, grass on the tee, and grass in the rough. Obvious also is that all of us prefer to play golf on grass, green grass. But how green must it be? Or, must it be green? For certain, golf can be played on brown, dormant grass. From a practical standpoint, greenness of golf turfgrass must

be dictated by the plants' ability to sustain their photosynthetic action at a rate necessary to support the level and intensity of play, maintain the recuperative potential of the grass following damage, and to sustain the continuous process of new shoot growth. New shoots are necessary to avoid loss of turf and to maintain the level of density required to provide a playing surface free of weeds.

Turfgrass quality is judged by the standards established for its beauty, use, playability, density, freedom from pests, and uniformity of growth and color — green color.

The color green enhances the beauty and aesthetic appeal of a golf course and its environs. The plant element chlorophyll imparts this green color and is essential for photosynthesis. Photosynthesis is the fundamental process of food manufacture in nature and is the primary physiological function performed in turfgrass leaves. Photo-

synthesis proceeds in chloroplasts located in green plant cells and only in the presence of light, carbon dioxide, and water. Photosynthesis makes possible the existence of all plants and animals. Only *green* plants are able to convert the energy of sunlight into organic forms that are necessary for growth and survival of the plant itself.

Chlorophyll is an unstable pigment and is continually being decomposed by sunlight and regenerated through synthesis processes in living cells. It thus maintains a relatively stable chlorophyll content in leaves that is not altered appreciably during the growing season. When turfgrasses are placed under cultural regimes or exposed to environmental stress, the balance of chlorophyll synthesis to degradation may be detrimentally altered. Factors that reduce leaf area below that necessary for production of sufficient chlorophyll reduce photosynthesis activity below the

required level to maintain adequate growth and recuperative potential. If we knew what or where that point or level might be, we would know exactly how green our golf course should be. Unfortunately, this remains one of the many unknowns in turfgrass culture. From what is known, however, it is possible to point out certain limitations and constraints beyond which grass growth may be severely limited and if the responsible cultural practice is continued will likely result in thinning and ultimately in death.

ESSENTIAL or primary cultural practices are concerned basically with the development, growth, and maintenance of a green, dense, and pest-free turf. Mowing, watering, and fertilization are the primary cultural practices that affect these factors.

Cutting heights required to meet the demands of the game severely limit the number of species and cultivars that can be used on golf courses. Musser lists only some 40 to 45 species suitable for any turf purpose, and for any one purpose in any one location (putting greens), there probably are fewer than three or four suitable species.

Cutting height influence on root systems has been well documented. In fact, height of cut directly affects depth and extensiveness of root systems. As cutting height is lowered from optimum, there is a corresponding decrease in the root system. Thus, root growth is reduced by lowering heights of cut because of defoliation or loss of green photosynthetically active tissue. Golf course turf must be green enough to support this function. For any given species or cultivar in any given turfgrass situation, the lowering of height of cut and increasing the mowing frequency will effect a greater reduction of root weight.

Watering practices, rainfall, and drought all affect the amount of available water in the soil. The amount of soil water available to the grass plant will produce well-known and documented responses.

Plants extract water from soils most easily at that level of available soil water known as field capacity (0 bars). As the level of available water drops below or decreases from this point, water is absorbed with increasing difficulty. Initially, as the available moisture range decreases, there may be an extension of the root system. That this will occur as long as other variables (mowing height and fertility) remain

constant and at an optimum or near optimum level is well known. However, as the plant comes under stress for water and a deficit occurs, certain detrimental physiological responses may occur.

For example, Madison has shown that verdure (amount of green plant material beneath a mowing height) decreases under even slight water stress. It also has been shown that turf cut at heights comparable to fairway heights will survive and remain green when moisture is maintained at approximately 20 percent deficit levels. However, this study did not include traffic or play as a variable.

Another significant factor in survival of turfgrass when it is stressed for moisture or when it is cut at or near the minimum required for survival, is the effect of temperature. When water is withheld, the cooling effects of transpiration and evaporation do not exist, and an increase in temperature and decrease in humidity will occur. During a drought, failure to apply supplemental water to golf turfgrass may produce dormancy, and if it is prolonged, it could become lethal.

In grass plants under stress, the lack of water will limit the rate of photosynthesis, not necessarily by its unavailability as a raw product, but because of the physiological effects produced by temperature. For example, translocation of the by-product of photosynthesis (carbohydrates), stomatal closure, exchange of gases at cell membranes and other physiological processes are all affected by increases in temperature.

AS TEMPERATURES warm to stress levels, grass will survive better at higher heights of cut. Also, lowering of heights of cut at times when temperatures elevate may increase stress to damaging levels. These conditions may be obtained when heights of cut on greens and fairways are being lowered for tournament play during July and August. Thus, from a practical standpoint, if heights of cut are to be lowered, the reduction should occur, if possible, when temperatures are favorable.

In this respect, studies in Nebraska have demonstrated a 3°F temperature increase for turfs mowed at $\frac{3}{4}$ (0.75) inch as opposed to those mowed at one (1.0) inch. This may not appear to be of great magnitude, but from a biological standpoint, a three-degree temperature differential could have significant effects on biological aspects such as rate of photo-

synthesis, carbohydrate translocation, and evapotranspiration.

When one manipulates height and frequency of cut to affect putting speed, water becomes more critical. It has been demonstrated that cutting below the optimum mowing height for greens, fairways, and tees is far more damaging when less than minimal amounts (i.e., 20 percent deficit) of water are applied.

Robert Wilson, superintendent of Oak Hills Country Club, in San Antonio, Texas, indicates that putting green turf can be maintained indefinitely at 5/32 of an inch as long as adequate soil moisture levels exist and as long as water may be used for regulating temperatures (synergizing or misting). Under tournament conditions, however, when cut at $\frac{1}{8}$ inch, color will begin to fade after two days of play and shoot growth cannot be maintained beyond 10 days. At that point the grass is brown, actually dormant, for if corrective action is applied, it recovers. How long beyond this 10 days the grass would remain viable and have the ability to recover is unknown.

One could speculate that withholding water at either height of cut during periods of high temperature stress would result in rapid loss of color followed closely by cessation of shoot growth, dormancy, and, unless corrected in a short period of time, death. Further, grass cut at the lower height would succumb more quickly. This speculation would seem to agree with the belief of some authorities who have indicated that the combination of less than optimum levels of water, height of cut, or fertility results in a decreasing potential for tolerance to stress. This will, one might expect, impact adversely on green color. For certain, when stress exists or persists, a decreasing number of options are available to correct or modify the effects produced by the negative manipulation of a single primary cultural practice.

This hypothesis and these observations need to be documented by research. Furthermore, they support the belief of the USGA Turfgrass Research Committee that studies involving cultural practice interactions need resolution.

HOW GREEN does a golf course have to be? From a practical as well as from an agronomic and physiological standpoint, the course must be green enough to support and to sustain production of sufficient chlorophyll to ensure a rate of photosynthetic activity

sufficient to support continuous development and growth of shoots. The plant itself must avoid prolonged dormancy during the growing season, and it must maintain density at levels needed to preclude weed invasion. Certainly, on a temporary basis, a green color is not essential for play; brown, under certain conditions, may even be preferred. For the long term, however, grass must be green to live. There is latitude for manipulation of cultural practices to compensate for an adverse effect produced by less than optimum application of one factor — either lowering the height of cut or withholding water. That tolerance, however, is substantially reduced when one of the practices (mowing or watering) is lowered to the minimum sustainable level. When two or more practices (watering *and* mowing) are reduced to minimum sustainable levels, few, if any, options are available for corrective action. Loss of color with its attendant problems will soon lead to death of the grass plant.

Finally, from an aesthetic standpoint, Alister MacKenzie, in his book *Golf Architecture*, published in 1920, states:

Another common erroneous idea is that beauty does not matter on a golf course. One often hears players say that they don't care a tinker's cuss about their surroundings: what they want is good golf.

I haven't the smallest hesitation in saying that beauty means a great deal on a golf course; even the man who emphatically states he does not care a hang for beauty is subconsciously influenced by his surroundings. A beautiful hole not only appeals to the short handicap player but also to the long, and there are few first-rate holes which are not at the same time beautiful holes.

In other words, while always keeping uppermost the provision of a splendid test of golf, I have striven to achieve beauty.

These words are as true today as they were 63 years ago and as they will be 63 or more years hence. And, while there is great opportunity to minimize the amounts of water and fertilizers and, perhaps, to lower heights of cut and to increase speed by manipulating these and other cultural practices, we must not lose sight of the fact that if golf is to be played on grass, it must be green. And, green is beauty! Research may, and will, give us new grasses and provide us with the knowledge to reduce current maintenance costs, but only chlorophyll will provide green color and grass upon which to play.

How Green is Green? How Brown is Brown?

A MIDDLE APPROACH

by STEPHEN G. CADENELLI

CGCS, Country Club of New Canaan, Connecticut



Nature needs only our assistance — not our dictations.

WHERE DOES ONE begin to develop a philosophy or declare a statement regarding just how green good turf should be, or even more basic, how green is green?

There is no doubt that universal opinions exist on one fact in this controversy — golf is played on grass, not on color!

Many have stated that golf in America has deteriorated because of the lush green condition of our golf courses caused by overfertilization. It is said that too much nitrogen is being applied at the wrong times in the growing season. It is said that even more significant negative impact on golf in America is the overapplication of water to greens, tees, and fairways. I don't disagree with these statements, but I question how

such statements can be made when no standards exist to determine just how much water or fertilizer is actually required by the grass plant. Indeed, nearly all fertilizer requirements are based on research done on foodstuffs. Water requirements are even less researched. At best, the amount of water applied best represents the philosophy of the "art of greenkeeping" in that watering is done by feel. So really, what is meant by overwatering and overfertilizing? Is this an oversimplification? The point being that no reference points exist from which one can say that turf is too lush, overwatered, and overfed. So just how green is green; how brown is brown?

The question can be even further confused by admitting as evidence the

notion that playing conditions in Scotland are ideal and should be copied in America. What are these conditions? On a recent trip to England and Scotland, I found greens that varied from very firm, closely cut and moderately fast to excessively soft, shaggy, and extremely slow. Fairways were almost universally very thin, to the point of having little turf and with quite a bit of bare ground showing. Are these the conditions we want to copy?

What middle ground can we find that would satisfy everyone? The question can best be answered by exploring a few myths that supposedly represent the ideal to be sought in regard to playing conditions.

Myth No. 1 states that we in America have ruined golf as originally intended. Rather, the Americanization of golf is no more than the result of the American desire to improve and perfect. Yes, Americans have changed the game, but not for the worse. Improved turf quality and more refined playing conditions are symptomatic of the American zeal for excellence.

Myth No. 2 believes the Scottish way is the only or best way. Not so! There is much to be copied from the art of green-

keeping as practiced in Scotland, but it is a mistake to think that American conditions could or should emulate totally the conditions across the sea. No doubt the Scots can teach us quite a bit, and they have useful methods to be utilized. However, only those that fit naturally into the American golf-scape should be considered. It is important to note that under-fertilization can be as harmful, especially when soils are allowed to be depleted of meaningful levels of nutrients.

Myth No. 3 is concerned with over-watering. Who is to blame for over-watering? The golf course superintendent? The green committee? The USGA, PGA professionals, or the general playing public?

Frankly, if it is agreed that over-watering is such a major problem, there is enough blame to pass around. Tournament sponsors and TV networks deserve a share for demanding such totally perfect green conditions. Touring professionals also deserve some of the blame for their demand of perfect conditions at all costs through the green. The playing public, observing what the pros demand, then make the same demands. Green committees have been forced to

do more and more to provide those near-perfect conditions on their golf courses. Finally, the golf course superintendent, feeling the pressure to produce the best-looking conditions, relents and begins to manage the golf course for color and not for the best playing conditions.

WHAT IS the answer? There is no doubt that common middle ground must exist from which all of us in golf can agree regarding ideal playing conditions. This middle ground or middle-of-the-road approach lies somewhere between the lean, native approach of the Scots and the lush, overdone approach of many American courses. This middle ground would exemplify the best thinking of the day regarding the judicious use of fertilizer and water. Common sense would dictate just what areas can be expected to be kept alive during summer dormancy. The key word is "alive."

Golf is a great game played on beautiful and aesthetically pleasing grounds. Those grounds can be kept pleasing through the use of common-sense management practices and the belief that Mother Nature needs only our assistance — not our dictations.

How green is green? How brown is brown? The Wairakei International Golf Club, New Zealand.





News Notes for Spring 1983

New Alignments for Some Green Section Regional Offices

In order to maintain and preserve the quality of Turf Advisory Service visits in Ohio, Kentucky, Missouri, Wyoming, and Montana, it has become necessary to realign Green Section Regional Office coverage for these areas.

The step has not been taken lightly. We are very much aware of the importance of continuity in our relationships with long-standing subscribing clubs. Nevertheless, the realignment will provide TAS subscribers with a more equitable share of the time and attention of the Green Section agronomists in these particular states. There will also be a better balance or ratio of TAS clubs to Green Section agronomists within all regions. Time, we are certain, will prove the change to be most beneficial for all.

Ohio and Kentucky will now be served by **William G. Buchanan**, Director, and **Patrick M. O'Brien**, Agronomist, of the Mid-Atlantic Region. Their address is Suite B4, 9017 Forest Hill Avenue, Richmond, VA 23235. Telephone (804) 272-5553.

Missouri, Montana, and Wyoming will now be visited by **Dr. Douglas T. Hawes**, Director of the Mid-Continent Region. His address is 17360 Coit Road, Dallas, TX 75252. Telephone (214) 783-7125.

We are confident the realignment will strengthen the Turf Advisory Service nationwide. With this exceptional Green Section team, new friends, new ideas, and new perspectives have proven to be as beneficial to subscribers as continuing exchanges between the more familiar faces of the past.

How to Take Samples for the Soil Testing Service

Sand and soil materials are by nature quite variable. It is therefore extremely important that the sand, soil, and organic matter samples that you send to the laboratory be truly representative.

Instead of scooping up the entire sample from one place in the stockpile of material, take numerous small samples from different locations in the pile. A soil probe inserted into the pile to a depth of about 10 inches is a good method of sampling. About 30 of these small samples will make up a volume of about one gallon of material. Probe at random from all sides of the pile and at various elevations.

Remember that sampling is the most frequent and the most serious source of error in the analytical process and in the mixing process. The laboratory results can show only the values found in your sample. If the sample is not representative, then the results of analyses may be worthless, and possibly even dangerous!

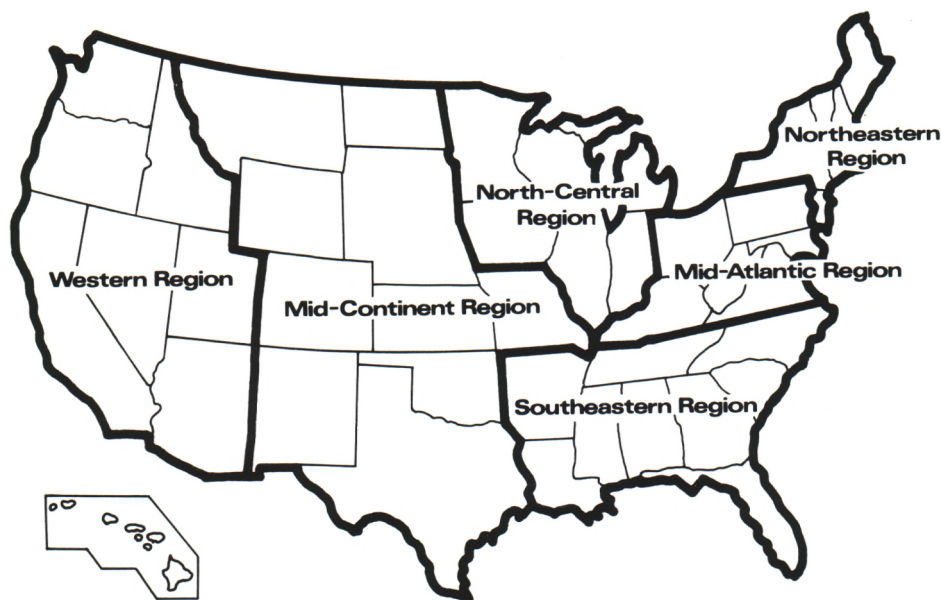
Soil Testing Service Fees Increase

In 1982, Agri-Systems of Texas, Inc., was designated to perform physical

analyses for materials to be used in the construction of putting greens. Response to this service has been very good. Clubs have kept up a steady flow of samples for use in construction and in top-dressing.

Agri-Systems observed its 20th anniversary on March 1. In its 20 years, this laboratory has served more than 2,000 clients. Marvin Ferguson, President of Agri-Systems, reports that the analytical services are becoming a consulting service as well. Many of the clients call to discuss their reports and the projects for which they need materials analyzed.

Agri-Systems has announced that prices for the service are being increased by 25%, effective April 1. Sand sieve analyses will be performed for \$25 per sample. Mechanical analyses will be \$50, and the complete analysis of particle size, pore space, permeability, bulk density, and water retention will be \$250. This is the first increase in prices in more than 10 years.



USGA Green Section Regional Map

TURF TWISTERS

SHADY BLUEGRASS

Question: I have recently heard that Kentucky bluegrass can be used in shady areas. What varieties are suggested? (West Virginia)

Answer: A blend of Kentucky bluegrasses with a small percentage of fine fescue has given excellent turfgrass cover in shady areas. The better shade-tolerant Kentucky bluegrasses include Nugget, Birka, Bristol, Glade, A-34, Merion, and Victa.

IS NOT ALWAYS EQUAL

Question: I have a mixed stand of bentgrass and *Poa annua* in my greens. Each spring, when *Poa annua* is in flower, I notice that some of the patches of *Poa annua* simply do not flower. I have looked closely at the patches and they certainly look like annual bluegrass, but they don't flower like *Poa annua*. What's going on? (Kentucky)

Answer: What you are probably looking at are patches of sterile *Poa annua*. In research on annual bluegrass, supported by the Green Section some years ago, it was established that there are several distinct subspecies of *Poa annua*. They are *Poa annua* var. *annua* L. Timm, *Poa annua* var. *reptans* (Hauskins) Timm, and *Poa supina* Schrad. These are all discreetly different grasses within what we call *Poa annua* or annual bluegrass. We suspect that there could be even more of these subspecies as more becomes known about the very variable plant which we simply call *Poa annua*. Obviously, all *Poa annuas* are not created equal.

TO THE GROOVY

Question: Neighboring superintendents and I are having a controversy over the use of solid versus grooved rollers. What are the advantages of grooved rollers? (Louisiana)

Answer: Grooved rollers are more beneficial in producing a better putting surface because they encourage more upright growth habit of the grass. The surface area of the grooved roller is tremendously reduced, thus they do not lay the grass down as much in front of the bedknife. Reels with grooved rollers also have a truer cutting height than do those with solid front rollers.

LONESOME WIND

Question: Do tree windbreaks between fairways reduce irrigation needs of the turf by reducing evaporation and transpiration losses? (Colorado)

Answer: Well, yes and no! Tree windbreaks may reduce the direct loss from evaporation and transpiration by turf in windy areas. They also help to create a more desirable atmosphere for playing golf on the windswept high plains. However, it is very doubtful that they reduce water loss on the golf course property. Tree roots are often found running under the fairways. The trees pump into the atmosphere more than enough water to make up for what the turf may not use because it is growing on a wind-protected fairway.