MARCH 1973

USGA GREEN SECTION RECORD

A Publication on Turf Management
by the United States Golf Association

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Dr. Marvin Ferguson, winner of the Green Section Award with Edward L. Meister, Jr., (left) Green Section Committee Chairman and Lynford Lardner, Jr., USGA President (right).

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1973 Green Section Education Conference: "Practical Turfgrass Management"

Marvin H. Ferguson - 13th Recipient of USGA Green Section Award

Marvin H. Ferguson of Bryan, Texas, became the 1973 recipient of the Green Section Award for distinguished service to golf through work with turfgrass. Dr. Ferguson's contributions in the field have been varied and important over three decades.

As a young man his work at the USGA Green Section in Arlington, Va., helped to establish the usefulness of arsenical materials for herbicidal purposes and resulted in the recognition of thiram as an effective turf fungicide. Later he was responsible for deciding which of hundreds of grass selections should be saved and moved from the USGA's Arlington Turf Gardens to the United States Department of Agriculture Plant Industry Station in Beltsville, Md.; one of the five bluegrass strains saved was later released as Merion bluegrass. U-3 bermudagrass was the only bermudagrass moved to Beltsville.

Dr. Ferguson's work at Texas A & M University, where he was a professor of agronomy for 15 years, was vital in the evolvement of the USGA Green Section Specifications for Putting Green Construction, which rely heavily on his contention that matters of permeability and pore space distribution, together with the employment of textural layers to take advantage of soil-water movement phenomena, are vital criteria for evaluating putting green soils.

Dr. Ferguson has served the USGA Green Section at three times during his career, first during 1940-42 at the Arlington Station, then from 1947 through 1951 as a research agronomist, and finally from 1953 through 1968 as Director of its Mid-Continent Region and National Research Coordinator. Following are excerpts from the acceptance remarks by Dr. Ferguson.

"I accept the Green Section Award with mixed feelings—with a sense of pride and a sense of humility.

"I am proud of the Award first because of the name it bears. The United States Golf Association Green Section has been a major factor in my life's work. My experiences with the Green Section could fill an afternoon, but I shall not inflict them upon you.

"I am proud of the Green Section Award because of the men who have received it before me. I have had the rare good fortune to know all of them. I have been inspired by them and I have tried to emulate them in many ways, and yet I have fallen short in all ways.

"These considerations make me proud to join the list of Green Section Award recipients but humble because of the stature of the men on that list.

"I am humble for another reason. This Award is inscribed 'for distinguished service to golf through work with turfgrass.' Yet as I recall my days of visiting golf courses and talking with superintendents and club officials, I always gained more information than I gave.

"There is another reason for which I am proud of this honor. I know a great many people have a voice in choosing the recipient of the Green Section Award but I also know that the Green Section staff plays a significant role in the selection process. The knowledge that they must have approved of my being chosen for this honor is very gratifying and I appreciate their confidence.

"During my career, I have felt that I have been blessed more than most men. I have had a varied career and a satisfying one. I am now engaged in golf course architecture and consulting work. My son, my daughter, and my wife work with me. My wife Floy is with me today. This Award is as much for her as for me.

"And so, with a close-knit loyal family, warm friendships and work that I enjoy, what more could one ask?

"The only words I can think of that adequately express my feelings are truly, 'My cup runneth over.' Thank you very much."

P.J. Boatwright, Jr. and Frank Tatum of the USGA Executive Committee and Superintendent Roger Larson check the collar cut on the No. 4 green at Pebble Beach.

Preparing Your Course for Tournament Play

by JOSEPH C. DEY, JR., Commissioner Tournament Players Division of the PGA

Let's suppose you're the golf course superintendent or the Green Committee Chairman of a club which has contracted to hold the Open Championship a few years hence. What are you going to do about it?

Some cowardly souls, after fighting back the tears, may think about resigning on the spot. Others may start from the mental position that they'll show those touring professionals—they'll make the course so severe and so tricky that those pros won't know where they are. Still others may complacently say they'll keep the course just as the members play it—after all, golf should be a pleasure, not a penance; besides, low scores will help create interest and attract more spectators as the tournament progresses.

But all these theories and questions have been thought out and settled long ago. There are, in fact, some solid principles to guide you. Whether the prospective Open Championship is the United States Open or the Nassau County Open, the basic idea is the same—you are going to help determine a champion golfer. You are going to provide a testing ground that will reward skill. The other side of that coin is that the less skilled will have a more difficult time, and are likely to be penalized for their deficiencies. You are going to set up a testing ground that will evoke the best there is in the players.

Now this does not mean that your course is going to be made over. No competent golfing authority is going to schedule a true championship—of whatever class—at a course which needs extensive remodeling to be a proper test. That certainly is the point of view of the organizations which deal with the major championship events in this country, the USGA, and the PGA Tournament Players Division, and the PGA itself.

So we start by taking the course as the architect designed it. Perhaps it needs tightening—usually it is set up for every-day play and it may not be a true championship test. Usually that can be rectified and some tightening done simply by the judicious use of rough.

At first your members will tend to resent almost any alteration from the normal—and especially if more and heavier rough entails more and slower searching for the ball. Eventually, though, most members will come to

respect and to enjoy an enhanced challenge. In the months and even years of preparation for a major championship such as the United States Open, they will have growing appreciation of fine course conditioning. At the end of the Championship the early scoffers will be the proudest members, for when the Championship is all over, the course is likely to be in the best condition of its history.

This will come as a surprise to some who believe the old wives' tale about how tournaments tear up courses. But listen to the testimony of Ted Rupel. He was the golf course superintendent at Cherry Hills in Denver when the 1960 Open was played there. He wrote the following in the publication of the superintendents' association called "The Golf Course Reporter":

> "As for the condition of the grass, nothing could be better for the actual playing area. It must be considered that there are only 150 players in the tournament, and that they hit the ball so few times that the course gets a rest. The biggest factor in the recovery of the grass was that the use of golf carts was suspended ten days before tournament time, and that was very favorable to the grass from a growing standpoint."

As I have said, we start by taking the course as the architect designed it. Just a word about this. Most American courses belong to one of two principal schools of architecture—the school which espouses position play for *every* shot—that is, there is a prime position for each shot, and any straying from it is likely to be penalized. In other words, you play from A to B to C, and the area for each shot is restricted to some extent. That is the theory behind the design of the vast preponderance of courses in our country.

The other school of course architecture is a small one. It theorizes that, when all is said and done, the only thing that counts is the ultimate objective—the green and the hole itself. This school gives you considerable freedom on the way to the green, but once you arrive in that area you find the green and the hole protected to the death. A leading exponent of this philosophy was an amateur golfer and architect of many years ago, Max Behr, who was runner-up in the United States Amateur Championship of 1908. He compared golf to certain kinds of hunting, with the hole as the quarry, and he believed in defending the hole almost with his life.

There are some evidences of this philosophy when the Masters Tournament is played at Augusta National. Bob Jones and Dr. Alister MacKenzie collaborated in designing Augusta National so that there would be ample room off the tee for the average player, for Bob's basic belief was that "The first purpose of any golf course should be to give pleasure, and that to the greatest possible number of players, without respect to their capabilities. As far as possible, there should be presented to each golfer an interesting problem which will test him without being so impossibly difficult that he will have little chance of success. There must be something to do, but that something must always be within the realm of reasonable accomplishment."

So while the delightful Augusta National course may seem rather loose and liberal off the tee, it changes character and becomes severe on and around the putting green.

Now let's assume that the Championship you're going to entertain is a major championship. That means the organization which conducts it has some definite standards for setting up the course. The major authorities are pretty much agreed on the objectives to be reached—that is, the USGA, the PGA and the PGA Tournament Players Division, no matter the name of the tournament. The principles apply to all tournaments, though so-called minor events usually cannot be given the same amount of loving care. The major organizations seek to have some continuity in conditioning from tournament to tournament, from year to year, so that deserving winners will be determined and fair play served.

Early in the game of preparing for a major tournament, the sponsoring organization, such as the USGA, gets together with you on what tees to use, how the fairways are to be outlined, and how to treat the area around the putting greens. This has to be done in detail. You can't just say that fairways should be 40 yards wide, and let it go at that. You have to study each hole individually, each shot individually, and come to a decision on exactly where each shot should be aimed—where the grass will be fairway and where rough. You don't want to favor one kind of player over another—you don't want to set up an advantage for, let's say, the player who chronically hooks the ball over the man who can control a fade. You want to try to require all players to use every club in the bag.

To give you a case in point, in the last year of preparation for the 1964 U.S. Open at Congressional in Washington, the USGA representatives spent one full day in the preceding fall in determining the lines and width of fairways, or approaches to putting greens, and how to treat the areas around the greens. This was an 8-hour day in consultation with club officials and the golf course architect who was helping Congressional in some remodeling.

Then, the next spring, after the grass started growing again, sometime in April, another full day was spent by the same people—club, architect and USGA—in reviewing and refining what had been done in the fall. This, then, relates to just one aspect of preparing the course—its design, its layout.

The professional Tour tends to defy this sort of treatment, although such treatment is sought for the tournaments comprising the Tour. But the very nature of the Tour prevents achieving consistency and uniformity. The Tour starts in January and runs practically all year. Tournaments are played over many different kinds of terrain, on various kinds of turf, in various climates, in all sorts of weather. The player on the Tour must truly be a man for all seasons. Last January at Tucson the temperature was 20 degrees in the morning, and the scheduled start had to be delayed 1½ hours. In such circumstances it is not possible to obtain perfection of either design or of grooming, and as you know, design and grooming interact upon each other. The following week-end if you watched telecasts of the Bing Crosby Tournament at Pebble Beach, you saw players lift balls in the fairways and *place* them within one club-length of where they lay—very preferred lies. This is not pure golf as Old Tom Morris knew it. It does violence to a basic concept of the Rules of Golf, to play the ball as it lies. But Pebble Beach is customarily very wet in winter. This winter it has had a great amount of rain. Thus, when players, caddies and scorers—perhaps some marshals and press representatives—walk on the fairways, their footprints are likely to be quite deep in spots, heel prints particularly. To try to dig balls out of depressions one to two inches deep in the fairway is not golf. So in such a condition a Local Rule is adopted to provide relief, as suggested in the Appendix to the Rules of Golf booklet.

This very diversity and complexity of course preparation and course conditions week after week throughout most of the year is one reason why the help of an agency such as the USGA Green Section is needed. Our tournament contracts call for the tournament sponsors to obtain competent outside agronomic advice such as the Green Section provides. Now some golf course superintendents don't relish consultation with outside agronomists. This is not a wholly unnatural reaction; the superintendent knows his course better than anyone else. It's his baby. But the best fathers in golf course maintenance as in life are those who are always open to new and better ways of raising their children. The Green Section agronomists deal with scores—even hundreds—of superintendents. The Green Section men do not profess to be super-superintendents. They are scientists trained in course maintenance matters who are able to communicate to you when you're getting ready for that championship, not only their knowledge but the practical experiences of hundreds of other superintendents. The wise superintendent welcomes backstopping of such professional calibre, especially when it is impartial, with no axe to grind or nothing to sell.

So now let's turn to the matter of producing championship turf. Of course, it is not within my competence to discuss *how* to do this. I can only tell of some of the *results* desired. Let's look at the hoped for results in broad general terms:

FIRST, THE TEEING GROUND

The grass on tees should be short—ideally, about one-half inch, for both bermuda and non-bermudagrass. Remember that iron shots are going to be played on most of the short holes, at least, and the player doesn't want any grass between the club and the ball, insofar as that is possible.

Obviously, the tees should be firm and level. I recall a U.S. Open in which the superintendent of the course mistakenly dressed his tees with too much sand rather shortly before the tournament, and the footing on some of them was quite bad. Ben Hogan slipped on one while driving. His ball wound up in the worst rough on the course.

SECOND, FAIRWAYS

The importance of close-cropped fairway turf cannot be overemphasized. The possibility of fluffy lies is to be avoided like the plague. Players detest them, with good reason. The fairways have to be brought along to a point where players can show their true skill. This means, among other things, a proper watering program, and adherence to it.

THIRD, THE PUTTING GREENS

Firm, keen greens, on the dry side, provide the best test, for both approach shots and putts. You want the approach shot to stay on the green only because of the skill with which the player has struck it—not because the greens are soft. The great tendency is to overwater in order to keep them green. This is usually bad for the long-term health of the turf. Soft greens—"puddings," as one British player calls them—do not reward the skillful player over the inferior. A sound program of using as little water as possible can generally help produce championship greens. As Fred Grau once said, you play golf on turf, not on color.

FOURTH, THE ROUGH

In general, the rough should require a good

recovery shot. Its presence should reward the player who is skillful enough to stay out of it and should exact some toll in recovery from the player who plays into it.

I'm going to quote the specifications for grass cutting which we send to all of our tournament sponsors in our joint efforts to provide good tests. They are based on specifications used by the USGA and developed over the years from a foundation laid by a great man of golf, Richard S. Tufts, of Pinehurst, who did more than anyone I know to establish sound, sensible standards for preparing courses for championships. The figures in these specifications should be regarded as variable. For example, although we talk about height of cut, we all know that density of the turf is really more important—but there is no common measure of density. So here are the guidelines for height and width of cut, for both non-bermuda and bermudagrass turf:

	Height		Width
	Non-Bermuda	Bermuda	
Tees:	Not over 1/2-inch	Not over 1/2-inch	
Fairway Areas:			
Fairway	1/2 to 3/4-inch	1/2-inch	30 to 40 yds.
Collar off Fairway	2 inches	1-1/2-inches	4 to 6 feet
Rough — Primary	4 to 5 inches	2-1/2-inches	—
Putting Green Areas:			
Putting Green	3/16-inch	3/16-inch	—
Collar off green	1/2 to 3/4-inch	1/2-inch	30 to 36 inches
Light rough off collar	2 inches	1-1/2-inches	2 to 6 feet
Rough — primary	4 to 5 inches	2-1/2-inches	—

Now what about bunkers? Here is an area where rigid adherence to a timetable is important. All too often sand is dumped into bunkers just before the tournament in a crash effort to round out the program of preparation. The result is needlessly unfair lies. Any fresh sand should be put in bunkers fully three months in advance, so that it may become well settled. If there is inadequate rain to pack it, water it artifically.

Suitable sand includes what is known as plasterer's sand, mason's sand, or brick sand. Sand which will pass through a 1/8-inch sieve opening and which has had silt and very fine sand particles removed by washing will resist packing. Sand particles which are round in shape tend to shift under a player's feet, whereas sand with angular particles is more stable. Sand in the face of bunkers must be shallow enough and firm enough to prevent a ball from becoming lost in it.

Players should not be able to putt out of greenside bunkers. To prevent this, the lip should be about three or four inches high on the bunker margin facing greens. There should be no lip on sides or the rear of bunkers, otherwise balls may become unplayable under such lips.

Obviously, bunkers should not contain stones. Rakes should not leave huge furrows. Oakmont, near Pittsburgh, used to have colossally large and deep furrows. In preparation for the 1953 Open there, the USGA chose to have smaller furrows. Some Oakmont officials wanted the old ones, and a contention developed, which was eventually compromised. It gave rise to some verses about Oakmont's grandfather furrows:

O, the dune hills in the sand along the sea
Where the waves dash high with mighty, noisome claps
Are as smooth as glossy silk, or homogenized milk,
Compared with Oakmont's furrowed traps.
For a gentlemanly bunker, give me those
That will never show on topographic maps,
Where the soil's politely raked, neither carved, nor sculped, nor faked,
But deliver me from Oakmont's furrowed traps.

Now I've seen them all—from awesome Pebble Beach
To Pine Valley's woods (than which there are no punker);
But the most remote from heaven is when your ball lies in Row Seven
Of a plowed and disced and harrowed Oakmont Bunker.

Practice areas are important to tournament players. They should be maintained similarly to comparable areas on the course. Practice tees should be mowed at the same height as fairways. Practice putting greens should be cut and kept in the same manner as the greens on the course, and cups should be changed daily. There should be an area where players may chip to the practice green.

The target for which the player aims is the flagstick, and it is surprising how inadequate some flagsticks and flags are. Standardization is important to the player who must play a

different course every week. Following are good specifications for the flagstick:

Material:	Fiberglass
Height:	Eight feet
Diameter:	Not more than three-quarters inch from a point three inches above the ground to the bottom of the hole.
Color:	Solid cream or white. (Stripes make it hard to see, from a distance, where the flagstick enters the ground.)
Color of flag:	Yellow, preferably solid. (This makes the best target against the green background of a golf course.)

In preparing for a tournament, attention must be given to matters involving the Rules of Golf. The course superintendent can perform a great service here in so preparing his course that little or no ground under repair will exist, and so that few if any special rules will be needed.

Inattention to the Rules has hurt many a tournament. The authority sponsoring the tournament should do a meticulous job here in cooperation with the course superintendent.

We could spend all day discussing this subject alone, so let's just consider some of the main points:

Teeing grounds: The number of the hole should be on a sign at every tee. There have been sad cases of players playing off wrong tees just because the committee had not insured numbering of the tees. And what do you do if a tee marker is moved, or stolen, especially in the middle of a stroke play round? A handsome marker was stolen during the last Ryder Cup match in St. Louis. After some bad experiences a couple of years ago, we adopted the following procedure:

> When the tee markers are put in place for the day, a short white line is painted with a spray gun on the ground immediately in front of each marker. The number of the round is then painted on the ground near it. Thus, if a marker is moved or stolen, following players and the committee can know where the day's location is.

Out of bounds: It is essential to have a precise line which can be determined at the ground—the ball usually lies on the ground. Large white stakes, well embedded, are suitable, provided bushes and trees do not prevent sighting between any two stakes. A continuous white line painted on the ground is the best means of marking a boundary. Out of bounds should be marked as far back from playing areas as possible—in other words, don't crowd the course and force a player out of bounds. If possible, try to avoid having any out of bounds. Paint marks on tree trunks do not provide a satisfactory definition of a boundary, because the line is determined at the ground, and

USGA representatives at Pebble Beach in preparation for the 1972 U.S. Open.

Greenside bunkers should have a lip, about three or four inches high on the side facing the green.

exposed tree roots and trunks are imprecise.

Water hazards: Small stakes or painted lines are used to define the margins of water hazards. Small stakes have the disadvantage of being attractive to small boys for use as boats to float down the stream. Painted lines are greatly to be preferred. Yellow paint or stakes are used for regular water hazards; red is used to define lateral water hazards. The sponsoring organization should supervise the defining of water hazards just as it should supervise all preparations relating to the Rules of Golf.

Ground under repair is usually defined by white lines—but we hope you will never need them.

Obstructions—artificial things—are amply covered in the Rules of Golf, but some tournaments must have a number of temporary immovable obstructions, such as concession stands, scoreboards, tents, and the like. Although such things should be placed where they are unlikely to interfere with play, it still is advisable to have a Local Rule allowing relief for the line of play—the USGA can provide the text of such a Local Rule.

Cart paths present a continuing problem, especially as the edges tend to break down readily. If relief is to be given from hard-surfaced cart paths, the edges must be clearly defined.

So much for the Rules aspect of course preparation.

Now, let's say that your course is ready for the start of the Championship, and as the first day of play arrives there is a tremendously important job to be done—the selection of locations for tee markers and for holes in the putting greens. Obviously, the two elements are closely related, especially on par-3 holes. In setting tee markers, consideration obviously has to be given to factors such as the line of play—the presence or the absence of wind—whether the course is slow or running fast—how long the individual holes are to play—and so forth. Once upon a time it was thought that courses should be progressively lengthened as a tournament progressed, until at the end, the course played at its maximum distance. That is a long outmoded theory. The first round of a competition is just as important as the last—indeed, the first shot is just as important as the last—they all count in the score—and so the test should be a balanced one from day to day. This is an important function in setting tee markers.

One of the most intriguing topics is locating the holes in the putting greens. You'd be surprised at how many golfers have never seen a hole cut. They haven't a clue as to what happens in the mere act of changing cups, much less as to how hole locations are selected.

Jack Tuthill, the Tournament Director of the PGA Tournament Players Division, tells an amusing story about an experience he had. A tournament was being played at a course with flat, almost rectangular greens, with little character. A small crowd of spectators was standing around one of the greens when he and the hole-cutter came onto the green. Jack could tell that the spectators were waiting to see where the hole was to be cut. The green was almost square. Jack had a screw-driver in his hand. As he walked out toward the middle of the green, he tossed the screw-driver backwards over his shoulder and it stuck into the ground. Jack told the hole-cutter to do his stuff at that spot. And he heard one spectator say to another: "Is *THAT* the way they pick the holes?"

It is highly desirable to select the hole locations on the day of play. If they are picked or cut the day before, weather conditions may change overnight to the extent that the original selections may not be suitable. Moreover, strange things can be done by vandals overnight. The officials charged with hole selection should go around with the greenkeeper who does the hole-cutting. Any less attention may produce strange results. In one of the John G. Anderson Memorial Tournaments at Winged Foot, the night before the qualifying round the committee chairman gave the course superintendent a list of locations to be used the next morning such as: First hole—six from the left, five from the back. The word was passed to a hole-cutter who didn't understand golf. The result was that the measurements were made in feet, not yards. It was a strange qualifying round.

Well, here is how to pick hole locations, according to a recent USGA decision: Many factors affect selection of hole locations. The first and most important is good judgment in deciding what will give fair results. *Do not be tricky* in locating holes.

Following are specific points:

- Study the design of the hole as the architect intended it to be played. Know the length of the shot to the green and how it may be affected by the probable conditions for the day—that is, wind and other weather elements, condition of the turf from which the shot will be played, and holding quality of the green.
- There must be enough putting green surface between the hole and the front and the sides of the green to accommodate the required shot. For example, for a long iron or wood shot to the green, the hole should be located deeper in the green and farther from its sides than may be the case for a short pitch shot.

In any case, the USGA recommends that the hole be located at least five paces from any edge of the green. If a bunker is close to the edge, or if the ground slopes away from the edge, the distance may well be greater, especially if the shot is more than a pitch. Consideration should be given to fair opportunity for recovery after a reasonably good shot that just misses the green.

- An area two to three feet in radius around the hole should be in good condition without any steep slopes or, if possible, any changes in the degree of slope. In other words, the green in the holing-out area should be as nearly level as possible and of uniform grade, but it need not be exactly level. In no case should holes be located in tricky places, or on sharp slopes where a ball can gather speed. A player above the hole should be able to putt with a reasonable degree of boldness, and not purely defensively.
- Consider the condition of nearby turf, especially taking care to avoid old hole plugs which have not completely healed.
- Holes should be cut as nearly on the vertical as possible, not plumb with the contour of the green.
- There should be a balanced selection of hole locations for the entire course with respect to left, right, central, front and back positions. For example, beware too many left positions with resulting premium on drawn or hooked shots.
- For a competition played over several days, the course should be kept in balance daily as to degree of difficulty. In a stroke competition, the first hole of the first round is as important as the last hole of the last round, and so the course should not be set up appreciably more difficult for any round—balanced treatment is the aim. An old concept of making the course progressively harder round after round is fallacious.

One form of balanced daily treatment is to select six quite difficult hole locations, six which are somewhat less difficult, and six which are of moderate difficulty.

- In early rounds, anticipate players' traffic patterns and avoid locating many holes whence walking across the green by many players could spoil good hole locations for later rounds.
- In match play, a hole location may, if necessary, be changed during a round provided the opponents in each match play the same location. In stroke play, Rule 36-4a requires that all competitors in a single round play with each hole cut in the same position. When 36 holes stroke play are played in one day, it is not customary for hole locations to be changed between rounds, but there is no Rule to prohibit. If they are changed, all competitors should be informed.
- The greenkeeper who cuts the holes should make sure that the Rules of Golf are observed, especially the requirements that the hole-liner not exceed 4¼ inches in outer diameter and that it be sunk at least one inch below the putting green surface (Definition 15).
- During practice days before a competition, it is advisable to locate holes in areas not likely to be used during play, preferably at the fronts and the backs of greens, bearing in mind the areas which will be impaired by foot traffic patterns.

Let me say just two things more:

First, the condition of the course is the most important element in a tournament, in the view of the players. A well-prepared course gives them the best opportunity to display their skill. It tends to reward good play, and thus helps to produce a good winner fairly. It is an excellent thing for the club, even long after the tournament has ended.

Second, be ready for the unexpected, for something unexpected is always sure to happen. I'm reminded of the minister who went to visit an elderly patient in a hospital. The old gentleman wasn't speaking—he was pretty sick—until, all of a sudden, he strained forward and tried to speak, but couldn't. The minister gave him a small pad of paper and a pencil, and the dear old soul wrote briefly on it—and then suddenly expired. The minister stuffed the pad back in his pocket, called a nurse and a doctor, and the needful things were done. A couple of hours later, the minister recalled that he had the old gentleman's note in his pocket. He took it out, and this is what it said: "You're standing on my oxygen tube."

The 70 Percenters

Panel Members: **James B. Moncrief,** USGA Green Section, Georgia
Crawford Rainwater, Club Official, Pensacola, Florida
Arthur Snyder, Superintendent, Phoenix, Arizona
Charles Underwood, Superintendent, Lawrenceville, Georgia
Robert Williams, Superintendent, Highland Park, Illinois

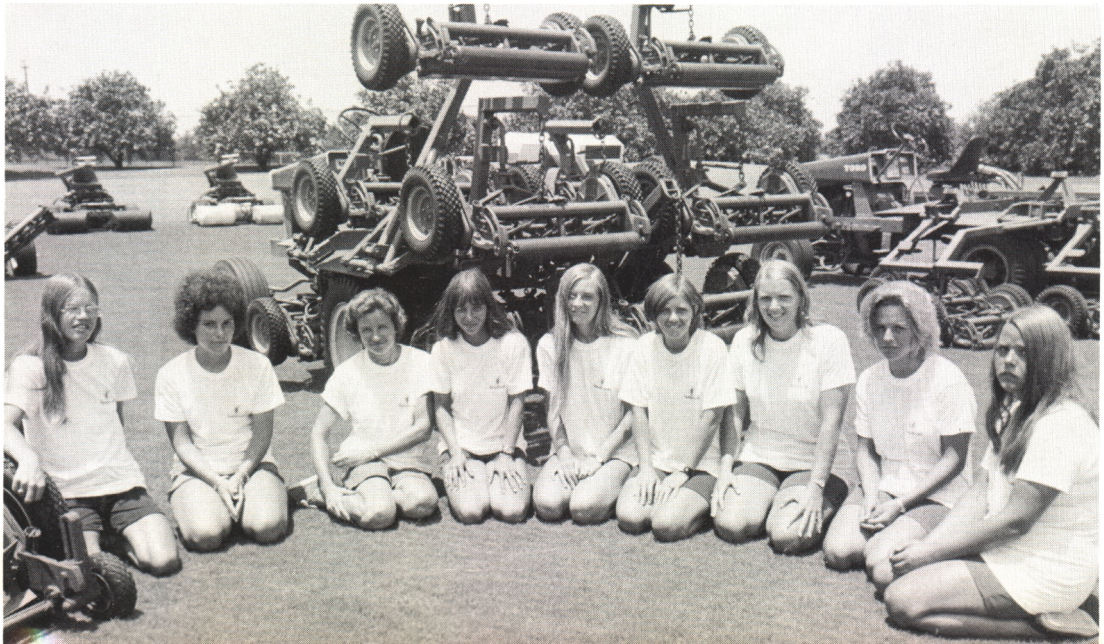
Moderator: William H. Bengyfield, USGA Green Section, California

Moderator: In 1820, Alexander Monro received 4£ (about $15) a year from the members of the Aberdeen Golf Links. For this he was to take charge of the links, provide accommodation for the "member's boxes," pay particular attention to keeping the holes in good order and to be at the call of the members on all necessary occasions. ("Something From Thistle Dhu," Gary Wiren, USGA Green Section Record, May, 1972). Thankfully, there have been some changes in the last 150 years.

During the past 20 years for example, every study of golf course maintenance costs has shown labor to be the largest single cost item. In fact, for every $100 spent by the golf course superintendent today, $60 to $70 goes for labor! Thus our topic, "The 70 Percenters" is an extremely important one. Let's look at it in some depth. From the club's point of view, there has been a marked increase in costs and benefits in Social Security in recent years. Should clubs review and reconsider their pension and employee retirement plans?

Rainwater: Indeed they should. The new amendments to the Social Security law are the most drastic ever made. Both cost and benefits have been greatly increased for 1973 and it must also be noted that additional increased costs and benefits are automatically built into future years. I would strongly recommend that if you have a supplemental pension or profit-sharing plan that you review it immediately in view of the changes in Social Security. See if your total plans are equitable. Do they meet your desired goals? Can you afford their costs—now and in the future? Personally, I prefer to see supplemental plans integrated with

Superintendent Arlin Grant has included nine women on his maintenance crew for 54 holes at Innisbrook Golf and Country Club.



Social Security so as to automatically adjust benefits when changes in the Social Security law take effect.

Moderator: Can you tell us about the new Occupational Safety and Health Act (Department of Labor) and how it may relate to golf course maintenance crews?

Rainwater: My advice is to study the new OSHA requirements and get your house in order. In my business, we have already had inspections and they can be very rough.

Moncrief: As I understand it, you must permit an inspection of safety and health conditions on the spot and without advance notice. I understand Federal Inspectors have uncovered violations in three out of every four places visited so far.

Williams: I'd suggest checking the January, 1973 issue of The Golf Superintendent magazine. It carried complete information on OSHA.

Moderator: Let's talk a bit about the management of labor. What is the superintendent's greatest weakness in handling the 70 percent labor expenditure?

Williams: The obvious weaknesses lie in organization, communication and motivation. Superintendents will have to become much more aware of the necessity for employee motivation. Golf course workers seek recognition and achievement through their work in a pleasant environment. What they want, in addition to their pay check, is to feel a sense of contribution, belonging to a team. I believe educational seminars for the superintendent will provide many answers and eventual improvement.

Moncrief: Getting the maximum effort from each employee is certainly up to the superintendent. But he must discipline himself first if he wants to motivate others. He must "know each man" and, once he does, act accordingly.

Moderator: In any discussion of labor efficiency, we should not overlook the processes involved in hiring a new man. What procedure do you follow? Is there something better than a hit-or-miss, trial-and-error method?

Underwood: I think through the process of an interview with a prospective employee where you ask questions directly, rather than letting him tell you about himself, is a start. I find that after talking to a man I can usually tell if he is the type of individual I want to hire. If this first step is positive, then proceed with an investigation into his previous employment, work habits, honesty and dependability.

Snyder: Because of relatively low pay and lack of opportunity for advancement, few apply for jobs on a golf course except on a temporary basis, then leave as a better paying job turns up. It is, therefore, necessary that we select those most likely to stay with us. At our club, we have every applicant fill out an application form which delves quite thoroughly into his past experience, the type of work he has done and length of time spent on each job. He is interviewed personally in order to get an idea of his attitude toward work of this kind, also the degree of eagerness and alertness displayed, as against apathy.

Williams: Grounds personnel are becoming more stabilized perhaps because salaries, benefits, etc. are better than in the past. There is less turnover from year to year. The men are generally being trained to perform in more than one capacity and this allows much greater versatility and flexability in assignment of daily tasks.

Moderator: Why is it some superintendents can maintain an 18-hole course in top condition with eight or nine men while others can't get the job done with 12 or 15 men?

Underwood: First, we must determine what top condition really means. Other factors to be considered include the number of times traps are raked weekly, fairway, tee and green mowing frequency and the amount of special hand maintenance chores which have to be accomplished. The presence of labor-saving devices and availability of capable people to operate them are also involved. In the final analysis, it depends on the superintendent's ability to utilize

his men and machines to their maximum capacity.

Moderator: Well then, have all the improvements in machinery, automatic irrigation, chemicals, etc. really reduced labor force requirements on the golf course?

Snyder: Not really! Although each improvement has reduced the amount of time to do a particular job, the demands of today's golfer, coupled with increased traffic on the golf course, plus time needed for repairing and servicing this equipment, require more manhours than in the past! And the operation of a so-called automatic irrigation system takes up much of the superintendent's time leaving less time for his other duties.

Underwood: The idea of buying a piece of equipment and thereby eliminating one man from the maintenance crew has perhaps been generated in the minds of a lot of club officials and general managers by clever advertising and salesmanship. Equipment improvements have enabled the superintendent to accomplish many additional jobs brought about by demands from the golfer for even better playing conditions.

Moderator: Let's move to another subject. Each year, we have more and more college trained turf management majors coming into the job market. Do they make ideal assistant superintendents?

Williams: A qualified yes and no! **Yes** if you are thinking of a situation where a superintendent is contemplating retirement within a period of five years or so and has that time to adequately train his own replacement. **No** if there is no chance for a long-range permanent position. Young students quickly tire of being an assistant. If they are on the ball, they will be seeking greater challenges, responsibility and remuneration. This indicates that the university student will only stick around for about two years as an assistant superintendent. Consequently, you have little stability in your organization. Also, your older workmen resent a constant change in supervision. Ideally, a young university turf student will seek at least three or four years of on-the-job training and gradually work into a position as a superintendent at a club that is consistent with his background. His on-the-job training should preferably be at two or three different clubs for broader experience.

Snyder: My answer to the question is no! The primary requisite of a good assistant superintendent is experience in golf course maintenance work rather than an education in the science of turf management. He must be a sort of jack-of-all trades, and able to handle a myriad of jobs that constantly crop up on a golf course. He must be able to pick the best man available for any particular job while handling each man in a manner which keeps him happy with his job. A college trained turf management major rarely has these qualities and will not make a good assistant during the period needed to acquire them. As soon as he does acquire them he is ready for a superintendent's job of his own and will soon be leaving. The training of a new assistant must then start all over again.

Moncrief: Unless a college major has had previous experience in managing people and running a golf course, his formal training really leaves him short in qualifications for an assistant superintendents job. However, some superintendents and clubs are willing to take him on, give him this needed exposure and help move him on. Perhaps he should be called a "trainee superintendent" rather than "assistant superintendent."

Moderator: In this age of Womens Lib, what about women workers on the golf course? Ralph Hull, Superintendent at the Arizona Biltmore, has reported women make excellent gardeners in the clubhouse and hotel area.

Moncrief: In 1972 I visited Innisbrook Golf and Country Club in Florida where Arlin Grant is the superintendent. On our tour of the three 18-hole courses, I observed nine women working on the crew,

handling all sorts of equipment—mowing fairways, tees, greens, raking bunkers, etc. Their ages ranged from 16 to 39 and they were all in uniform. There have been no employment problems and there is a waiting list now with frequent calls wanting to know when employment will be available. Mr. Grant says the women come from many different occupations; waitresses, clerks and even junior college students. They enjoy their work, make good money and have done nothing to put their job in jeopardy, as someone is waiting to take over. I can foresee when this will be a common practice on golf courses in the future. Mr. Grant also tells me that his equipment repairs are not as great since the women have taken over. They won't tinker with the machine but will wait for the mechanic or superintendent to come by with assistance.

Moderator: In this day and age, everyone is cost conscious. I constantly hear about the high cost of golf course maintenance. What are the facts? What really is the relationship between the golf course grounds maintenance budget and the total club budget?

Williams: Grounds maintenance cost is currently running about 16 per cent of the total golf expense dollar to the membership. Continued effort by the course superintendents and the USGA Green Section towards efficiency in maintenance has been responsible for this accomplishment. Most clubs are realizing that their golf course is the prime reason, the prime source of club income and are allocating appropriate funds for its maintenance.

Moderator: That's a good point to close on. Thank you all very much.

Nutrient Application Update

by WILLIAM G. BUCHANAN, Eastern Agronomist, USGA Green Section

Turfgrass management today is a demanding scientific job where great changes are taking place along with the new demands on the superintendent. The terminology is changing as well. Today we say turfgrass management as opposed to "caretaking." Today we say superintendent instead of greenkeeper. Today we say scientific management as opposed to green thumb. Today we say nutrient application instead of fertilizer application. You know there has to be progress being made when the terminology changes from "spread the manure" to "apply the nutrients."

Dr. Jim Watson of Toro Company in a recent talk said, "Fertilization is the process of supplying plant nutrients to supplement the natural supplies of the soil." That pretty well says it all. Before we update the nutrient application too fast, let's look at where we have been and take another look at the plant nutrients.

The actively growing turfgrass plant is made up of water and organic compounds (dry matter). There are 16 elements that combine to make up the organic compounds in the plant and provide the nutrition to the plant necessary to enable it to complete its life cycle. The 16 elements are carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, zinc, copper, molybdenum, boron and chlorine. These essential elements can be divided into groups—macro-nutrients and micronutrients. Macronutrients are used in larger quantities than the micronutrients; although very small quantities of the micronutrients are required by the plant, generally less than two parts per million in plant tissue, they are just as important to the plant as the macronutrients.

A major portion of the dry matter of the plant is made up from three of the 16 elements—carbon, hydrogen and oxygen. The atmosphere provides the carbon via carbon dioxide. Water is the primary source that supplies the hydrogen after it has been absorbed by the root system. Carbon dioxide and water combine to provide sources for oxygen. Since carbon, hydrogen and oxygen make up a large percentage of the nutrients, they are classified as macronutrients. The remaining six

macronutrients are primarily obtained from the soil and they are nitrogen, phosphorus, potassium, magnesium, calcium and sulfur.

There are many facets of the nutrient story that can be taken under study. The relationship of the individual nutrients with the soil, the effects of each element on the turf, what each element does in the plant, and so on. This paper deals with the practical end of the element's relationship with the plant, how the element acts as a nutrient and what happens if the element is excessive or deficient, and the main sources of the element.

Each essential nutrient has a specific role in plant growth and development. A brief rundown of the essential elements is as follows.

Nitrogen—Nitrogen is applied in the largest amounts in fertilization programs because it is used up more readily by turfgrass. Nitrogen is needed by the plants more than other essential nutrients, with the exception of carbon, hydrogen and oxygen. Nitrogen content in the plant's dry matter is generally between 3 to 6 per cent. Young plants generally have a higher nitrogen content than older plants. Depending on the age and specie of the grass plant, the monthly requirement for actual nitrogen can range from zero to two pounds per 1,000 square feet per growing month.

Nitrogen affects the plant's root growth, color, shoot growth, disease resistance, heat and drought hardiness, and also the plant's ability to resist cold.

Nitrogen nutrition can influence the disease susceptibility of a plant. Work at many universities and research centers have shown that high nitrogen fertility may cause turfgrasses to be more susceptible to *Helminthosporium* leaf spot, brown patch, *Fusarium* patch, *Fusarium* blight and gray leaf spot. Low nitrogen encourages dollar spot, red thread and rust. Therefore we must look for the happy medium between the zero and two pounds of nitrogen per 1,000 square feet per growing month. Also, high nitrogen levels show a tendency to increase the chances of wilting in the summer and desiccation in the winter.

Phosphorus—Every living cell of the growing plant contains some phosphorus. Although nitrogen and potassium are used in much larger quantities by the plant, phosphorus is very important because it plays a part in the reproduction of the grass plant, the establishment of the plant, the rooting and maturation of the plant. Relatively higher phosphorus levels tend to make the plant mature faster. As with nitrogen, different turfgrass species vary in the amounts and absorption rates of phosphorus. Warm-season grasses absorb less phosphorus than the Kentucky bluegrasses.

Potassium—Potassium is used by the plant in relatively large quantities, second only to nitrogen. Potassium is also found in the cells of the plant. However, as the plant reaches maturity the amounts of potassium are reduced. Potassium increases the thickness of the cell walls, thus making the plant more resistant to heat, cold, and drought conditions, increasing wear tolerance, and encourages rooting. When potassium is applied, it is very unlikely that you will see any visual response of the plant; potassium does not affect things like color and density.

Researchers have noted that high potassium levels reduce the incidence of *Helminthosporium* spp., brown patch, *Fusarium* patch, red thread and dollar spot.

Calcium—The quantity of calcium used by the plant ranks third behind nitrogen and potassium. Calcium is like phosphorus and potassium—found in the cells, mostly in the leaves and stems, rather than in the seeds. It is an important factor in cell division and also serves to neutralize toxic substances that exist within the cell. Calcium becomes permanently fixed in the cell walls, giving leaf tissues a high calcium content.

Red thread and *Pythium* blight are two diseases that are related to calcium deficiencies.

Magnesium—Magnesium directly affects the utilization of phosphorus in the plant. Magnesium is also essential in the plant because it is an integral part of the chlorophyll molecule, and without clorophyll there would be no green plants. Magnesium is not used in very large quantities by the plant because it is very mobile within the plant and is constantly being passed from old cells to newer ones. Extremely high concentrations of magnesium may be toxic to plants.

Sulfur—Sulfur is fairly well distributed within the plant. It is mainly found in amino acids which are required for protein synthesis. Powdery mildew on Kentucky bluegrass has been related to a sulfur deficiency by researchers.

The nine macronutrients have been covered now, so we should take a look at the micronutrients.

Manganese, zinc, copper, iron, boron, chlorine and molybdenum are the seven micronutrients. Generally, soils have adequate supplies of micronutrients for plant life since the plant demands such small quantities of the micronutrients. The reason we have to apply these nutrients is that many times the element is in the soil but is in a form that cannot be used by the plant. Soils that leach very easily, modified soils and sandy soils that are heavily irrigated or soils that become severely compacted are the most likely to have a micronutrient deficiency. The trend today to sandier

soil mixes in putting greens is an example of an area where minor nutrients are required because of the possible leaching and heavier irrigation. As with magnesium, high concentrations of manganese, boron, zinc and copper can be toxic to the turfgrass plant.

Iron and Manganese—Both iron and manganese are important to the color of the turf and both are required for chlorophyll synthesis. Therefore, when either one or both of these elements are deficient there is a discoloration in the turf. Iron is most likely to be deficient in waterlogged, poorly drained soils, or soils with a high content of organic matter. Areas that have heavy thatch layers are likely to be low in iron. Manganese is likely to be deficient in alkaline conditions or heavily leached areas. As noted before, manganese can become toxic with high concentrations. The manganese concentration is highest on poorly aerated soils, compacted soils and acid soils.

Molybdenum—Molybdenum is required in extremely small amounts by the plant. The primary function in plants is associated with nitrate reduction. A deficiency results in poor protein synthesis and nitrate accumulation.

Zinc and Boron—Zinc and boron functions are not well understood. Even though at high concentrations they are toxic, they are essential to the plant. High concentrations have been found only on rare occasions by researchers.

Chlorine—Chlorine is the last of the micronutrients. It is thought to be associated with osmotic pressure and cation balance in the plant. Again, deficiencies have rarely been observed. Research shows no specific role in the plant's metabolism by chlorine.

In these few paragraphs I have tried to explain an update of thoughts behind nutrient application. When we fully understand the complete functions of all the nutrients, then we will be able to fertilize and truly make a nutrient application.

Physiological Responses of Cool and Warm Season Grasses

by **THOMAS L. WATSCHKE,** Assistant Professor, Pennsylvania State University

Over the past 50 years the golf course superintendent has made tremendous advances in improving his status and, particularly during the past decade, has gained the recognition he has long deserved. With this recognition has come rapidly increasing salaries and improved social prominence. But, also with it has come an awareness by the public of the earning power and educational training today's superintendent possesses. Consequently, today's superintendent is going to have considerably more expected of him; both from his club membership and society.

As a result, presentations at conferences of material which do not always directly apply to practical situations will increase. This material is presented to improve and increase the overall knowledge of the turf superintendent about his commodity; turfgrass.

Most superintendents recognize symptoms of physiological breakdown; slowing of growth and wilt from drought and temperature stresses, lesions and chlorosis from diseases, nutrient deficiencies and insect damage. The time has come for superintendents to increase their knowledge of why these symptoms occur beyond knowing that the soil is dry or the temperature is high. Being acquainted with physiological processes and how they are affected by environment and management should be a part of the arsenal of knowledge that today's successful superintendent possesses. For example, a superintendent in the transition zone may be asked by someone why bermudagrass does so well compared to bluegrass in the summer months. If the superintendent merely points out that bermuda is a warm season grass and bluegrass is cool season, he undoubtedly will not be revealing anything the person does not already know. Golf superintendents are considered, and rightfully so, to be the turf experts in their community. People asking questions about turf have the right to expect a knowledgeable answer. Therefore, it is the responsibility of golf course superintendents to attend conferences and meetings to improve and increase their knowledge of how grass grows, and keep abreast of research de-

velopments and new extension publications.

Many physiological phenomena occur in plants. The two most important are photosynthesis and respiration. Different environmental conditions and management greatly influence the rate and efficiency of these two processes. Changes in the rates of these two processes ultimately affect the growth and performance of turfgrasses.

Variations in environmental conditions such as light, temperature, and moisture influence the rate of photosynthesis. Photosynthesis of cool season grasses like bluegrasses, fescues, ryegrasses, and bents is affected differently by temperature from that of warm season grasses like bermudas and zoysias. The mechanism for fixing CO_2 in warm season species is more efficient than the mechanism of cool season grasses. Because of this difference, warm season grasses have a higher temperature optimum for photosynthesis than cool season species (Figure 1).

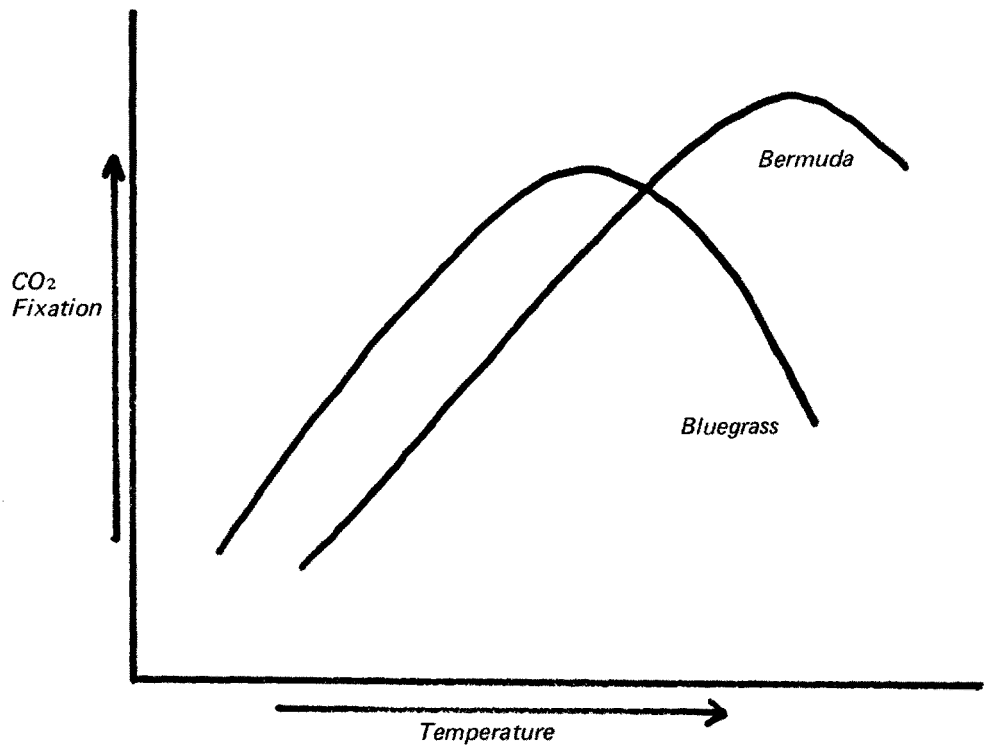
Occurring simultaneously with photosynthesis in cool season grasses is a process called photorespiration. This respiration liberates CO_2 from the leaf without supplying any usable energy to the plant. Consequently, they retain the carbon and incorporate it into useful materials. Subjecting temperate grasses to low oxygen atmosphere will inhibit photorespiration. When photorespiration is inhibited, the photosynthetic rate of bluegrasses will approach that of bermudagrass even at high temperatures (Figure 2).

Although no practical means of inhibiting photorespiration has been found, the implications of a practical solution are interesting to contemplate. It would be ideal if cool season grasses could maintain rapid photosynthesis at high temperatures and also retain the desirable characteristics they possess at cool temperatures. If germplasm of cool season grasses from southern regions can be found which show regulation of photorespiration, they should be included in breeding programs to enhance the possibility of increased high temperature tolerance of progeny.

Warm and cool season grasses also respond to different light intensity. In mid-summer, when light intensities are near or above 10,000 foot-candles, warm season grasses have increased fixation with increasing light intensities. However, cool season grasses, in general, do not appreciably increase fixation above 6,000-7,000 foot-candles (Figures 3). Consequently, warm season grasses utilize more of the available radiation than do cool season species.

Dark respiration rates are also strongly influenced by temperature; increasing when temperatures rise. This causes a reduction in

Figure 1. Effect of temperature on photosynthesis of bluegrass and bermudagrass.



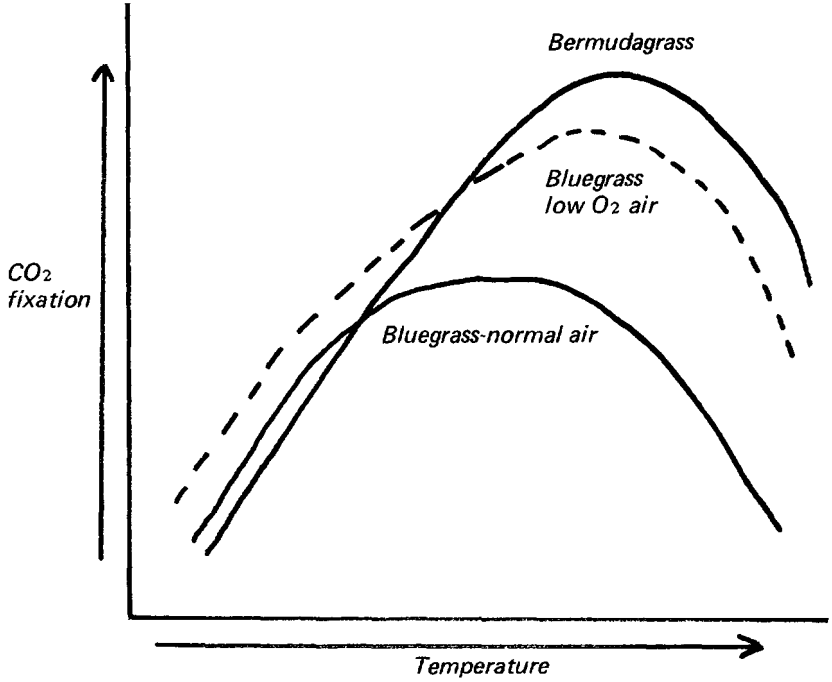
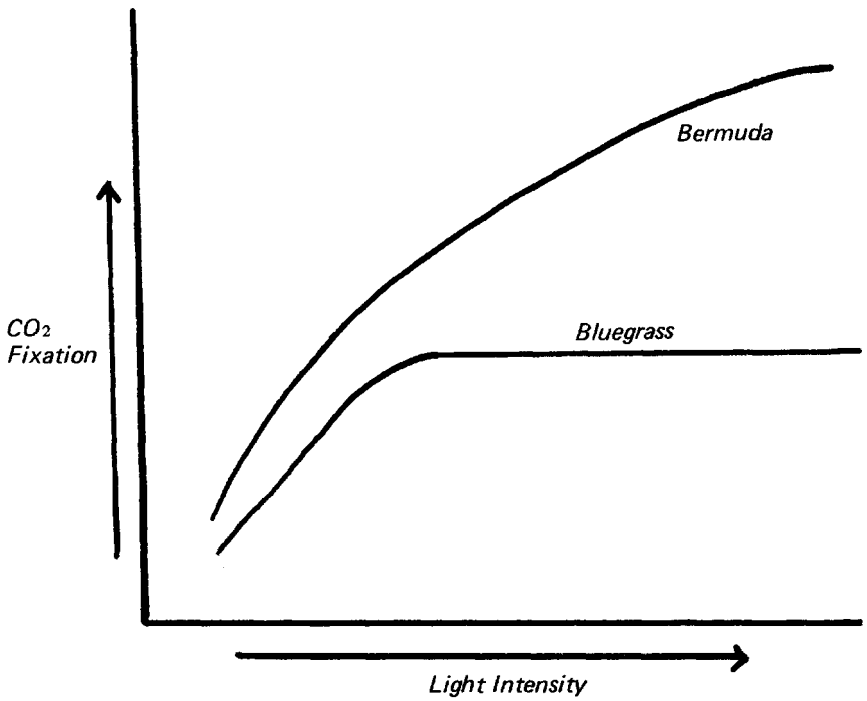


Figure 2. Effect of temperature on photosynthesis of bermudagrass and bluegrass in normal air and bluegrass in low O_2 air.

stored carbohydrates because CO_2 is being lost to the atmosphere, and as long as carbon is available, growth is accelerated. Therefore, high carbohydrate levels are desirable, particularly during the hot months of the year. Nitrogen fertilization should be frugal to minimize growth responses. Since the ability of temperate grasses to fix CO_2 is decreased at high temperatures and the utilization of previously fixed carbon is high, management must compensate for the plant's shortcomings.

When all is said and done, the successful golf course superintendent is the one who can predict plant responses to environmental and managerial influences because he knows something about how grass grows.

Figure 3. Effect of light intensity on photosynthesis of bluegrass and bermudagrass.



The Only Good Weeds Are Dead Weeds

by **STANLEY J. ZONTEK,** Eastern Agronomist, USGA Green Section

Everyone must agree that one of the most basic prerequisites of a good golf course is a weed-free turf. With it the desired species of grasses can more easily be maintained, and the aesthetics and play of the course is improved. A common and basic, yet somewhat misunderstood, facet of turf management is the post-emergence control of annual and perennial weeds. Broadleaved, narrowleaved and tap-rooted weeds all fall into this category.

Often, when a Green Section agronomist visits a course, one type or a variety of weeds are noted scattered throughout the acreage. Generally, a superintendent will have a spraying schedule set up to apply a weed killer at the proper time for good control and minimal turf hazard. This is excellent. However, when asked what chemical or mixture of chemicals he plans to use, the answer could be, "I have the material in the chemical bin." As to what it contains, "Let's check the label." This is where much of the confusion (and error) on weed killers originates. The incomplete reading and understanding of the label.

THE LABEL

In weed control, as in other things, the label on the container contains some of the most useful and important information on the product to be used. The ingredients, what is controlled, directions and cautions for use are all printed on the label. *Read and understand what is on the label.* This is a very basic rule. However, misapplications and errors still occur and many of these can be traced back to not carefully reading the label.

Much of the confusion on weed killers originates in the complicated and confusing technical names and numbers of the active ingredients listed on the label. To many people, 2-(2-methyl-4-chlorophenoxy) Propionic Acid means nothing. Upon "translation" to MCPP, this and other ingredients on the label hold the key to the success or failure of your weed

COMMON TURF HERBICIDES

Common Name	Trade Name	Chemical Name
2,4-D	2,4-D	2,4-dichlorophenoxy Acetic Acid
2,4,5-T	Brush Killer, etc.	2,4,5-trichlorophenoxy Acetic Acid
Silvex	2,4,5-TP	2-(2,4,5-trichlorophenoxy) Propionic Acid
MCPP (mecoprop)	Mecopex	2-(2-methyl-4-chlorophenoxy) Propionic Acid
Dicamba	Banvel-D	2-methoxy-3,6-dichloro Benzoic Acid

control application.

The above chart is a listing of the most common turf herbicides. They are listed by common name, trade name and chemical name. You may wish to save it for quick reference to check on the types of herbicides contained in your weed killer.

Also listed on the label are the types of weeds that the herbicides will control. When you are planning to apply a herbicide be certain that the weed or weeds that you have will be killed with the herbicide that you plan to use. If not, your herbicide application will be a waste of time, money and labor.

Another extremely important part of the herbicide label is that which contains the cautions for use. Almost all herbicides have some type of restriction in their use. These restrictions are *always* plainly marked on the label for quick reference and ease of understanding. Some common restrictions are: applying high concentrations of 2,4-D to creeping bentgrass and dwarf bermudagrass; applying Dicamba under the drip line of trees and shrubs or anywhere where their roots can uptake the chemical. Also, caution should be exercised with all herbicides used on close-cut putting green turf, especially where *Poa annua* exists. These herbicides could affect the ever-sensitive *Poa annua* plant.

These cautions are not meant to deter the herbicide user when he has a weed to control. Rather, they are to make him more aware of any possible hazard with the chemical.

HERBICIDE MIXTURE

In some cases prudent use at low rates of these herbicides can eradicate the weeds and yet not harm the turfgrasses. In the Eastern office of the Green Section we have found that light rates of MCPP, Dicamba and 2,4-D can be mixed together and safely applied to most turf areas without injury to the cool-season grasses. This includes applying 2,4-D and Dicamba to bentgrasses. The secret to this application is to apply very light rates of a mixture of herbicides (2,4-D, MCPP and Dicamba). This sets up a synergistic type of action. That is, by using a mixture of these herbicides, they complement each other so less total herbicide will safely and easily eradicate the weeds. This is especially important with today's concern for pollution. By the wise use of synergism, the applicator can save the herbicides by using less of them and yet still accomplish the job. With less herbicides used, there is also a savings in cost. A few gallons of weed killer will now go a much longer way.

In our region of cool-season grasses, we often recommend a mixture of eight ounces of 2,4-D, 16 ounces of MCPP and eight ounces of Dicamba per acre in 30-40 gallons of water for general weed control. When applied in the spring or fall when the weeds are actively growing, the air temperatures are no higher than the 70s and there is adequate moisture in the soil, almost all turf weeds are controlled. When the temperatures are higher, lighter rates of this combination can still be effectively used.

There are also commercially available mixtures of 2,4-D, MCPP and Dicamba. These include Mallinckrodt's Trex-San and Trex-San-Bent, and Gordon's Chemicals Trimec Bentgrass and Trimec Fairway. These products have the advantage of convenient pre-mixing (blending) along with the synergistic reaction for good weed control. These materials also contain on the label the approximate directions for use of each product, listing their specific rates, and how and when to apply them.

As a footnote to herbicide applications, it may be worthwhile to look into the use of the new foam nozzles. These nozzles supposedly increase the effectiveness of the herbicide application by concentrating the spray on the weed leaf for a longer period of time. Plus, with lower pressures used and the foam nature of the spray, harmful drift can be lessened.

With the knowledge at hand of the type and amount of herbicide in the container, the weeds they control and any precautions for use, one can more easily and accurately plan a weed control program. Also, the possibility of causing turf or ornamental injury by applying the wrong chemical in that particular situation is eliminated. The newer mixtures of herbicides that exhibit synergism are most useful in safely and easily controlling most turf weeds.

All in all, a proper choice of herbicides used in the proper manner can lead to the weed-free turf that everyone desires.

Swordfish for Dinner And Healthy Turf, Too

by CARL H. SCHWARTZKOPF, Mid-Continent Agronomist, USGA Green Section

What is the relationship between swordfish and turf? As one looks back at the 1972 season with all of the rain in the Midwestern and Eastern parts of the country and many courses closed because of flooding, you may conclude that I'm proposing fish propogation as a side line for golf course operations. That's not my purpose. Still another correlation might be in urging the use of fish for fertilizer as the American Indians and early settlers did. Again, not really. Well then, you conclude, I'm going to discuss improved turf management techniques so that you will not only have a great golf course, but more time to go fishing! Not a bad idea. But actually, my attempt is to enlighten you as to what has been happening in pesticide legislation and how we can still have swordfish for dinner and healthy turf too.

The recent legislation restricting the use of mercury, The Environmental Protection Agency PR Notice 72-5, dated 3/22/72, entitled "Certain Products Containing Mercury; The Cancellation Thereof," caused great concern to people in agriculture and especially individuals in the areas of turfgrass management. The use of mercury has not been banned, but restricted by the Federal Government. State and local governments have however banned mercury use in many instances. Mercury in pesticides occurs in the inorganic or salt form, and in the organic form as the alkyl and aryl groups.

INORGANIC OR SALT FORM

This group includes the metal itself and the compounds of chloride, sulfide and the oxides. The familiar use of this form of mercury used on golf courses is mercurous and mercuric chloride for the control of *Rhizoctonia solani* (brown patch), *Sclerotina homeocarpa* (dollar spot), *Fusarium nivale* (pink snow mold) and *Typhula itoana* (gray snow mold).

Symptoms of poisoning from this form of mercury are tremors of the extremities, inflammation of the gums and a personality change. An example of the personality change led to the common tale that the Mad Hatter in "Alice in Wonderland" was a victim of mercury poisoning. Mercury nitrate is used in the process of making felt hats.

ORGANIC—ARYL GROUP

The second group is the aryl group. This is a large group, and the most familiar compounds in this group are the phenylmercuric acetate and nitrate materials. Observations have shown that this group is no more dangerous or toxic than the inorganic form and may be even safer. Upon entering the body, the phenyl-mercurials are distributed and removed or excreted similarly to the inorganics. Mercury containing compounds have the unusual characteristic of being absorbed through the skin; therefore, added caution and protection should be used when handling these materials. However, it is just as important to guard against inhaling the dust or fumes of these chemicals. Both the inorganics and phenyl-mercurials are fairly rapidly excreted. Although both of these types have the tendency to accumulate in the kidneys, only under rare conditions do they cause permanent damage.

ORGANIC—ALKYL GROUP

The most detrimental group of mercury-containing compounds is the alkyl group. This is the group that has caused the greatest concern in today's mercury controversy. Unlike the other mercury compounds, the alkyl compounds are known to cause permanent, irreversible damage to several parts of the brain, resulting in paralysis, blindness, and even death. The major outbreaks of poisoning in Iraq, Guatemala, Sweden, Japan and the United States that have been brought to our attention were due to alkyl mercurials that had been used for seed treatment or that evolved through the ecological food chain, such as the mercury poisoning incidents from fish consumption in Japan.

The present concern about mercury and the most serious part of the relation that it has with the environment is the fact that inorganic and possibly phenyl-mercurials can be converted in nature to the highly toxic methyl mercury. This conversion can be referred to as biosynthesis; it was first noted in Japan, then in Sweden and later in Canada and the United States. Consequently, the health implications of the biosynthesis of methyl mercury are evident. Many forms of inorganic mercury when present in polluted water are transformed to methyl mercury. This methyl mercury is taken up by algae, which in turn are taken up by zoo plankton. The zoo plankton are eaten by small fish. These smaller fish are eaten by larger fish, and so on until we get to swordfish.

Therefore, one can see how it may be

Superintendent Lou Haines, Denver Country Club believes in ecology on the golf course. "It's our environment too!"

possible for the mercury containing compounds used on turfgrass to affect the environment. However, with the soil being the greatest filter known to man, the majority of materials applied are adsorbed by the soil particles and become a part of the microflora in the thatch layer. Studies show that mercury containing compounds applied to turf have little if any leaching ability and remain stable in the thatch, mat and upper few inches of the soil. Nevertheless, given the basic chemical properties of mercury and its pattern of activity in the environment, it cannot be said that any use is not a potential contaminant to water and the food chain. Soil particles carrying mercury fixed to it may erode from treated agricultural areas and, once these soil-mercury particles reach an aquatic environment, it then is possible for them to become converted to the highly toxic alkyl mercury form by microorganisms in the bottom sediment.

Although mercury was first described in the fourth century B.C. by Aristotle, and much of the chemistry of the medieval era and later was based on the use of mercury or quicksilver, it wasn't until recently that people considered it a threat to life. This is an interesting sidelight, because hundreds of years before the metal itself was identified, the parent ore, cinnabar, was used by prehistoric man for religious rites, for war paint and related magic reasons. Cinnabar was valued for its brilliant red color and was used in decorative work by the ancient Egyptians; it is also believed that the Sphinx was painted with this pigment at one time. Consequently, we can see that mercury has been used for a considerable period of time, but only recently has become a major area of interest, as DDT was several years ago.

Coming back to the present, the use of mercury containing compounds has been one of the major weapons in a superintendent's management program for the control of turf disease. With the restrictions and limitations imposed by state and local governments, this caused some inconvenience to superintendents who have been using mercury compounds throughout the year for disease control, especially in the late fall and early winter for a preventive snow mold program.

Should the mercury limitations have been imposed several years ago, the impact on turf management would have been more severe than what it is today. Why? Because alternate materials are available instead of mercury. These newer chemicals have proven to be

satisfactory when used for specific disease control, such as *Rhizoctonia solani, Fusarium nivale* or *Typhula itoana.* Many of the new chemicals do not have the broad spectrum characteristics that are associated with the mercury compounds. Therefore, it is required that two different materials be used for snow mold protection; one fungicide for *Fusarium nivale* (pink snow mold) and another for *Typhula itoana* (gray snow mold). Fungicides being more specific and lacking broad spectrum characteristics require the superintendent to recognize a specific disease and know what chemical is needed for control.

Prior to having specific fungicides for specific pathogens, it was possible to spray one chemical and control many organisms, the pathogenic as well as the non-pathogenic. However, now with the advent of the systemic fungicides and the broad spectrum range of control they claim, the possibility does exist that these chemicals will be used much as the old broad spectrum mercury materials.

The newer systemics do not contain mercury and other heavy metals. Unfortunately, they have not been around very long; this makes it quite difficult to evaluate their effect on the environment. Several years ago when enzymes were substituted for phosphates in detergents, everyone was happy until it was found that the substituted enzymes often caused more harm than the original phosphates. It is possible that the chemicals we have substituted for mercury will cause more harm than if we continue to use the heavy metals. With the registration required to market a pesticide, this is not very probable or likely to happen.

Dr. Jesse Steinfeld, Surgeon General of the United States Public Health Service, put it appropriately when he said, "The problem of the health effects of toxic metals is a legitimate area for concern. It is not, however, a legitimate cause for hysteria."

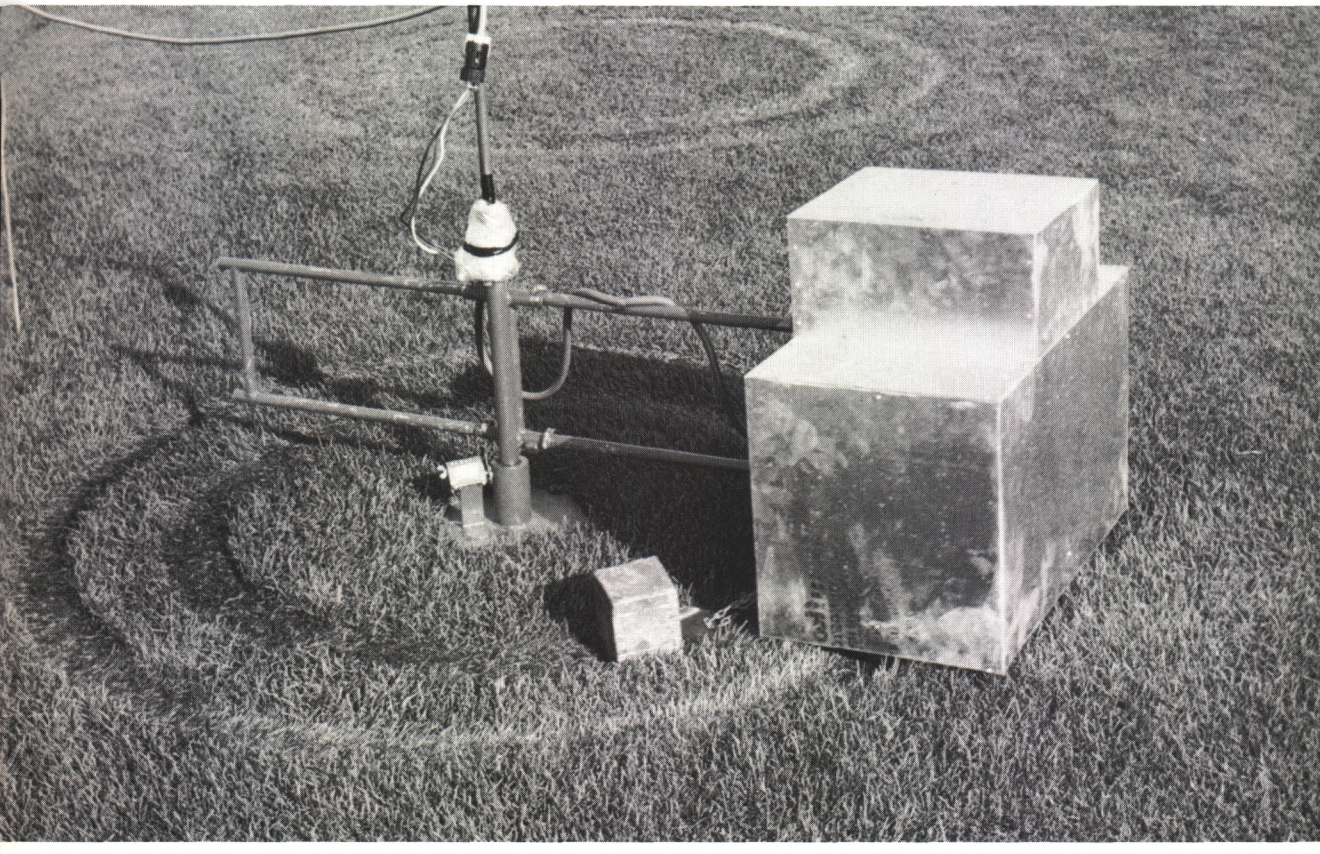
The loss of mercury was anticipated by suppliers of pesticides for the agricultural and turf industries. It was through the efforts of these people that alternate materials were developed for use today. From the practical point of view, it is very possible that the use of mercury may become more restricted in the future, but other chemicals that have proven satisfactory are available.

When one reviews the history of mercury as first described by Aristotle, then during periods of Medieval medicine to its use today as a fungistat, one can see that its uses have been many and varied. With understanding people in the legislative areas of government, mercury applications can continue on a limited or restricted basis. However, should the mercury-containing pesticides be completely removed, it will be necessary to apply the available alternate chemicals now on the market.

What is new about ecology, environment and pollution? Just because protection of our environment has suddenly been discovered by a lot of excited citizens doesn't make it new. Golf course superintendents, horticulturists and many others in agriculture have been active, practicing ecologists for a long time, going about their work and protecting and improving the environment without headlines or hysteria. On a golf course, protection and improvement of the environment is just plain good turf management. Each day, superintendents must combine the elements that make up the environment to efficiently provide the superior playing conditions needed for the game of golf.

The current crop of militant environmentalists are missing the mark when they accuse people in agriculture of being environmental polluters. Fertilization, irrigation and appropriate use of pesticides are all part of the solution to pollution, not part of the problem. Golf course superintendents and golfers alike have an important and positive story to tell when they say, "It's our environment, too."

Better Golf Courses Through Research



Turfgrass wear simulator designed for project to study causes and prevention of turfgrass wear. Developed by Dr. James B. Beard, Michigan State University.

by **ALEXANDER M. RADKO,** Eastern Director and National Research Director, USGA Green Section

Research is the systematic search for the truth. Research is a new process, a new technique, a new product derived by scientific study. In short, it is the search for a better life. It follows then that the aim of turfgrass research is to make life better on the golf course for every golfer. This, in a nutshell, is what the program of the Green Section of the United States Golf Association is all about. In November 1920, the Green Section was formed "for the purpose of investigating the problems of grass culture and of distributing to its members the information obtained." That purpose has remained constant to this date. From its inception to the present the USGA has invested nearly $4 million in the Green Section. A sizable portion of that sum was directed into research.

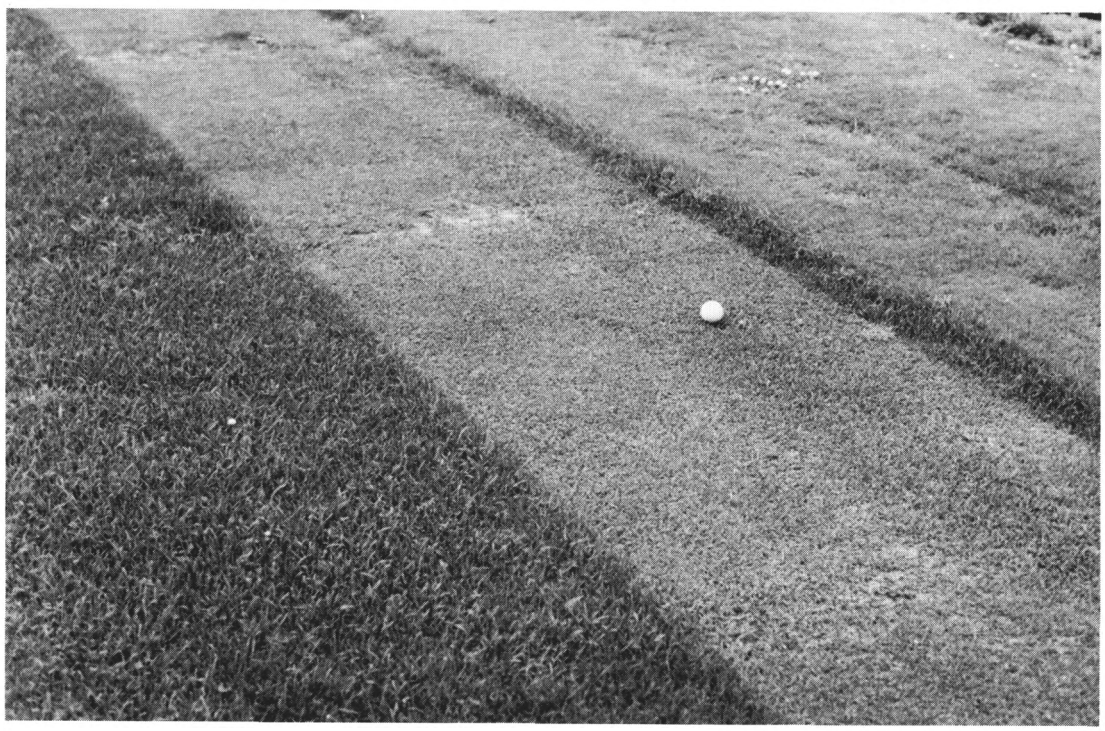
Golf became known early as "The Rich Man's Game." This may have been in reference to what was invested but it could have been in reference to what was being wasted. To quote from an early cost report, "It was estimated that golf clubs in the United States annually expended $25 million in the establishment and upkeep of turf, and there was good evidence to show that nearly half of this money was wasted by the use of foolish methods." Prior to 1920 there was no organized research, no place for clubs to turn to for information. The rate of golf course construction at that time was nothing short of phenomenal. There were some

3,500 courses in play by 1925. Every one of them was crying out for help. As a result, waste was commonplace and costly. The need for one central agency, impartial and authoritative, was sorely evident. Officials of the USGA and the United States Department of Agriculture met, agreed, and the Green Section was born.

From 1920 through 1953 the Green Section in collaboration with the U.S. Department of Agriculture, first at Arlington, Va., and later at Beltsville, Md., inscribed an indelible chapter in golf turfgrass research. Golf course management and maintenance changed from a "hit or miss" program to a highly specialized field of technology. The Bulletin of the Green Section of the USGA was the organ through which golf clubs first received technical aid. Thousands of chemicals were screened and tested for disease, weed, and insect control and a precise rate for each favorable test was determined and announced. Maintenance practices were improved, new techniques were devised, ideas for new machinery were developed and new grasses were discovered and bred. In short, the industry came of age. During World War II when male scientists were called into the service, a woman researcher, Dr. Fanny Fern Davis, was appointed to carry on Green Section work and to no one's surprise she contributed significantly to the use of 2,4-D in weed control, a force of major impact in fine turfgrass culture ever since. Close association with U.S. Department of Agriculture scientists added immeasurably to quantity, quality and speed of projects developed. The U.S.D.A. facilities and brain power were the best available. The clubs benefited greatly by the Green Section's close association with the eminent agricultural researchers of the day.

The pattern of research quickly resolved the need for decentralization of the Green Section program. It set the stage for the program in existence today. First do the research, then test these results at various regional points throughout the country, discuss results in regional conferences, then report findings in publication. In the 1920s, District Service Bureaus were first established in Cleveland, Philadelphia and in New York. Several were added later to further enhance the program's value. District leaders developed a coordinated program of research and demonstration on golf course turfgrass projects. Promising selections of new grasses were tested; new products in disease, insect and weed control were demonstrated; fertilizer and lime tests were conducted; new machinery was demonstrated, and numerous beneficial maintenance and manage-

A Kentucky bluegrass selection being subjected to putting green height of cut. Kentucky bluegrasses that thrive under close cut would be a great asset for tee and fairway use.



ment practices were developed. Regretfully, the district program ended with the market crash of 1929 and once more staff activities returned to one central Green Section office at Arlington.

Not until 1953 did the Green Section embark upon its present program of service to Member Clubs. It now plays a strong role in funding the decentralized research work at many stations throughout the country. In 1923 the Green Section allocated the grand sum of $100 to the University of Florida for research. Today approximately $50,000 annually is directed to universities and experiment stations through the U.S.G.A. Green Section Research and Education Fund, Inc.

Funds are derived from USGA dues, individual contributions, golf associations, golf course superintendents associations, sponsors of major golf tournaments, and from the National Golf Fund. the PGA's National Golf Fund, which is derived from National Golf Day, has contributed generously to research and scholarship programs over the years. Benefit to golf is such that we urge every Member Club to support National Golf Day annually. The U.S.G.A. Green Section Research and Education Fund, Inc. finances scientific projects that are golf course management oriented. It deals with research in the following ways:

(1) Needs are recognized by Green Section staff members as they go from course to course and receive the advice of superintendents. Research projects are framed to meet such practical needs.

(2) Funds are obtained for state agricultural experiment stations and colleges for specific studies. (Dividends are still being received from investigations formerly conducted cooperatively by scientists of the Green Section and the United States Department of Agriculture.)

(3) Research results are evaluated under playing conditions by the Green Section.

(4) Courses are warned against products whose worth is not proven; considerable money has thereby been saved.

(5) The total research program is planned and coordinated on a national scale. Funds can thus be placed most efficiently. Duplication of efforts can be avoided. Results of all research become available readily to all sections. The Green Section's National Research Director keeps in touch with experiments over the country and is constantly alert to golf's interests in research.

Accomplishments of the Green Section's research program include improvements in every phase of golf course management. These have been documented and reported in The BULLETIN OF THE GREEN SECTION OF THE UNITED STATES GOLF ASSOCIATION, TURF CULTURE, TIMELY TURF TOPICS, the "Turfgrass Management" section of THE GOLF JOURNAL and THE GREEN SECTION RECORD. Green Section publications, except for a brief span during the Depression, have a record of continuity since 1921 in the publications listed. Some specific and outstanding accomplishments of the research program for golf include:

(1) The development of the "C" series of creeping bentgrass that find prominent use on putting greens. These include the Arlington, Congressional, Toronto, Cohansey, Washington and many other improved selections.

(2) The development of Merion Kentucky bluegrass.

(3) The development of the Tifton series of bermudagrasses that have greatly improved playing conditions throughout the South.

(4) The development of a sound method of putting green construction and physical soil analysis that has world-wide application. Produced a motion picture in color demonstrating the techniques of this construction method.

(5) Initiated studies and discovered safe materials for control of devastating diseases of putting green grasses. Although discovered in the 1920s, they are still being used today.

(6) The development of Meyer zoysia and several bermudagrasses.

(7) Researched effective controls for the major golf course weeds and insects.

(8) Conducted traffic studies which resulted in the modification of golf spikes and shoes.

(9) Researched nutritional requirements of turfgrasses.

(10) Researched soil compaction and techniques to minimize it.

(11) Published the book TURF MANAGEMENT, first of its kind and a comprehensive book on the maintenance and management of golf course turfgrasses.

(12) Supported fellowships that trained turfgrass students at the graduate level.

(13) Basic study of *Poa annua* designed to provide better understanding of problems associated with its growth.

Problems now being researched:

(1) Bermudagrass improvement through selection, irradiation and breeding.

(2) Kentucky bluegrass improvement for tee and fairway use. Dwarf types for uninterrupted play under the Rules of Golf. Our avowed aim is the elimination of "winter rules."

(3) Bentgrass breeding and selection for greens, tees and fairway improvement.

(4) Techniques to insure better success with renovation of greens, tees and fairways.

(5) Problems related to nutrient and pesti-

Representatives of Texas A & M University and the Green Section examine project collection site. Project designed to test nutrient and pesticide retention in soils.

cide retention in putting greens.

(6) Techniques to simplify management.

(7) Combination warm season-cool season turf for the upper South.

(8) Investigations into the causes and prevention of turfgrass wear.

(9) Continued research into studies of weed, insect and disease control . . . better solutions to present problems and a search to solve new problems as they arise.

The Green Section's research goal has never waivered from its original course . . . that of improving conditions for play on golf courses throughout the nation. A number of problems still must be resolved and a number of new ones will arise. Research needs the support of every golf club in the United States. Benefits derived from Green Section research benefit every club. The agency through which the USGA raises funds for worthwhile projects is the U.S.G.A. Green Section Research and Education Fund, Inc.

This is how it functions:

(1) Needs are recognized by Green Section Staff Members as they visit subscribing USGA Members. Turf management problems are discussed with golf course superintendents and club officials.

(2) Available research funds are then allocated to state agricultural experiment stations and colleges for specific studies on golf course related problems. Studies are performed by trained scientists and researchers expert in the particular area to be studied. The best possible return for every research dollar spent without question is realized from funds granted universities and experiment stations. The framework is there crying out for funds to be put to work for golf. We are the losers if we don't take full advantage of this great opportunity.

(3) The total program is planned and coordinated by the Green Section staff on a national scale. It is the only agency so equipped. Thus funds are placed more efficiently and duplication of effort is avoided. This is an important point. Duplication of effort is research money wasted. Research results then are documented, published and become readily available to everyone interested in golf course maintenance and management.

This, in brief, is the research phase of your USGA Green Section program. Its only aim is a better course and better golf for every golfer.

Some People Manage Practically and Others Practically Manage

Panel Members: **Warren Bidwell,** Superintendent, Congressional C.C., Bethesda, Md.
Richard Valentine, Superintendent, Merion G.C., Ardmore, Pa.
Holman Griffin, Mid-Atlantic Director, USGA Green Section

Excuse our title as a play on words, but we hope everyone gets the message. Practical golf course management is the name of the game and the alternative is simply a graduated scale reflecting degrees of failure. Practical management means making the most of what you have as well as formulating plans to get what you need.

The past 10 years have seen a remarkable improvement in golf course operations and the credit can be divided among new techniques, new materials and, not least of all, machinery. We are definitely agreed that golf course operations must continue to mechanize if we are to survive economically.

Along with the development and introduction of new methods and products must come a strong sense of need to increase our knowledge and skill. Professionalism is more important today than ever before. Not only must we become more knowledgeable, but we must learn how to pass on the proper information and skills to employees. This is an age of specialization in which the strong mind is replacing the strong back in every field. More sophisticated products and equipment require a much higher degree of skill and intelligence in our employees than ever before and you as a golf course manager must continue to raise your level of proficiency in all areas or you will be replaced by someone who will.

Participation in professional turf organizations at all levels and attendance at turf meetings or simply exchanging ideas with your neighbor superintendents is vital to success. No man can successfully survive in today's society

When erecting fences, the work can be done most economically with the proper tools.

Spraying side hills too steep for a tractor. Where there is a will, there is a way.

unless he contributes as well as seeks help from others. Relating one's experience is one of mankinds oldest forms of teaching and still works well today.

Progressive clubs no longer regard travel and membership expenses for the purpose of attending turf meetings as an unnecessary expense, but rather as an investment which pays dividends. By the same token, the progressive golf course superintendent no longer regards the time spent at meetings as a carefree holiday, but rather as an opportunity to increase his professional knowledge. Both the man and the club benefit from this type of activity.

We have just made a strong case for attending turf meetings and the next point to follow should be that we must not only learn about new development, but we must also apply what we learn. At a recent conference we heard that there are three kinds of people: (1) those who make things happen, (2) those who observe what is happening, and (3) those who wonder what happened. A golf course superintendent had better develop the talent of making the right things happen because time, taxes and turf wait on no man and we can't afford to always be wondering what happened.

Perhaps the difference between the practical manager and the fellow who practically manages is motivation. The professional listens to new information with the purpose of making use of it for his own future success and the other fellow may listen just as intently but for the purpose of explaining why his program was less than successful.

Through new equipment, exemplified by the mechanized bunker rake and the triplex putting green mower, the professional sees a way to do the job well and at the same time save money for the club. Brand "X" simply sees a new machine which will make the job easier and reduce the effort required of him. Very few clubs can afford an open budget type of operation and their success and even survival most often depends on doing a better job of managing men and money.

No one seems to argue that labor is the largest single item in a golf course budget—it accounts for nearly 60 to 70 percent of money spent for maintenance. This should readily tell us that if we can better utilize manpower and find ways of making it more efficient, or even

eliminate the need for some of it, we are attacking the cost of the maintenance problem at its source rather than treating the symptoms.

Comparison shopping for materials is in many respects commendable, but a 50 per cent saving in materials is not likely to do nearly so much good as a 50 per cent saving on the manhours required to apply it. Actually, you have very little control of the material costs in your budget, anyway. The price is set by the manufacturer and you either buy it or you don't, and if it is a good material that does the job, it often means certain failure if you don't buy it.

The story is different with labor. The basic problem is much more complicated than whether we need it or not; the problem is how best to utilize the manpower available. The grass has to be cut and there is no decision to be made about that when its growing, but you begin to make progress when you begin figuring ways to do the job more economically.

The seemingly simple problem of what to use to cut grass has an almost limitless number of solutions, each with its own ramifications in the cost of maintenance. Brands, models, initial cost, cost of maintenance, ease of maintenance, degree of skill required by the operator, life expectancy of the machine, and performance are only a few of the many hundreds of possible considerations.

Because it is impossible to disassociate any phase of management from economics, we will continue to talk about economics as we explore some of the other facets of practical management.

Supervision is a most important part of any management program. To put it in the words of one well-known golf course superintendent, "I get paid for what I get done, not what I do." The man who thinks he has to do most of the work himself is not a good supervisor and he is shirking the major portion of his responsibility. Delegation of authority is a key management tool and requires special skills which a good supervisor must learn.

Some clubs refuse to acknowledge the golf course superintendent as a supervisor and there are many golf course superintendents in name only which tend to perpetuate this practice. Refusing to acknowledge the need for a competent supervisor with professional knowledge is to invite frequent golf course crises which most often result in disaster.

The progressive golf clubs now recognize the necessity of a competent supervisor as well as a competent assistant. Security and continuity for the club are derived from having some depth in the supervisory staff.

Taking a more philosophic view of the assistant superintendent, this position trains him for the future, whether at your club or elsewhere. Golfers have long recognized the need for financial assistance to promising young golfers and have spent millions in this direction. Should they and we not be just as concerned with the talented youth who will be the future golf course superintendents?

There is no need to change titles or seek more prestige for the position of golf course superintendent and to become a kind of prima donna. The popular demand for perfection in

Contract lime applications over frozen ground quite often save time and money and it really makes no difference when lime is applied. The main concern is not to rut the fairways.

Hand picking of bermuda from bent greens is one control, however, Siduron can do the job more practically.

golf course turf and member pride in having outstanding conditions at all times is more responsible than any of our efforts for bringing this new era of professionalism to the business. It is sad but true that the days of the craftsman are almost gone. The apprentice who worked for a nominal salary to learn a trade disappeared with the horse and buggy. Few golf course superintendents are capable of handling the job their father or grandfather handled without seeking additional skills and knowledge. Hopefully, what remains of the past era of the craftsman is the intense pride in a job well done.

The practical superintendent no doubt spends a lot more time on paper work now than ever before. Labor unions, OSHA, EPA, federal, state and local regulations of all kinds make the task more demanding. These have little to do with growing grass *per se,* but they can't be overlooked without serious consequences.

Record-keeping is the driest subject of all, but it is an absolute necessity for a well managed golf course operation. The only substitute is a photographic memory, in which case the person having it and all the information should be enclosed in a plastic bubble or vault to protect the club's interest. We simply cannot be too conscious of minute details if we are to continually improve our abilities. To rely on memory for the prodigious amount of data which influences our present and future is ineffectual, to say the least. Very few superintendents become deeply involved in record-keeping beyond the extent of guideline activity, but without sufficient data from the past we cannot expect to operate any type of business economically or in most cases effectively. Good records are essential for the practical manager, and the importance of keeping them should be stressed to any future superintendent for the same reasons that public high schools require a certain amount of history in the curriculum of every student.

Earlier in the program, Joseph C. Dey, Jr., spoke of preparing a golf course for tournament play. Such requirements are a true test of practicality, and the stresses associated with major tournaments are demanding upon both man and turf. Hosting a major tournament is a prized goal sought by many of the more progressive superintendents, and it has been said many times that every superintendent should have a chance to experience such an event as a part of his education.

Weak points in the course are revealed quickly during a major championship, and you can imagine the delight of a regular member completing a good round of golf under the same conditions of play just offered to some notable amateurs or professionals. Club members usually enjoy most tournaments and a successfully completed tournament can be a source of pride to both the club and the superintendent. There can also be many other tangible and intangible assets derived from hosting a major tournament.

Finally, your reputation and your future success in golf course management are largely determined by your managerial ability, so it is much better to be known for your practical management than for just practically managing.

GREEN SECTION RECORD
MARCH 1973

TURF TWISTERS

NEITHER RAIN

Question: After prolonged rains my members complain that conditions for play are inferior. Is this true at most courses? (N.Y.)

Answer: Except where exceptionally good drainage exists, courses play badly after prolonged rains. Saturated soils become spongy, grasses become limp, sparse and shallow rooted and so the turf isn't as firm nor is the footing as good as it is when dry. It is indeed a different playing surface. The average player doesn't adjust well to soft conditions and so his game suffers—ALONG WITH THE COURSE.

NOR FROST

Question: On early spring mornings I have frost on my greens. My members want to play. What is the best way to remove the frost so the course can be opened? (N.Y.)

Answer: There are only two safe ways of removing frost from greens: 1) a two- to three-minute syringe cycle by the sprinkler system around greens, or 2) wait for the sun and warmer temperature to melt the frost. Some new chemicals are now under investigation, however, but in our judgement, all the facts are not in.

SHALL STAY THESE COURIERS

Question: Although we want to support the USGA and the Green Section, we also have one of the best golf course superintendents in the country. Our course is always in great condition. How could the Green Section Turfgrass Service (including direct visits to our course) possibly be of benefit to us? (Virginia and California)

Answer: Not only do you have a top-notch superintendent, but there is also available a number of other sources of "outside" information. We feel this is all to the good of golf and your club. No one has a monopoly on all knowledge, all information and all ideas. The Green Section Service, in addition to annually supporting turfgrass research projects at universities throughout the country, can be of direct benefit to any club if its experience and ideas are properly used. Staff members make over 1,200 golf course visits nationwide each year! Because they have nothing to sell, when they are teamed with the superintendent, the entire turf management program at a club is strengthened. Professionals have always consulted with one another—doctors, lawyers, accountants, even golf professionals. The Green Section is unique. Year after year, since 1923, it has been devoted solely to golf course turf. Try putting it to work for you.