MARCH 1968

# USGA GREEN SECTION RECORD

A Publication on Turf Management
by the United States Golf Association

# USGA GREEN SECTION RECORD

**A Publication on Turf Management by the United States Golf Association**



**VOL. 5, No. 6** **MARCH 1968**



**Cover Photo:** James L. Haines, of Denver, Colo., receives the Green Section Award from Wm. Ward Foshay, President of the USGA, during the annual USGA Green Section Conference on Golf Course Management. See article on page 15.

Published six times a year in January, March, May, July, September and November by the UNITED STATES GOLF ASSOCIATION, 40 EAST 38th ST., NEW YORK, N. Y. 10016. Subscription: $2 a year. Single copies: 35¢. Subscriptions and address changes should be sent to the above address. Articles, photographs, and correspondence relevant to published material should be addressed to: United States Golf Association Green Section, P.O. Box 567, Garden Grove, Calif. 92642. Second class postage paid at Rutherford, N. J. 07070. Office of Publication: 40 East 38th Street, New York, N. Y. 10016

**Editor: William H. Bengeyfield** **Managing Editor: Robert Sommers**

***THE GREEN SECTION OF THE UNITED STATES GOLF ASSOCIATION***

**Green Section Committee Chairman: Henry H. Russell, P.O. Box 578, Perrine, Fla. 33157.**

**Green Section Agronomists and Offices**

**EASTERN REGION**

**Northeastern Office: P. O. Box 1237, Highland Park, N. J. 08904**

Alexander M. Radko, Director, Eastern Region
Holman M. Griffin, Northeastern Agronomist
Lee Record, Northeastern Agronomist

**Southeastern Office: P. O. Box 4213, Campus Station, Athens, Ga. 30601**
James B. Moncrief, Southeastern Agronomist

**MID-CONTINENT REGION**

**Southwestern Office: Texas A&M University, College Station, Texas 77843**
Dr. Marvin H. Ferguson, Director, Mid-Continent Region and National Research Coordinator

**Mid-Western Office: Room 905, 211 East Chicago Ave., Chicago, Ill. 60611**
James L. Holmes, Mid-Western Agronomist

**WESTERN REGION**

**Western Office: P. O. Box 567, Garden Grove, Calif. 92642**
William H. Bengeyfield, Director, Western Region

# USGA Green Section Conference Issue

## Subject:
## The Putting Green

The material in this issue of the Green Section Record is a condensation of material presented at the Green Section's Annual Conference on Golf Course Management in New York City. It is reproduced as a permanent record of the conference.

*AT THE GREEN SECTION CONFERENCE: Below—William C. Campbell and son Colin. Right above—Panel discussion: from left Richard Craig, James R. Fulwider, Edward Roberts, Jr., William H. Bengeyfield. Right below—Guests from other associations: Robert E. Hanna, Executive Director Northern California Golf Association; Billy Lozano, Executive Director Mexican Golf Association; Newell Pinch, Executive Director Southern California Golf Association; James Gaquin, Executive Director Royal Canadian Golf Association.*

*Joe Barone, foreman, stands in steep depression separating levels of the ninth green at the Yale University Golf Course, New Haven, Conn. Adequate green size on either side makes possible such a steep depression, and yet it is considered fair.*

# A Golfer's View of Greens

**by WILLIAM C. CAMPBELL**

As Ben Hogan said, "Golf is two games—one played in the air, the other on the ground." Ben has found that the second game is the more frustrating of the two, if not the more difficult. More strokes are taken on the green than elsewhere. The percentage of the green's importance to the overall game is higher among the better players, even if they are good putters in most cases, so the green is naturally the focal point of competitive golf. Appropriately, the green requires more money for construction and more for maintenance than any other part of the course; certainly good greens are the best investment a course can have.

Having played in major tournaments for 30 years, including 47 national Championships here and abroad, I have inevitably acquired strong feelings about golf and golf courses, particularly greens. So please forgive me if I forego facts in favor of opinion and prejudice. Just because golf courses are better than they used to be—or at least there are more good courses now—and just because the science of construction and maintenance has improved so much shouldn't deny me the golfer's self-appointed privilege of criticism.

The competitive golfer cannot afford negative thoughts, nor can he risk the loss of confidence by blaming himself. So with the good I shall mention the bad, and be so impolitic as to cite examples of each among courses that are known to golfers everywhere.

As to size of green, I regret the apparent trend towards hugeness. Excessive size adds to the cost of both construction and maintenance, but my gripe is that it puts too much emphasis on putting. Of course big greens aren't new; the Old Course at St. Andrews, for example, combines the 5th and 13th greens into one putting surface of 43,000 square feet, almost a full acre. The third hole at the Williams Club in Weirton, W. Va., plays from an elevated tee 130 yards long to a fairway that extends 600 yards mostly uphill to a green of some 26,000 square feet. The extreme, I suppose, may be valid as a conversation piece—like the 17th green at Lost Tree, in North Palm Beach, Fla., where a sand trap was built in the middle of the green.

I can see only a few reasons for not having all greens quite small. They should be just large enough to:

1. Accomodate long approach shots to long par-4 holes, and tee shots to long par-3 holes.
2. Offer a number of hole locations so that wear can be spread out.
3. Provide strategic variety to test the player's decision and shot-making.

I prefer greens no larger than those at the No. 2 Course of the Pinehurst Country Club, Pinehurst, N.C. They put a fair premium on accuracy, and yet they fit the requirements listed above.

Also, cups should be changed according to the direction and velocity of the wind, depending upon the degree of difficulty desired and the tactical implications.

As to the shape of the green, I am allergic to the stereotyped square, elevated, slanted back-to-front design, often with traps on the short right and left sides. This design may be fine for drainage and viewability from the fairway, or if the hole calls for a backstop for the ball when the approach is from a much lower elevation than the green. But a habit of such design is without imagination by the architect, robbing the course of its character and the golfer of some of his fun.

However, any indentation into the circular or rectangular green, or any tangential extension of it outward, should be for better reason than just its appearance when seen from above lest the aberration result in just an easy chip if one misses the green itself. I favor the judicious use of knolls, mounds, dips, swales, and yes, traps and water—all strategically located next to or near the green—with the green shaped accordingly.

The 10th hole at the Pine Valley Golf Club, Clementon, N.J., is "made" by the short right bunker—more so because a shot on this short hole can hit well onto the green and still gravitate to the bottomless little pit of sand.

What would the famous 17th, or "road hole" at St. Andrews be without the ledge across the right front of the green, the bunker close in to the left, the old road just over the back, and the green angled to present a thin target? Or all of the Augusta National's par-3's without their strategic bunkering and shapes? Or, among others, Augusta's par-4 ninth without a short left bunker forcing the play to the right where the ball can be too wide and down hill, or if played too tightly to the front half of the green, can back all the way off? Or Augusta's 11th, without its high fairway mound short and right of the green, kicking the weak second shots towards the water that cuts into the short left side of the green?

Look at almost any green on Pinehurst's classic No. 2 Course: the first hole with its dip short and a steep rise to the center of the green, which is angled to the left around the bunker. The golfer is inclined to play to the right where the ball can kick off the green to uneven ground. As the cup is put farther back on the green, it brings the left bunker more into play. The green narrows towards the back, requiring more accuracy for the player who would get close to the pin—also control, since the green falls away at the back toward pine trees.

Or look at Pinehurst's second hole, where the green is shaped for various pin locations, depending upon the difficulty desired for the long approach. This shot must carry a bunker and mound on the short right side, yet stop short of a swale on the far left, with the green falling away on all sides except where the mound is located between trap and green.

These dips and doodles afford an infinite variety of problems for the golfer who is too bold or too cautious. In fact, the No. 2 Course is typical of the old British seaside courses which is what Donald Ross had in mind when he designed it.

As in all of these examples, it is essential that the green and its immediate surroundings complement one another, with the green often sloping toward the particular problem to be encountered in order to multiply its effect. Thus we are concerned with the contour of the green itself, which combines with shape to create the "character" of the green. Augusta's fifth, sixth and 14th holes offer spectacular contours, making it important for the golfer to approach to the "smart" side of the hole.

One of the most severely contoured greens at Augusta is the 18th, which would surprise the millions of televiewers who must wonder if the many putts missed there are caused only by the pressure of trying to win the Masters.

Some of the holes at St. Andrews Old Course would be little remembered except for the contouring of their greens:—for instance, the 12th, a short par-4 with a difficult convex green; and the 18th, with a subtle slope in back and the

treacherous "valley of sin" in front. The famous 18th at Pebble Beach has a green that looks much flatter than it is, and has embarrassed many a golfer.

I don't mind terracing if it allows enough room for a hole to be located on each level, so that a player has a reasonable shot without necessarily putting from a different level. Pinehurst No. 18 is a good example of fair terracing. Augusta's sixth would be a bad example if the hole were located in the back right, which fortunately isn't often done.

The best example is Yale's famous No. 9, a long par-3 to a large, deep green that is bisected by a deep dip, leaving an adequate target and putting area on each side of the dip.

If there is a strong prevailing wind, the green's slope should be designed with the wind in mind. A bad example is St. Andrews' 11th, whose green is so fast and sloped that a strong wind from behind the green blowing downhill (which is usual) can make it impossible to control even the small ball on the putt, or to keep a spinning recovery from the deep trap short of the green from coming back into the sand. Such a green should have at least one protected pin location, and it should be used in such severe conditions.

If a green's speed and slope are unrelated to each other, the results can be disastrous. For example, at Broadmoor Golf Club in Colorado Springs during the 1959 United States Amateur, the No. 1 green (now the 16th of the East Course) was too sloped and fast to be fair; the West Course, where the 1967 Amateur was played, has a number of greens that are too sloped or too fast, or both. The problem was compounded in the 1967 Amateur by the use of a "wet" pin location on a dry day in order that the people who did not finish the previous day's play could complete their rounds using the same cups as the rest of the field.

Also, I would lobby against having too many slopes on any one green, and against having too precipitous changes in slope, unless the hole is a short par-3 or is designed for a short approach shot. Otherwise there is simply too much luck, depending on where the ball lands, especially if the green is hard to the bounce. Good examples of gentle contouring are Pine Valley, and the East Course of the Merion Golf Club, Ardmore, Pa. Bad examples are the Broadmoor's West Course holes No. 6, 7, 10, 12, and particularly No. 8. Such results are usually by intentional design, but occasionally we see greens that are simply the victim of faulty construction, or are too new to have smoothed out. I doubt that No. 11 of the Broadmoor's West Course will ever be a popular green because of the irregularity of its contouring.

Reading any green on a mountainside, let alone putting on it, is a difficult business at best. The Broadmoor West Course is interesting and scenically spectacular, and the best player won the Amateur there. However, in my judgment it is not yet ready for a national championship. It can take years to age a course properly. On the other hand, the greens of many old courses show undulations that were not contemplated by the architect.

Drainage causes most of these changes, such as we see at The Country Club, in Brookline, Mass. For example, the ninth green in the 1963 Open made for uncertain putting and chipping, and allowed little variety in proper pin location. A putting surface should be relatively flat near the cup—for four or five feet all around, or preferably seven or eight feet. If not flat, at least the surface should be of the same plane near the cup. This is especially important now with the continuous putting Rule, particularly if the greens are large and the first putts therefore are long.

As to the surface of a green, I recommend a combination that will be firm to the pitch, yet fast to the putt. If fairway grass is lush, or such as crabgrass, where it is difficult to impart spin, the greens might be kept softer; but even then the putt should roll fast.

Again, the speed of the green must not be decided independently of the contours. Of course I prefer a smooth surface, but I admit that irregularity of surface influences one's confidence more than it affects the ball. You may have noticed this in playing late in the day when the shadows accentuate heel prints on the greens that you hadn't known were so rough. The best attitude is a positive one, such as displayed by that great putter Deane Beman during the World Amateur Team Championship in Rome in 1964. It was a new course, play was heavy, and several days of rain had left the surfaces brutally uneven. Deane kept putting the ball in the middle of the hole, explaining that the bumps would "average out."

Of course, shoes are much to blame for damage to greens—rather, people who wear the shoes and who walk improperly. I give little

*The 13th green at Pinehurst Country Club. The approach is from the left to a small green, and it requires the utmost accuracy when the hole is in the front.*

chance for the campaign on behalf of flat rubber soles, since most people (including myself) need more traction, whether on hillside or in wet conditions or simply because of a violent swing. One answer seems to be the counter-sunk (flush) spikes, because the lack of protruding shoulders reduces compaction.

Also, I approve of not allowing caddies to wear spikes at all, or not letting them carry heavy bags onto the green.

If there is much play during any competition, the cup should be moved daily. If there is a big field in a tournament with 36 holes on one day, the cup should be moved midday so that it is in a different location for each round.

Ball divots are still a problem, despite the Rule allowing their repair at any time. Such ball marks are a nuisance for the player and green staff alike. With fewer caddies these days and players therefore more responsible for repairing the damage done by club divots in the fairway and ball marks on the green, I suppose the answer lies in education through efforts by the USGA, the PGA, and various clubs.

With prize money ever higher on the pro tour, and Rules more liberal, are we far from allowing a "putting ball?" Since the ball can be cleaned, (and in the interest of time I see no valid reason why not) the only rub would be spike marks. Even they may be lessened through the use of fewer and/or smaller spikes. I don't foresee that the Rules will ever allow spike marks to be repaired, for then a round might never be finished.

Grain worries a lot of people. It is a part of bent grass, though even bermudagrass has its nap. I don't object to grain because I grew up with it, and I find that, within limits, it makes putting more interesting. South Africa produces marvelous putters; I think it not a coincidence that greens there are notoriously grainy. But grain should be consistent, i.e., in the same direction on any one green, so that it is only necessary to look at the cup to know all about the grain. Incidentally when cups are changed I wonder if the green staff is careful always to align the grain.

All this adds up to a lot of tender, loving care that a course requires if its greens are to be what the golfer wants and expects. The in-

---

**THE AUTHOR**

William C. Campbell was the 1964 United States Amateur Champion. He has played on six Walker Cup teams and was Captain once; played on four Americas Cup teams and was Captain once; played on the Eisenhower Trophy Team once. He was the recipient of the 1956 Bob Jones Award for distinguished sportsmanship in golf.

gredients are design, construction, science, and dedicated work. My home course (Guyan Golf and Country Club in Huntington, W. Va.,) will forever bear the imprint of its long-time Green Committee Chairman, R. J. Foley, a professional horticulturist. He rebuilt all our greens and tried eight strains of grass before he found what would grow best in an area known as Pea Ridge (because reputedly even soy peas couldn't grow there). Mr. Foley was a one-man committee for over 20 years, and we still have a one-man Green Committee in C. McD. England, Jr. If you can find the right man and give him 100 per cent authority, you may be as fortunate as we have been at Guyan.

Mr. Foley is the oldest member of the USGA Green Section Committee in both service and age. No one has done more for golf in West Virginia, both as an expert on grasses and as an official in a game which he never played.

There are some incidental points which space will not permit me to discuss, such as the best time for watering being in conflict with union attitudes; greens shrinking with mowing as more berms are thus created; cutting greens too close, especially convex surfaces such as Oakmont's No. 3 green in the 1962 United States Open; letting greens become too dry, thin, and crusty so that you can actually hear a ball roll (such as Augusta in 1950 on Nos. 10 and 13); topdressing never to be used before a competition, and never as a cosmetic, as unfortunately was used at Merion for the 1966 Amateur on Nos. 15 and 17, leaving no contact between the ball and the ground; and having the greens best for each championship, rather than saving them for another one, such as was done at Carnoustie for the 1966 British Amateur in anticipation of the 1968 British Open.

Finally, the guiding principle of what the player expects in greens is that, as much as possible, luck should be taken out of the greens so that the best player will have the best chance of winning. There **is** a line to be drawn between the difficult and challenging on the one hand, and the too difficult and unfair on the other.

# *Putting Green Design — Please Golfers, Ease Maintenance*

**by MARVIN H. FERGUSON, Mid-Continent Director, USGA Green Section**

The first requirement of a putting green is that it provide good playing values to please the golfer and to test his skill. A putting green also should lend itself to economical maintenance. Contrary to the beliefs of some, there is no conflict between these requirements.

A plea for design which will permit economical maintenance frequently encounters the argument,

"You are asking us to sacrifice golf values for the sake of easy maintenance."

Conversely, an insistence upon good and interesting design from the player's viewpoint is challenged by an allegation that such a green will be costly to maintain. These arguments lack validity in most cases. Let us examine some of the major considerations in putting green design.

### Size

The golfer prefers a green large enough to provide a variety of hole locations, but he objects to a green so large that it places too great emphasis on the putting. He likes a green, or at least a target area, to be relatively small if the approach is a short one, and he prefers larger targets as the length of approach shot increases.

Now what does the golf course superintendent want? He wants plenty of cup space so that turf will have time to recover from the traffic in one location before it is used again. This rules out very small greens. If the approach is a short one and calls for a small target, the superintendent prefers that the green be larger with well defined and separated hole locations. On the other hand he knows that every maintenance operation is related to size of the putting surface, and that very large greens are expensive.

It appears then, that both the golfer and the superintendent prefer greens of moderate size, big enough to provide for variety and traffic rotation, but not so large as to overemphasize

*No. 4. hole at Baltusrol Golf Club, Springfield, N.J. Looking from green back to tee. Green is large, two-level, green. Hole inflicts severe penalty if ball lands anyplace but on the green. An awesome hole from either direction.*

the putting phase of golf and to add greatly to the maintenance cost.

### Contours

Contours which exist in the form of gentle rolls and swales add interest to the game. They reward the player who has an ability to "read" the green. Such contours should not occupy so much of the putting surface however, that there are too few level places in which to locate the hole. An area of several feet in diameter around the cup should be flat, or gently sloping in a single plane. There should be no depressions which will trap water. Such areas are more susceptible to footprinting, and they react differently in their effect on a ball played to the green.

Maintenance requirements call for similar contouring, if for different reasons. Gentle slopes are necessary for surface drainage. It is preferable for water to be removed from the green in more than one direction. Steep slopes are hard to irrigate and sharp contours cause scalping by mowers.

For both maintenance and player interest, larger and steeper contours should be off the green or near the edge. There they are effective in challenging the golfer's skills in his approach to the green, they do not effect a reduction in the area available for cup setting, and they do not impose unfair situations for the player on the putting surface.

### The Surface

Players want the surface of the green to hold a well-played shot. They also want a smooth, true, uniform surface that is unmarred by ball marks and footprints. This poses an apparent conflict. It is commonly believed that only a wet green holds a shot properly, and that only a dry green will resist footprints and ball marks.

We disagree. A green constructed of a properly constituted soil mixture will resist footprinting and ball marks even when it is wet, and it will hold a properly played shot even when it is dry. The behavior of a turf surface depends greatly upon the character of the soil in the green. The proportions of sand, soil, and organic matter; the size, shape, and uniformity of sand particles; and the kind and amount of organic matter determine the stability and the resilience of the surface.

Such a surface is not a simple achievement. Fortunately, however, when construction is adequate to meet the players' preference, it also lends itself to effective maintenance. It provides for good infiltration of water and rapid percolation with the consequent diffusion of air into the soil.

All greens require routine maintenance, such as mowing, irrigation, aeration, topdressing, thatch removal, and the changing of the cup location. These operations are not cheap. However, they are no more expensive on a challenging, pleasingly contoured green than they are on a flat green without character.

The designer and builder must have an awareness of both needs. A challenge for the player is paramount. This is the reason for the existence of a putting green. On the other hand a green that is very difficult to maintain may fail to meet the needs of the player because it cannot be kept in peak condition.

The needs of both player and the turf manager can be met if the designer and the builder are aware of the needs and if they approach their creative task with a large measure of common sense.

# Green Construction — Techniques and Materials

by JAMES L. HOLMES, Midwestern Agronomist, USGA Green Section

The method and specification for the construction of a putting green recommended by the USGA Green Section have been available and in practice for 10 years.

Many individual greens on numerous courses have been installed accordingly, and new course green construction is tending in this direction. A few architects insist that all greens they design be built following these specifications. This trend is growing, also.

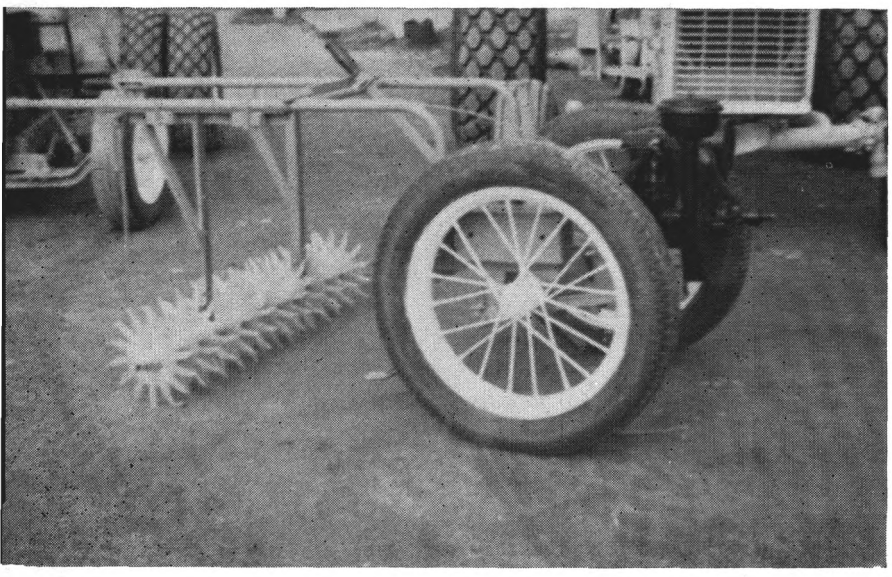
One outstanding advantage of such specifications is that they are the only specifications available which spell out exacting physical requirements. With this advantage, physical properties can be checked to determine if specified procedures have been followed during construction. This should be, and can be, extremely useful to architects and those providing the money to construct greens.

We are all aware that green behavior can vary widely following guess-work soil mixture-construction. Rarely are two greens built alike, and rarely do they behave similarly when guess-work methods are used.

Other advantages of greens built according to USGA Green Section specifications are:

1. They will perform in a predictable fashion, and all such greens will behave similarly.
2. They can be played following heavy rains or excessive irrigation.
3. The putting quality is more nearly uniform all day long and all year long.
4. Uniform air-water relationships, or assured presence of adequate soil air, encourage deeper rooting and healthier turf.
5. Less overall soil compaction.
6. A tendency for less severe turf disease activity.
7. These specifications offer the distinct advantage of obtaining proof that greens are built according to a set standard if the contractor agrees to construct accordingly.

Now that we have observed and lived with greens built to specifications for 10 years, prob-



*Spiking is important to the welfare of greens.*

lems with such greens can be determined or anticipated. Certainly we are aware that the absolutely perfect green has not been devised, and because of the characteristics of Nature and golfers, no such green will ever be built.

Simply, we are striving to reduce as many ills and satisfy as many golfers as possible. Even though this is a significant breakthrough in green construction, we hope for additions or improvements in the future.

Problems to anticipate are:

1. Specification greens must be built exactly —**with no variations.** This makes them relatively difficult to build.
2. The topsoil must be uniformly and homogenously mixed off site. This can be expensive, but certainly no more so than some architects charge for non-specification greens.
3. Often it is difficult to locate the most suitable sand. A medium grade or mason sand with less than 10 per cent fines or silt is necessary. Silica sand is superior to calcium carbonate.
4. Seeded or stolonized putting surfaces must be **kept moist constantly** until roots have penetrated to a depth of at least one inch.
5. More plant nutrients are needed for the first few years.
6. Specification greens **must** be topdressed with material **exactly** identical to the soil mix used in construction. Exacting methods of construction and topdressing must be followed at all times — this can be a problem for the sloppy builder and the careless superintendent.

Certainly, we are not naive enough to suppose that all future greens will be built according to specifications, or that most greens constructed in the past even come close to meeting these specifications. Further, many old greens have supported excellent putting surfaces for decades. Other methods of building are largely left up to the builder or contractor, and every conceivable type of soil mix is used.

It seems that a one-part soil, one-part sand, one-part peat conglomeration has performed quite satisfactorily, even though rarely does anyone make any effort to define or determine just what sand, soil and peat actually are. Further, many greens made from strictly native (on the site) soil have performed adequately, as long as rapid and sufficient surface drainage is afforded.

With increasing and excessive demand, both from traffic and for putting qualities, improved building procedures are becoming essential. The specification for putting green construction as developed by the USGA Green Section is a giant step in this direction.

# *Soil Physics and Green Construction*

**by HOLMAN M. GRIFFIN, Northeastern Agronomist, USGA Green Section**

It appears that we of the Northeastern Green Section Staff must do more to convince anyone building a golf course that the Green Section specifications for the construction of putting greens must be followed EXACTLY.

Many greens have been started with the idea of making them exactly according to the Green Section specifications, but, most often, some charges were made, and at present there are only 18 of these greens in the area east of Ohio and north of the Carolinas.

Some common reasons offered for not following through with the specifications are:

(1) We didn't have time for a soil analysis.

(2) We made some changes to cut expenses.

(3) We had to sod with whatever was available to get the green in play. And so on ad infinitum.

Well, we get pretty tired of hearing things like, "These greens are built exactly according to USGA specifications except for . . . ," and then comes the clincher about leaving out the sand layer or modifying the soil mix or some other such thing which completely changes the

whole order of things. Unless the greens were constructed **exactly** according to specifications, soil analysis and all, we really don t care to share in the responsibility for their success or failure.

Now, let's ask the question, "How do you build a golf green?" There are USGA specifications and there are other specifications; many right ways and an infinite number of wrong ways. It just seems most logical to me that you would start out building a golf green in the same way you would construct anything else—you must first have a plan.

Almost anyone starting out to build something gathers facts which he arranges in a logical order. The more that is known about the construction materials, the better you can visualize the finished product and its durability. In the case of a golf green, the construction materials are basically soil, sand, peat and gravel. We need information on their physical nature, as well as some idea of how they should be shaped together in order to do the job properly.

The final shape of the materials or topographical information will affect maintenance, play and surface drainage. However, regardless of contour the green will not be a good one unless it is built with adequate internal drainage, the potential to sustain good turf under proper management, and a resiliant surface.

Previous trial and error has shown that a green should drain in more than one direction, preferably not to the front, and that a slope in excess of one per cent is required for adequate surface drainage. With this information, a bulldozer, and enough money for grass seed, you can build a golf green. This not only **can** be done but **is** being done every day all over the United States.

The old method of using native soil in a hit-or-miss combination with sand and organic matter has given us many excellent greens in the past, but it simply is not adequate for green construction in this age of maximum traffic. To stand up under the onslaught of today's traffic, a green must be smooth, resilient, well-drained, possess adequate hole location areas and be of interesting design. Basically there are two ways to build a good golf green such as the one just described. One way is to keep mixing and rebuilding until you get what you want. The other is to use soil physical data as a basis for construction. The first method of construction is akin to Russian roulette, except the odds aren't as good. The second method—the proper use of physical analysis—is practically a certain success every time.

Since the Green Section developed and released a method of physical analysis of soil mixtures for putting greens in 1960, and combined this with a practical method of green construction, there has been little need for guess work in the construction of greens. We readily recognize that this is not the only method for properly constructing a green, but in my opinion every other method introduced thus far is a very poor second.

Some very logical questions might follow here such as:

"How can a laboratory analysis from Texas tell me what I need to build a golf green in New England?" Or!

"Soils are different, climate is different, and my Green Committee is different, so how can I use the same specifications as everyone else?"

The answer to both questions is that, although there are major differences in all factors, we are dealing with constant values, or tolerances, by which we measure the soil, sand, and organic matter to determine how it will be used. Actually, we are dealing with laws of physics, and soil physics in particular.

The physical data determined in laboratory analysis determines the acceptability of a soil mix, and common sense and good judgement based on previous experience determines the desirability of an acceptable mixture. What the Green Section has developed is a yardstick to measure soil mixtures and a method of building a green so that the components complement each other. Without a yardstick and a method or plan to follow, we can only guess what the result might be.

---

### CORRECTION

A portion of the article "An Eviction Notice for Poa Annua on Fairways" that appeared in the January issue of the USGA GREEN SECTION RECORD was in error. The article incorrectly read "During the first week of August all fairways were sprayed for broadleaf weeds, including knotweed, with a combination of 16 pounds Dicamba and eight ounces of a MCPP formulation per acre." The Dicamba content should be 16 ounces, not 16 pounds. The GREEN SECTION RECORD regrets the error.

# Bentgrasses for Putting Greens

by ALEXANDER M. RADKO, Eastern Director, USGA Green Section

Genetics plays an important part in the make-up of any plant, and bentgrasses are no exception. In the beginning all greens were established from seed grown in open pollinated fields. All of our present selections stem from this origin—from greens seeded at the turn of the century. It follows then that bentgrasses are not all alike due to inherited genetic characters.

As golf grew and people became involved in turfgrass study, they began to select strains that exhibited characteristics that they felt would improve putting greens. Special attention was given to qualities such as color, vigor, density, leaf texture, tendency to grain, tendency to thatch, growth habit (upright or flat), disease resistance, ability to withstand traffic, ability to tolerate herbicides, and other such characteristics.

Despite the fact that we have some excellent selections the search goes on. It is never ending. The turfgrass industry is growing and new selections are continually being funnelled into breeding programs at most of the universities. Today not all improved selections are vegetative. Some are seeded. A summary of available and most widely-used strains and varieties is as follows:

### Seeded Varieties

(1) Colonial — Astoria, Highland, Holifer, and Exeter. Best suited for areas other then greens; lacks aggressiveness; rarely used on greens; exhibits upright growth and grows in clusters.

(2) Seaside — Wide variation in individual plants; biggest percentage not especially vigorous; other inherent weaknesses, but generally acceptable for putting greens. Superintendents who know how to manage it produce excellent greens. However, these are in the minority.

(3) Penncross — A true and uniform creeping bentgrass turf produced from seed; quite vigorous; aggressive; a tendency to become fluffy under certain type management; inferior quality seed contaminated the market until Pennsylvania State University officials recently tightened controls. Quality seed should again be available this year.

(4) Velvet — Offers limited seeded types (Kingstown is one of them); suited best to the northern latitudes of bentgrass adaptation. Produces excellent putting surfaces in spring and fall, but has inherent weaknesses in summer. Produces extremely dense, thin-bladed, upright-growing, uniform turf; develops excessive thatch; susceptible to iron chlorosis and certain diseases; lacks aggressiveness; requires far less nitrogen than other bentgrasses.

(5) South German—Once again available, but not of the same high quality as the seed produced prior to World War II when the then existing seed production fields were abandoned. The early seed was a mixture of colonial, creeping, and velvet types. Some excellent South German greens still remain even though seeded at the turn of the century. Because of these different types each green results in patchy, quilt-like pattern of grasses of various colors and textures.

### Vegetative Selections

Individual strains of creeping bentgrass, mostly selected by turfgrass specialists from outstanding patches of South German and Seaside greens.

(1) Arlington — Most prominent feature is tendency to swirl; excellent traffic and wear qualities; mostly used in combination with Congressional.

(2) Congressional — Upright growth by itself makes fine putting surface, though mostly established in combination with Arlington; reported more resistant to snow mold affliction.

(3) Collins — Upright growth; not as aggressive as most creepers; originally recommended as third member of Arlington-Congressional-Collins combination turf but seems to have been eliminated by most; planting stock scarce.

(4) Cohansey — Light green (apple) color; very aggressive; upright growth; forms a true putting surface; well-suited also to the southern as well as northern range of bentgrass adaptation; one of the few bents that competes favorably with **Poa annua**. Because of its light green color must be planted alone; combinations form a mottled, non-uniform putting surface.

(5) Toronto — Thin-bladed, tight and upright growth; forms a true putting surface; exhibits a tendency towards reduced summer vigor; best in spring and fall.

(6) Washington — Thin-bladed, upright; forms

a true, tight putting surface; at best in summer season; cool season purple color objectionable to some.

(7) Old Orchard — Lighter green than all others except Cohansey; best in spring and fall, weakest in summer performance.

(8) Metropolitan — The early symbol of a very grainy putting surface; no longer recommended for greens.

(9) Pennlu — Did not perform up to expectation; forms heavy thatch, excessive grain; results in a fluffy, puffy surface.

(10) Velvets — Refer to (4) under seeded; same general traits for vegetative and seeded velvet bentgrasses.

(11) Nimisila — Dark green in color; upright in growth; good texture; becoming more widely used; good reports; appears also to be doing quite well in southern areas of bentgrass adaptation.

Other selections have been released by individual Experiment Stations such as Pennpar by Penn State, and Evansville by Purdue, which will become better known as new greens are established to these bentgrasses. Because these creeping selections are available only as vegetative stock, trueness to type depends greatly on integrity of the growers. It is most important to purchase planting stock only from growers in whom you have extreme confidence, for only if it is free of contamination will you be assured that you are getting the proper planting material, the selection of your choice.

# *Popular Bermudagrass Strains: Requirements and Peculiarities*

**by JAMES B. MONCRIEF, Southeastern Agronomist, USGA Green Section**

Common, bermudagrass, **Cynodon dactylon** (L.), at one time was used exclusively on southern putting greens. It is believed to have been introduced into the United States at about 1751, but common bermudagrass is rarely used on greens now and has been replaced with new selections. However when used, it requires a light topdressing at four week intervals to present a puttable surface.

Each spring the greens have to be reseeded due to the poor quality of the turf during the transition period. This factor alone caused intensive research for better bermuda strains for use on greens.

### Everglades

Everglades is a medium green bermudagrass selected at Bayshore Golf Club, Miami Beach, Fla., by Dr. Roy Bair, of the Florida Agricultural Experiment Station, in 1945. It is supposed to be a natural cross between a native Florida turf-type bermudagrass and species from South Africa supplied by the USGA Green Section at that time.

Everglades holds its green color during cool weather better than Tifgreen, but it does not produce a superior putting surface. A tour of courses during January in Southeast Florida showed scuffing on Everglades to be worse than on Tifgreen.

It is used mostly in South Florida, and it is seldom used on new greens today.

### Bayshore

Bayshore (Gene Tift) was selected at the Bayshore Golf Club, Miami Beach, in 1945 by Dr. Bair and is believed to have originated in the same manner as the Everglades selection.

It is light green in color, and is best adapted to the Southeast Florida area. However, it is gradually being replaced by Tifgreen or Tifdwarf.

Numerous variations are appearing in Bayshore greens. So far none of these has shown much promise. Under growing conditions of drought and unbalanced nutrients in the soil, seed heads can be numerous, but in most cases they can be reduced by good use of water and nitrogen. Two pounds nitrogen per 1,000 square feet per month in most cases is sufficient in a 3-1-2 to a 4-1-2 ratio.

### Tiffine

Tiffine is a $F_1$ hybrid of **Cynodon dactylon** and **C transvaalensis** from the East Lake Country

Club, in Atlanta, Ga. It is light green color, has a finer texture, and is more disease resistant than common bermuda. It is no longer being planted on new greens now. In fact, established Tiffine greens are being replaced with newer selections. The plant is male sterile and sheds no pollen, and therefore it cannot be used for breeding purpose. It was released in 1953 at the Georgia Coastal Plain Experiment Station. It grew best in eastern Georgia and South Carolina but is being replaced with newer selections, in this area, also.

It prevented Tifgreen from encroaching into the bent plots at the Athens Country Club for seven years. It is being tested further as a possible barrier to keep bermudas from encroaching into bent greens.

### Texturf 1 F

Texturf 1 F was selected at College Station, Texas and was taken from a golf course in the Dallas-Fort Worth, vicinity. It is a vegetative selection, and has to be increased by this method. It was released in 1957 by the Texas Agricultural Experiment Station. Certified stolons are available.

It is fine textured, light green in color, and produces a dense turf if properly maintained. It makes a good spring recovery in the area where it was selected, but as most bermudagrasses, it is subject to leaf spot disease. This limits it to dry climates for best results, but the lack of extensive root system makes it more susceptible to drought than common bermudagrass. It produces relatively few seed heads and does best in the area where it was selected.

### Tifgreen

Tifgreen was tested as Tifton 328. It is a $F_1$ hybrid triploid between a superior selection from the fourth green at Charlotte Country Club, Charlotte, N.C., and **Cynodon transvaalensis** from East Lake Country Club, Atlanta, Ga. The cross was made at the Georgia Coastal Plain Experiment Station, Tifton, Ga., and was released in 1956.

Tifgreen at this time is probably more widely used on greens throughout the world than any other bermudagrass. It is medium green in color and can produce a superior putting surface if managed properly. It is cold-hardy for a bermudagrass but it has been found to be subject to diseases even though it was originally released as a highly disease-resistant strain. As with most plants, its resistance to disease is reduced unless properly maintained.

It is sensitive to 2,4-D, Atrazine, Simazine, and similar herbicides. The closer it is mowed, the less 2,4-D need be used. Eight ounces of 2,4-D, per acre can cause discoloration if mishandled. Four ounces per acre repeated at 10- to 14-day intervals does less harm. Weed problems can be reduced greatly with proper management.

Tifgreen does best when it is cut to a height of one quarter inch. Unless there is close supervision, continuous 3/16" mowing is not suggested, especially during July and August.

Fertilizer for greens should provide nitrogen (N), phosphorus ($P_2O_5$), and potash ($K_2O$) in the ratio of 3-1-2. Use two pounds of nitrogen per 1,000 square feet per month in hot weather and one pound per month during cool months when the greens have been overseeded with cool season grasses. This program will provide about 18 pounds of nitrogen per 1,000 square feet per year. If a 3-1-2 ratio is used at this rate, 6 pounds of $P_2O_5$ and 12 pounds of $K_2O$ will be applied. These nutrients do not leach readily and may be applied in spring and fall when weather is cool.

Some superintendents add a little potash during the summer. Amounts up to one half pound of Muriate of Potash (60 per cent $K_2O$) per 1,000 square feet may be applied to bermudagrass greens during the summer if it is watered in promptly.

The greens should be cut lightly with a vertical mower once each week and topdessed five- to six-week intervals with 1/5 yard per 1,000 square feet. This is also referred to as "dusting" the green. Aerate monthly to help keep thatch problems to a minimum.

Tifgreen is being replaced with Tifdwarf in the South where bermudagrass is used. Bent is replacing bermudagrass in the upper South where a continual loss of bermuda is experienced in the spring.

### Tifdwarf

Tidwarf was selected from greens in South Carolina and Georgia originally planted to Tifgreen. It is considered a mutation. It is a darker green color than Tifgreen and most other bermudagrasses. It was released in 1965 from the Georgia Coastal Plain Experiment Station, and is gaining in popularity and use. In the South during 1967, it was used in 85 to 90 per cent of the new green plantings.

Tifdwarf maintenance is very similar to Tifgreen, except that daily mowing is necessary for a superior putting surface. It also needs a slight increase in fertilization—1½ to 2½ pounds of nitrogen per 1,000 square feet per month, depending upon the soil on which the green is constructed. It can be mowed constantly at 3/16 inch and has been maintained even at lower height with excellent results. If mowed at one quarter to 5/16 inch, the Tifdwarf displays a mottled appearance. At this higher height of cut, the mottled color looks very much like Tifgreen. Less effect from grain has been observed so far with less amounts of topdressing required. Overlapping of topdressing soil can retard growth or give a striped pattern on the greens.

When it has seed heads, it has only about half as many as Tifgreen, and this can be reduced readily with proper fertilization and irrigation.

All research compares it with Tifgreen as a standard. Tifdwarf is as cold-tolerant as Tifgreen but takes on a purplish cast when the weather is cool and so should be overseeded for winter play. It is very similar to Tifgreen in susceptibility to herbicides.

Insects, mainly sod webworms, have been a problem when insecticides are not used carefully. In addition, close surveillance for diseases on a preventive program is suggested. Tidwarf has not been in use long enough to observe affliction by "Spring Dead Spot". Since Tifdwarf is a bermudagrass, there is no reason to believe it will not react the same as Tifgreen. Tifdwarf is by no means the end of the search, for new selections always are being screened. Breeding for superior grasses also continues.

# Species for Overseeding

**by DICK TARLETON, Superintendent, Broadwater Beach Hotel Golf Courses, Biloxi, Miss.**

In the Deep South most of the putting greens are of Tifgreen bermudagrass or the newer Tifdwarf. In order to have an attractive putting surface, they must be overseeded for winter play while the bermudagrass is dormant. Few people realize that as far south as the gulf coast we play on northern grass greens for six months of the year.

Until just a few years ago, just about the only winter grass in use was domestic, or annual ryegrass. With the advent of the fine-leaved hybrid bermudagrasses, superintendents began to look for finer-textured grasses for overseeding. They also wanted grasses that did not go out as suddenly as rye, leaving them with our famous, or infamous, spring transition period. Probably a lot of the transition troubles that we blamed on ryegrass were more likely due to poor management of our bermudagrass.

One of the first attempts at improvement was a mixture of red top and seaside bentgrass. In most cases the results were very disappointing. In 1961, I tried this mixture on one green, and it was probably the poorest winter green in the South. However, we planted a second green with 25 pounds of Pennlawn red fescue per 1,000 square feet, and it was far superior to our other 16 greens, which were planted in ryegrass. The best winter greens I ever had were of Pennlawn fescue in the winter of 1962-63. They were also the most expensive. I now feel that I was very lucky because, we have learned as a result of more recent tests that fescues, when planted alone, do not perform too well.

Quite a bit of research has been done with different species in overseeding within the past eight years. Some of the most comprehensive work was done by the Milwaukee Sewerage Commission, under the direction of Charley Wilson and the late O. J. Noer. I was fortunate enough to have one of these trials in the winter of 1964-65. The grasses evaluated, both alone and in mixture, were: Poa trivialis, domestic ryegrass, Kentucky bluegrass, Pennlawn fescue, and seaside and penncross bents. The biggest and most pleasant surprise was the performance of Poa trivialis. It has a pleasing color, tolerates extremely low temperatures, performs well in combination with all the other grasses tested, and helps to mask the ever-present Poa annua.

What is the best mixture? This is like asking how far is up? One of our universities recommends 15 pounds of Pennlawn fescue and four pounds of Poa trivialis per 1,000 square feet. Some Green Section agronomists say five to seven pounds of Poa trivialis and two pounds of

Seaside bent. I know several superintendents who get excellent results with the late O. J. Noer's favorite of four pounds Poa trivialis, eight pounds Pennlawn fescue, two pounds Kentucky bluegrass, and one pound of Seaside bent. Despite these recent advances, more than half the superintendents concerned with this problem still swear by old, dependable ryegrass.

It is generally agreed that when planting the smaller seeds, the rate should be about 25 million seeds per 1,000 square feet regardless of the mixture. When using ryegrass, 50 to 60 pounds per 1,000 square feet will usually give an excellent stand.

Ryegrass is still the easiest and quickest to establish, and in most cases is the most economical. It will stand heavy traffic as well as or better than any of the other grasses discussed. If your course has heavy play in the fall, some ryegrass is essential. By adding three or four pounds of Poa trivialis to 40 pounds of rye per 1,000 square feet, you will get a little faster putting surface than that provided by ryegrass alone.

At the request of the commercial developers, we are helping to evaluate two selections of perennial rye — Pelo and NK-100. Both of these grasses are much finer in texture, and have a deeper green color than domestic rye. Though it is a little early to draw an accurate evaluation, as of now, their performance has been outstanding despite weather conditions that are unfavorable for overseeded greens. I am very enthusiastic about the possibilities of both of these selections, but especially the Pelo.

# Green Section Award

James L. Haines, of Denver, Colo., was named recipient of the United States Golf Association Green Section Award, presented annually for distinguished service to golf through work with turfgrass.

Mr. Haines has been Golf Course Superintendent at Denver Country Club, Denver, Colo., for 40 years. He is the third Superintendent to be named.

The Award was presented by Wm. Ward Foshay, of New York, USGA President, at that time, and Henry H. Russell, of Miami, Chairman of the Green Section Committee, during the Association's annual conference on Golf Course Management at the Biltmore Hotel in New York City.

Mr. Haines is considered by many to be among the pioneer turfgrass workers. In the early years of scientific turfgrass management he set an example through investigation of improved methods, equipment and grasses, and encouraged other superintendents to accept new skills and knowledge then developed.

He helped evaluate bentgrasses in cooperation with Dr. John Monteith, Jr., recipient of first Green Section Award in 1961.

Mr. Haines recognized the detrimental effect on turf caused by tree roots, and developed and patented a machine for pruning roots without causing damage to the trees or to the turf. He also invented a leaf rake.

He is directly responsible for the organization of the Rocky Mountain Golf Course Superintendents Association, and served as the first President. He has served as a director of the Golf Course Superintendents Association of America, and it was through his influence and urging that courses in turfgrass management were offered at Colorado State University after World War II. He was also influential in the establishment of turfgrass scholarships by the Trans-Mississippi Golf Association. In addition, he has trained numerous young men on his own course for careers as golf course superintendents.

Mr. Haines has been a member of the USGA Green Section Committee since 1953. He is the eighth recipient of the award. Previous winners were:

1961—Dr. John Monteith, Colorado Springs.
1962—Professor Lawrence S. Dickinson, Amherst, Mass.
1963—O. J. Noer, Milwaukee.
1964—Joseph Valentine, Ardmore, Pa.
1965—Dr. Glenn W. Burton, Tifton, Ga.
1966—Professor H. Burton Musser, State College, Pa.
1967—Elmer J. Michael, Pittsford, N.Y.

# *Turf Establishment — Stolonizing*

**by WILLIAM H. BENGEYFIELD, Western Director, USGA Green Section**

Within the next 10 years more new greens will be stolonized with improved selections of bentgrasses and bermudagrasses than ever before in the history of golfing turf management. Improved techniques, better trained and more knowledgeable superintendents, a greater awareness of quality turf, and the demand for more uniform putting surfaces by the golfer himself have already set the trend in motion.

Stolonization, or the vegetative propogation of grasses, is not new to turf management. The first recorded use of stolons on a golf course was at Columbia Country Club, in Chevy Chase, Md. Even today, stolonization still remains as the only method of propagating genetically pure bentgrass and bermudagrass strains. Unlike seed propagation in which considerable differences within a species will develop, vegetative propagation insures the transmittal of all of the plant's characteristics to the next generation.

New and improved strains of bentgrasses are sorely needed today. We are still using the selections made by Dr. John Montieth in the 1930s. Arlington, Congressional, and Toronto varieties illustrate the point. Certainly these can be improved on even as U-3 bermuda has given way to Tifgreen, Sunturf, Tifdwarf, and others in the bermudagrass improvement program. However, since the market for creeping bentgrass is so small, it does appear that any new research in this direction must be supported by golf interests alone. No plant patent rights or protection are afforded to the private researcher.

Stolonized greens can be established just as easily as, if not more so than, seeded greens. The work crew and the entire operation require a higher degree of organization and preparation. The application of a complete fertilizer and proper pH adjustment should be made prior to planting time. When the stolons arrive, every-

thing should be in the "go" position. At best, stolons should not be stored for more than four or five days before planting.

Perhaps the most often overlooked point in succeeding at stolonization is the rate of application. No less than 10 full bushels per 1,000 square feet should be used. This rate is needed to insure crowding at the outset. Crowding forces narrower leaf blades and a tighter, more acceptable turf. Many golfers have remarked that seeded greens have a finer texture than stolonized greens. The reason is that the rate of stolonization is frequently too low to force adequate crowding, and by comparison, there are more plants per square inch in the seeded green. Therefore, be sure to plant at least 10 bushels of stolons for each 1,000 square feet.

Planting should start as soon as the stolons arrive. Hand distribution still seems to be the best of uniform application. Cover the stolons with enough soil so that only about 25 per cent of the plant continues to show through the surface. Of course, use the same soil mixture for top-dressing as was used in original green construction. After rolling and again adequately fertilizing (preferably with an organic fertilizer this time), uniform irrigation at proper intervals (keep the stolons damp) will bring the newly stolonized green into play. A minimum of 10 to 12 weeks of good growing weather will be needed before play should be anticipated.

When stolonizing greens, be sure to deal with a reputable stolon nursery. Poor material or unknown sources spell disaster. The stolons should be harvested in a fairly "hardened' condition. If the parent material is "soft," overly fertilized, or in wet growth, it will not store well or develop strong, new plants. Of course, the nurseryman must be able and willing to guarantee purity of strain and freedom from weeds, bermudagrass and other foreign matter.

Stolonized greens offer greater uniformity of turf over the years, somewhat better disease resistance, and a greater adjustment to the climatic and growth factors.

*Photo by Geoffrey A. Hall*

***Stolons should be harvested in a "hardened" condition.***

# *Bringing Greens Into Play*

**by LEE RECORD, Northeastern Agronomist, USGA Green Section**

How many golf course superintendents in the United States have experienced the challenge of bringing a new putting green into play? Success or Failure begins with the initial construction. On this foundation lies a challenging and rewarding accomplishment.

The initial construction has been completed; grades and elevations are finished; tile lines have been installed for drainage; the soil mixture and seedbed have been prepared; seed, stolons or sod have been applied. The day of judgement begins.

Cultural practices from this day forth will determine the future condition of the course. Experiences will be your guide.

Water management is the most critical factor for germination and survival of your stolons or sod. Initially we are interested in the first few

inches of soil, for it is here that root development is necessary to stabilize the grass plant. Syringing the green several times a day will be an essential requirement. The upper surface must remain moist. Watering by hand for the first 10 to 14 days should provide ideal growing conditions. Working by hand will lessen the chance of erosion or creation of puddles on the green, and will assure a uniformly moist surface. As the plant grows, mechanical methods of watering may then be employed. Watering practices will necessarily change, as the plant develops and as climatic conditions change.

Mowing should begin when the grass reaches normal putting green height of 3/16 to 5/16 of an inch. Close frequent mowing beginning as soon as possible is essential. A sharp mower has to be used, and the green must be firm enough to support the mower and the man using it. A dull mower may bruise the turf, interfere with the rate of growth, and encourage diseases and insect activity. A power mower used too soon on the putting surface may create undulations and the spinning rollers could bruise the turf. Here we suggest that hand mowers be used for the first two weeks of mowing on a seeded or stolonized green. Greens should be mowed daily. Clippings may be left on the green during the early stages of green development, so long as the accumulation is not excessive.

### Topdressing Essential

Topdressing is essential for properly strengthening and developing the green, yet it is sometimes neglected. From the start, a new green needs topdressing with the same sterilized, uniform mixture that is used for your seedbed. Topdressing materials other than the type used in the base lead to soil layering and the eventual weakening of the green. Stolonized greens must be topdressed several times within the first few months. Greens established with sod may not require as much topdressing. However, it should not be completely neglected. On the seeded green, topdressing is more exacting and critical than on sodded or stolonized greens. The first topdressing should begin within the second to third week after germination. It must be done with great care because young plants are easily injured.

Beginning with the first topdressing, we are encouraging growth and smoothing the putting surface. The first topdressing will tend to fill in depressions and help retain moisture at the seedbed level. Additional topdressing will be required, perhaps as much as twice a month, until the green is ready for play.

If the turf catch is not satisfactory in localized areas, some resseding, re-sodding or re-stolonizing may be necessary. On seeded greens use certified blue tag seed only, and stay with the same variety. If additional stolons are not immediately available, Pennlaw fescue seed may be used to good advantage. This fescue will temporaily blend with any bentgrass and will disappear within a season. As it weakens the bentgrass takes over. Sodding is an exacting operation, and special care should be taken to assure a smooth surface. Special care of localized weak areas is sometimes required until such time as the weak areas are strengthened.

### Use Complete Fertilizer

Preventive fungicide and insecticide applications should begin within a few weeks after the turf is established. Compounds containing mercury should be handled carefully because young plants are sensitive to this material. Young turf is as susceptible to disease and insect activity as mature turf.

Different strains of grass require different amounts of fertilizer. A complete fertilizer should be used in establishing the turf cover. Topdressing in the early stages of green development could help slightly in adding nutrients.

Phosphorus stimulates early growth and root formation, and contributes to the general hardiness of the plant. Potassium is associated with the manufacture of carbohydrates and is linked with nitrogen in controlling growth. Nitrogen sources vary. Some are slow-acting; some are fast-acting. Many turf specialists believe that no more than one-half pound of actual nitrogen should be applied per 1,000 square feet at one time. Normally a 4-1-2 or 3-1-2 ratio is excellent in establishing greens.

The man responsible for maintenance of the green should determine when it is ready for play. Permanent injury could result from allowing play on a new green prematurely. Under normal conditions a green completed in the spring may not be ready until late in the fall. The golfer should realize that a new green does not become mature for a period of from three to five years. It takes this length of time to establish enough thatch for proper resiliency and cushion.

# Putting Green Turf from Seed

by HOLMAN M. GRIFFIN, Northeastern Agronomist, USGA Green Section

A grass seed is the basic unit from which a single plant, or possibly a vast turf area is developed. Each seed carries within it a genetic pattern which determines the type of plant that it will become. Whether we choose to propagate these plants and expand the turf from seed or by vegetative means depends largely on whether or not the plant can reproduce itself in kind from seed. If the plant can be reproduced true to type from seed, or at least with a high degree of purity, then this is the way it is usually done.

By all means obtain blue tag certified seed. Contaminated or dead seed is never a bargain at any price.

Prepare a proper seedbed according to USGA specifications, and add a sufficient quantity of lime and plant nutrients to get the seed off to a good start. Now we can devote full attention to the basic fundamentals of seeding and caring for the turf until it becomes a well-established.

The very first thing to determine is how much seed is required. The projective human population explosion is minor when compared to the population explosion of grass plants brought on by extreme rates of seeding. The seeding rate of Penncross bent can be used to make this point. Penncross has approximately 8,000,000 seeds per pound, and quite frequently seeding rates of from two to six pounds are being used. For an initial seeding, two to three pounds per 1,000 square feet may be an acceptable maximum limit, but above this the seed is wasted. Additionally, competition between plants is actually detrimental to the establishment of turf.

There is a simple way to visualize your seeding rate. Draw a one inch square on a piece of paper and place 55 dots within the square. Since a pencil dot is about the same size or smaller than a bent seed, the 55 dots represent the amount of seed which falls into one square inch when using a seeding rate of one pound of Penncross bentgrass per 1,000 square feet. If a 6-pound rate is used, then it can be illustrated by placing 333 dots in the square inch. You can well imagine that you are indeed wasting seed.

You may use this illustration as a common sense planting guide with any type seed, provided that you first determine the approximate number of viable seeds per pound and the size of the seed.

Once the seeding rate has been determined, the spreader used to apply the seed must be calibrated for this amount. The best method for seeding a new green is to have the surface loose and friable, divide the seed into two equal amounts and sow each half in opposite directions across the green.

Following seeding the seed may be lightly topdressed, and then rolled with a light roller just heavy enough to firm up the surface and assure that the seed is in firm contact with the soil. If rolling is omitted, or topdressing is too deep, the number of seed which establish themselves will be drastically reduced.

A roller of 75 to 150 pounds is sufficiently heavy to firm the seed in place, and the correct amount of topdressing may be determined by using simple mathematics.

Generally, seed should never be covered by a layer of soil more than two times the diameter of the seed. For bentgrass, this is less than 1/16 of an inch. Of course the nature of the material covering the seed, whether sand or a heavy clay, makes a great difference. Generally, one cubic yard of friable topdressing distributed over a 5,000-square-foot surface would provide about the right depth. If you want to figure this mathematically, 37.04 cubic yards of topsoil will cover 1,000 square feet to a depth of one foot; therefore, 3.09 cubic yards will cover 1,000 square feet to a depth of one inch and .19 or .20 of a cubic yard is needed for a depth of 1/16 of an inch. If you are able to distribute this amount of topsoil uniformly, you may safely apply one cubic yard. It should be emphasized, however, that if distribution methods are not uniform, the amount should be reduced or omitted completely.

Now the seed is planted and the only thing remaining until germination is complete is to provide adequate moisture and hope that nature supplies some sunlight and favorable temperatures. Of course, if the weather forecast is unfavorable, there are means to assist nature.

Adequate but not excessive moisture is essential. Too much moisture excludes oxygen and stimulates anaerobic bacteria which cause seed to rot. Inadequate moisture causes the

seed to die just as surely. The secret is to keep the root zone and the area just below moist, and gradually increase the quantity of moisture applied at any one time as the root system develops. Never puddle the surface.

To aid in moisture retention, mulches are available, such as straw, tobacco netting, burlap, and a number of specialized commercial preparations. These commercial mulches may hold the seed in place, conserve moisture and increase the temperature of the micro-climate surrounding the seedlings. Clear polyethylene is a good example of a protective cover or a mulch which serves all three purposes.

Under optimum conditions, the bentgrass seeds germinate in 96 to 168 hours (four to seven days), but it is by no means ready for traffic. In fact, seedling turf should be protected from all traffic for three to six weeks minimum depending on the care it is given and the climate.

Briefly, this is the procedure for planting a putting green. Following this we should begin to manage the green to bring it into play.

***MAINTENANCE OF GREENS***

# Cultivation, and Control of Weeds, Insects, Disease

**by EDWARD ROBERTS, JR., Golf Course Superintendent, Canoe Brook Country Club, Summit, N.J.**

### Cultivation

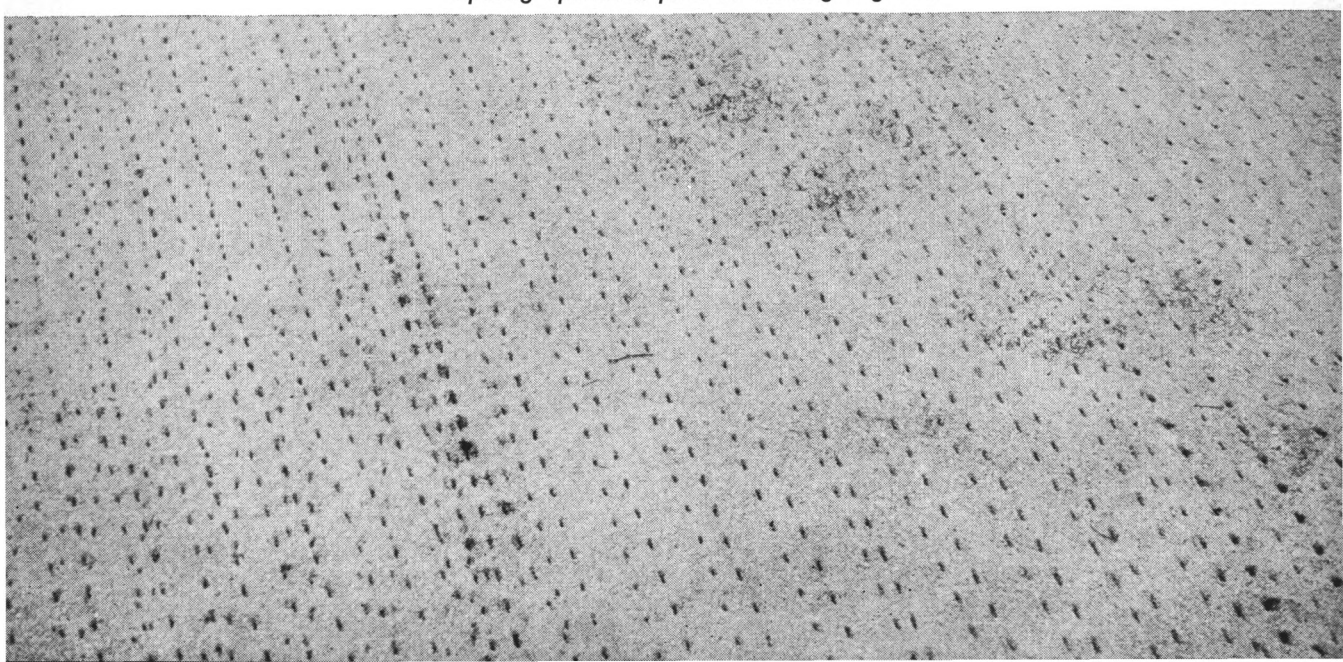
Cultivation is a very broad subject, which includes the following practices — aerification, spiking, slicing and forking. We know that they are all cultivation practices because they tend to raise and foster the growth of the plant by tillage.

I rely almost entirely on the aeration equipment. Now I realize that from a player's viewpoint this is probably the most detested piece of equipment that goes out on the golf course. Nevertheless, this is my way of producting better root development: by permitting air and moisture to penetrate the compacted zone.

I use the aerator in the spring and again in the late summer and try to plan the work for times of the least amount of play. This becomes more difficult each year with increased play.

The punching machine with hollow tines is preferred over the open spoons. I am aware of the argument that the open spoon machine creates more cultivating action, but I am also aware of the responsibilities of my position. I

*Spiking operation prior to seeding a green.*



*Superintendent Al Wilfong inspects thatching operation at Cornwells Golf Club, Cornwells Heights, Pa.*

must always produce the best playing conditions possible. The hollow tine does the job and at the same time causes the least amount of damage to the putting surface.

Cores from a green known to have an acceptable soil mixture are retained for topdressing. Whenever a poor topsoil mixture is found in a green, the cores are discarded and a suitable topdressing is applied. While greens usually are aerated twice a year, this is not necessarily true with problem greens. These may require one, or even two more treatments. This would be done between the spring and late summer.

### *Slicing and Spiking*

The only time I slice or spike a green is during stress periods such as last summer when excessive moisture lay just at the surface. Algae began to form, the hot sun boiled down, and a crusted layer formed in isolated spots. This is the time to spike or slice to break up that crust.

### *Vertical Mowing*

In late summer I thatch or vertical mow to remove as much of the old thatch as is possible. We take out as much at I dare while still presenting a putting surface. I then aerate, fertilize, and topdress to force the new growth into a good, healthy turf cover before winter. One last step is the application of gypsum some time around October. The gypsum aids nature in granulating the soil particles, thus permitting beter drainage.

### Control Of Weeds, Insects And Diseases

I prefer a preventive approach to these problems with a planned program which is altered whenever conditions change.

As the season opens I watch my temperatures about the second week of May and apply Dyrene at weekly intervals to prevent those diseases active at that time. As temperatures increase into the high 80's and into the 90's, and the humidity rises, I change to treatments of Thiram and PMAS at weekly intervals. These treatments will continue through summer except when copper spot may be evident. I then apply one dose of cadminate. During stress periods I will shock conditions with a zineb formulation for one application, then return to the Thiram-PMAS treatment until cooler nights, when I again apply the Dyrene. This usually ends in early October. During late November I apply Calo-Clor for the prevention of snow mold.

My thinking on the timing of snow mold

treatments has recently been altered. I learned recently through Dave Moote, Superintendent of the Rosedale Golf Club in Toronto, that snow mold activity starts much earlier than I had suspected. It is active in October when the leaves begin to fall. Slides that he showed during a conference at Rutgers University reveal that treatments made at that time are far more effective than treatments made later.

*Insects*

I rely on heptachlor or chlordane, which I apply about three times during the season. Evidence of insect activity is my guide to the time of application. Birds congregating on greens are a good indication that something is present. A quick investigation usually reveals the need for an insecticide.

*Weeds*

What is the greatest weed problem in the green? I say it is **Poa annua.** My answer to keeping this plant in check is an overall program that requires a step-by-step approach. One must be very cautious, and develop the proper conditions to obtain good results.

Check levels of nitrogen, phosphorus and potassium along with pH; be drastic in removing as much of the old plant in late summer as possible; fertilize more with nitrogen to encourage the bentgrass, less with phosphorus, which **Poa annua** loves; keep adequate levels of potash and the pH around 6.1 or 6.2; have the new, younger turf go into winter in a healthy state of growth; apply lead arsenate in late winter to permit penetration at the level of seed germination.

If this is done when the **Poa annua** is ready to break out, it will be forced to struggle for survival, and the bents will move instead. To me, **Poa annua** is a weed and must be eliminated.

**Hole Changing Techniques**

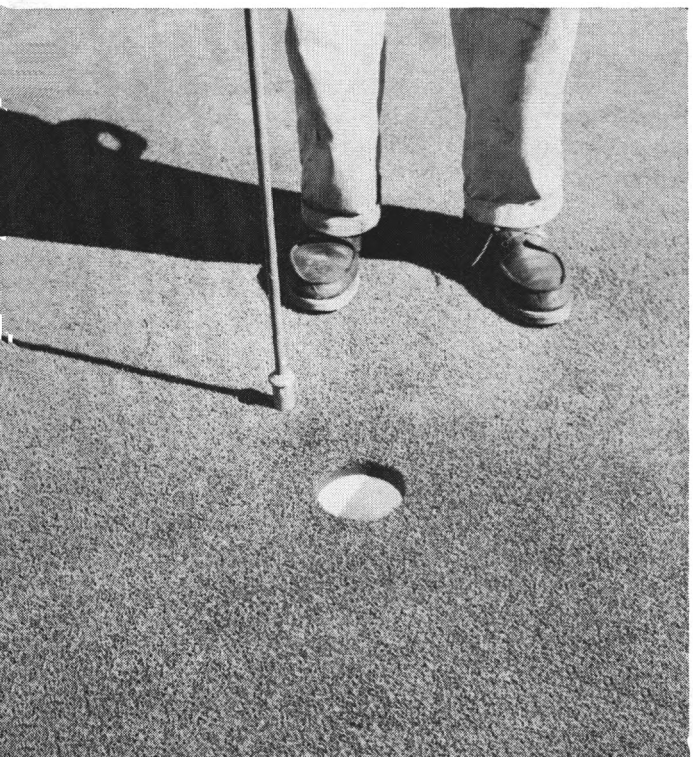
While it is true that it is not always possible to locate the hole in a nice flat area, when an incline is used it should be as gradual as can be found on the putting green. The small green with excessive undulations sometimes permits only 500 or 600 square feet of actual cupping surface. Such small areas will wear quickly on a course that has heavy play, forcing hole placement onto the slight slopes.

I use the standard cup-setter, keeping the top of the cup an inch from the putting surface. I restrict myself to within 12 feet of the inside of the collar.

*(Editors note: The USGA recommends that the hole should be located at least five paces from the edge of the putting green. If a bunker near the edge of the green is brought strongly into play, the distance should be greater.)*

Hole locations at my club are moved in a clockwise rotation so that no matter who changes the locations, they are always moving in the same direction. Thus, I can be sure of not overextending one area with traffic.

In making the cup change, I make two cuts with the hole cutter. The first removes the sod plug about two inches deep. I break or crack the sod plug to make it cone shaped allowing for a good snug fit when placed in the old hole. Whenever there are special events I will position the cups myself, studying each shot into the green and taking into consideration the caliber of golfers who are playing, wind, bunkers, or other hazards that come into play. By making use of the design and intent of the architect, one can toughen almost any hole considerably.



*Happiness is—A sharp, clean-cut hole carefully placed in a level area of the green.*

*No. 13 hole at Yahnundasis Golf Club, New Hartford, N.Y. Correct mowing technique adds emphasis to the beauty of the green, makes the putting surface stand out, and inspires confidence in the player.*

***MAINTENANCE OF GREENS***

# How, Why, and When of Mowing and Irrigation

**by RICHARD CRAIG, Golf Course Superintendent, The Camargo Club, Cincinnati, Ohio**

### Mowing

**WHY** — to produce a surface to putt on — a surface of grass, billions of grass blades growing straight up, not lying down, so that a putted ball rolls straight and true on the mowed tips of the grass blades.

**HEIGHT** — somewhere between 3/16 to 5/16 inch, usually 1/4 inch. This height of cut is made possible only by the use of bentgrass. If the varieties of bentgrass we are presently using were mowed closer than 3/16 inch, the mower would cut off all the grass blades and leave only the stems and runners to putt on. If bentgrass is allowed to grow higher than 5/8 inch, the grass would tend to lie down as a result of golfers walking on it, the rains beating down on it, and rolling action of the putting greens mower. Thus you would be putting on the side of the grass leaf or blade, putting would be slower and the surface would putt untrue. Also, I believe with the higher cut you would have more thatch formation.

**FREQUENCY** — Mow every day when you have developed a good fertilizer program which provides moderate, uniform grass response and there is sufficient temperature for growth. My program gives me approximately one mower basket of clippings per day on a 5,000-square-foot green. Again, by keeping the green mowed you encourage it to grow upright and not lie down.

**TECHNIQUES** — Mow in a different direction, or different angle every day.

Make big, wide turns on the apron of the green.

Use brushes three to four times a week except in extremely hot weather during July and August when bruising from the brush may cause wilt.

**EQUIPMENT** — Keep your mowers sharp. Lap your mowers every two to four weeks depending on your conditions.

### Vertical Mowing

**WHY** — To reduce and eventually remove grain from the surface of a putting green, and to control and reduce thatch. When accomplished in conjunction with topdressing, this allows soil in the topdressing to come into contact with the soil of the green and a firmer green results.

Keeps grass or turf young. By cutting off the old runners and removing them, new shoots form and eventually a new, younger, healthier turf develops.

**WHEN** — When the grass is growing and all conditions will allow the turf to recover quickly. Temperature and fertilizer are prime factors in decision.

**HOW** — Thinning to remove the grain can be done almost any time when the grass is growing, except during periods of extremely high temperatures, as in July and August when bruising caused by the mechanical action of the reel could cause wilting. The cutting knives in the vertical mower are usually close together, approximately 5/16 inch apart.

The depth of the knives should penetrate only to the grass runners — not into the thatch.

Each green and each variety of grass will respond differently to vertical mowing, so the operation should be checked frequently.

Thatching or deep vertical mowing to remove thatch should be done only in the spring or fall. The blades on the vertical mower are usually spread farther apart — approximately ½ to ¾ inch. The machine is set deeper so that the knives are cutting through the thatch and into the soil below. You must get all the way through the thatch, not just part way, to do a good job.

Removal of the clippings as a result of this operation can be done many ways: with the putting green mower, with leaf sweepers, with drag mats, or with blowers.

### Irrigation

**WHY** — Water is essential for growth of every living plant, and as stated before, the only way to have a healthy, true-putting green is to have the grass growing in an upright manner where the grass tip can be mowed off. Irrigation simply supplies the water to the grass as it needs it, when it needs it.

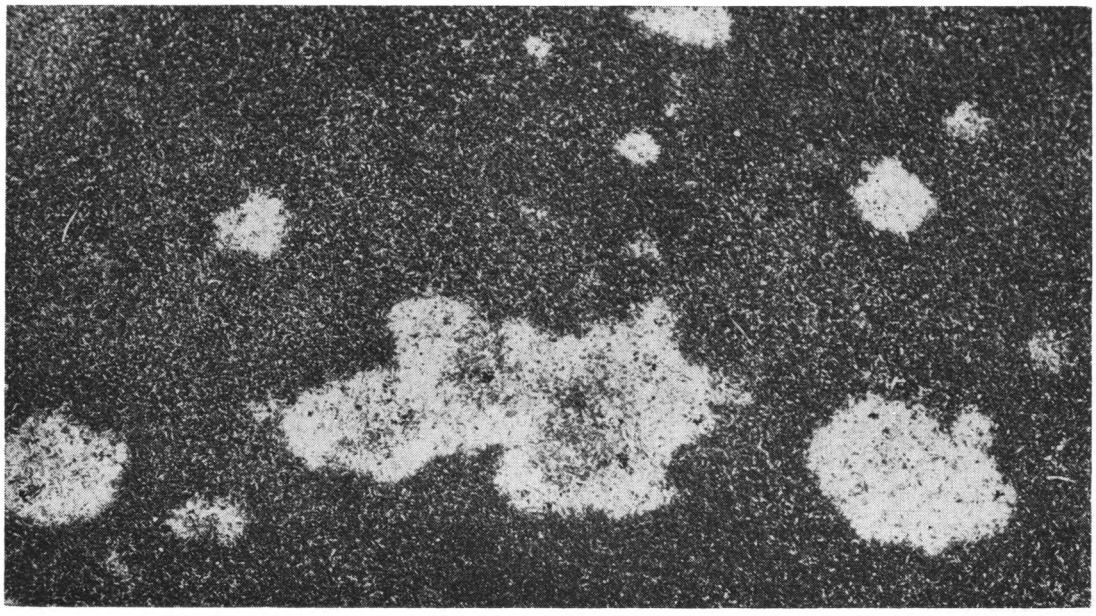
**WHEN AND HOW MUCH** — This cannot be predicted. It is a decision based on your judgement of each green individually. This decision is based on:

(1) Green construction — type of soil used in construction, whether tiled or not.

(2) Weather at the time and predicted for the next few days, how much will be lost to temperatures, humidity, and wind.

(3) Thatch present — how deep, how will player traffic affect surface, when does play normally start.

*Are we applying our preventive spray soon enough?*



*Soil is uniformly spread over the green and then dragged and spread with a steel mat.*

We superintendents abuse our job of water management. The only way to make a good decision on when and how much water should be applied is to look at each green individually. Inspect in the morning before you start your men where dew has or has not formed on the grass. The area where no dew has formed is usually a dry spot on the green. Later in the day check the soil under each green by removing a plug of soil and examine it. Squeeze the soil between your fingers. Educate not only your eyes but your fingers to the degree of moisture in your soil.

Try to keep uniform moisture throughout the green soil profile. By doing so, you will tend to to keep better roots on your grass, and with better capillary action in your soil, you can eliminate syringing greens except on very windy, hot days when evaporation from the leaves exceeds the amount of water the roots can take up.

Amounts of water required daily or weekly is impossible to foretell. The amount has to be based on all factors mentioned before—soil type, existing moisture, weather and the kind of sprinklers you have to use. I have found that low volume sprinklers with multi-application gives the water maximum opportunity to percolate into the green. I would suggest that whatever sprinklers and method you are using, try putting pans or cups around over the green to collect the water applied and see if you are applying your water uniformly.

Hand-watering of spot areas is essential. Poorly built older greens exhibit areas that form isolated dry spots. These must be watered individually by hand so as not to get the rest of the green too wet.

Remember, never have your green so wet that you can't add more water, or absorb a rain. You can always add more water, but you can't take off too much.

### Ways to Minimize Traffic Damage

*Through Management:*

Produce healthy turf by setting up programs that are well planned and thoughtfully carried out on each of the topics previously discussed.

*Through Education:*

Encourage the golf professional and the Golf Committee to develop an educational program to show and explain your club's particular problems to the members.

*Through Equipment:*

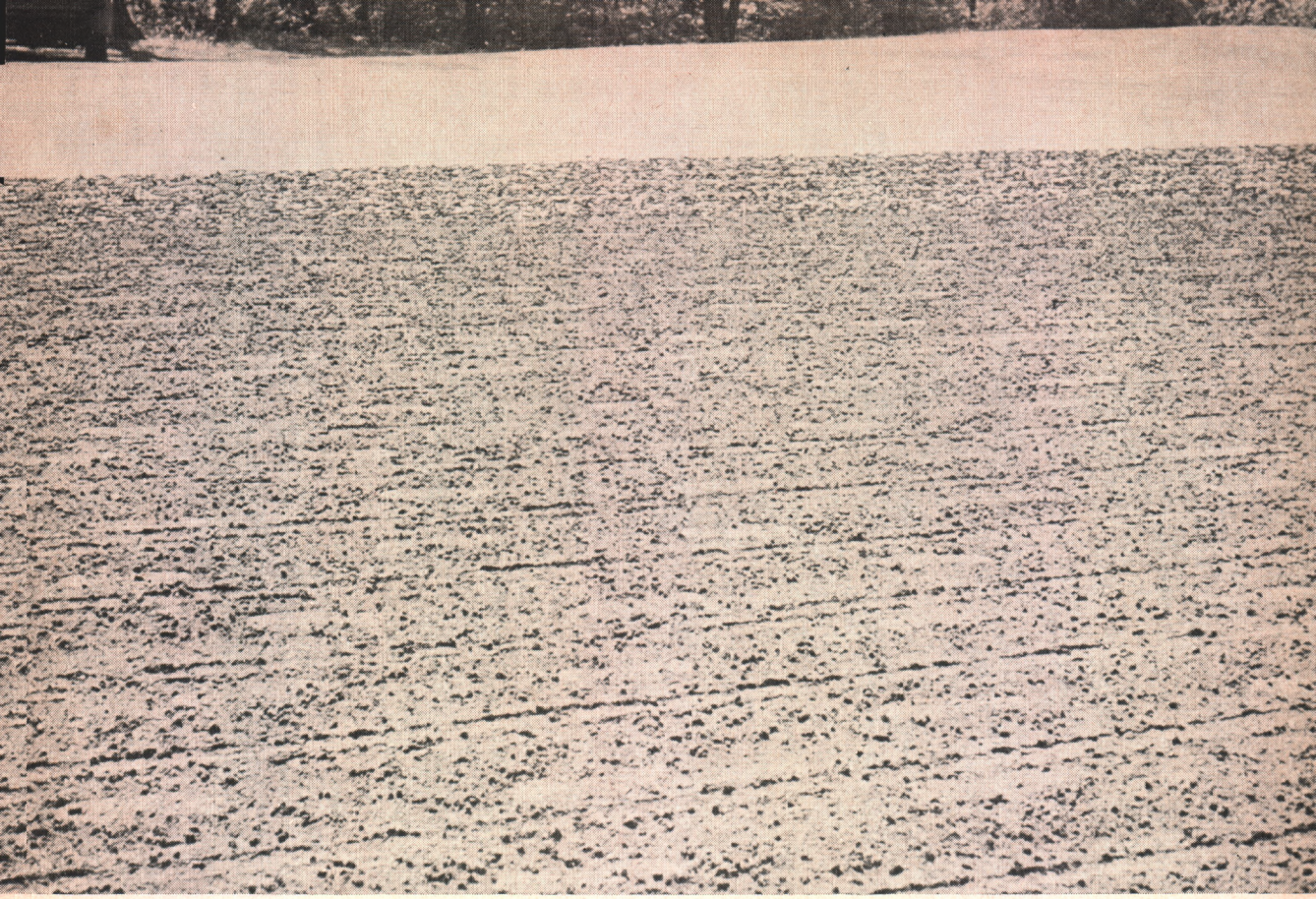
By the use of—

Signs: Traffic Control Signs.
Golf Etiquette.

Movable rope or chain barriers.

*Through Remodeling:*

Minor changes to the traps and green banks can, more times than not, reduce a traffic problem around a green to the point where grass can be grown.



*After aeration, cores are crumbled and trash is removed.*

# Topdressing

**by JAMES R. FULWIDER, Golf Course Superintendent, Century Country Club, White Plains, N.Y.**

In order for a golf course superintendent to carry out an extensive topdressing program, he must be a very firm believer in its merits. I happen to believe that topdressing greens is a very important maintenance practice. Because of the varieties of grass present, I am compelled in my situation to topdress regularly to maintain good putting surfaces.

Not all greens will respond to topdressing in the same manner for a number of reasons, but I think the principal reason is that many greens have several varieties of bentgrass. We know for instance that velvet, colonial, and some of the old south German strains will not tolerate heavy topdressing. On the other hand, strong-growing creepers such as Washington and Penncross respond well, and so with them topdressing is almost essential.

Several things must be considered if one does much topdressing. First, it takes time and money.

Second, the course should be closed one day a week so that the job can be done without interruption.

Third, storage facilities are needed, especially if the soil is prepared in advance by the crew and kept ready for use. Good quality commercially prepared mixtures are expensive. In either case, the topdressing mixture must be consistent with the soil below. Otherwise layering could become a problem.

It follows that if greens are topdressed often and regularly, mowers become dull and therefore require more care. Bedknives will have to be replaced more often and more time will be needed to sharpen the machines. A thorough job of cleaning up and washing the soil in would help alleviate the problem with the mowers. Not only would it help the mowers, but the golfers would be much happier.

The amount of topdressing applied at one

time will depend largely on the strain or variety of grass on the greens. Because of these difficulties, the amount of topdressing sometimes has to be varied from green to green. Normally, light, frequent applications are recommended. Some say heavy applications are harmful. However, I believe any amount that can be worked into the grass satisfactorily is not excessive.

If the greens have a tendency to be grainy, light vertical mowing, brushing, or combing prior to topdressing would be desirable.

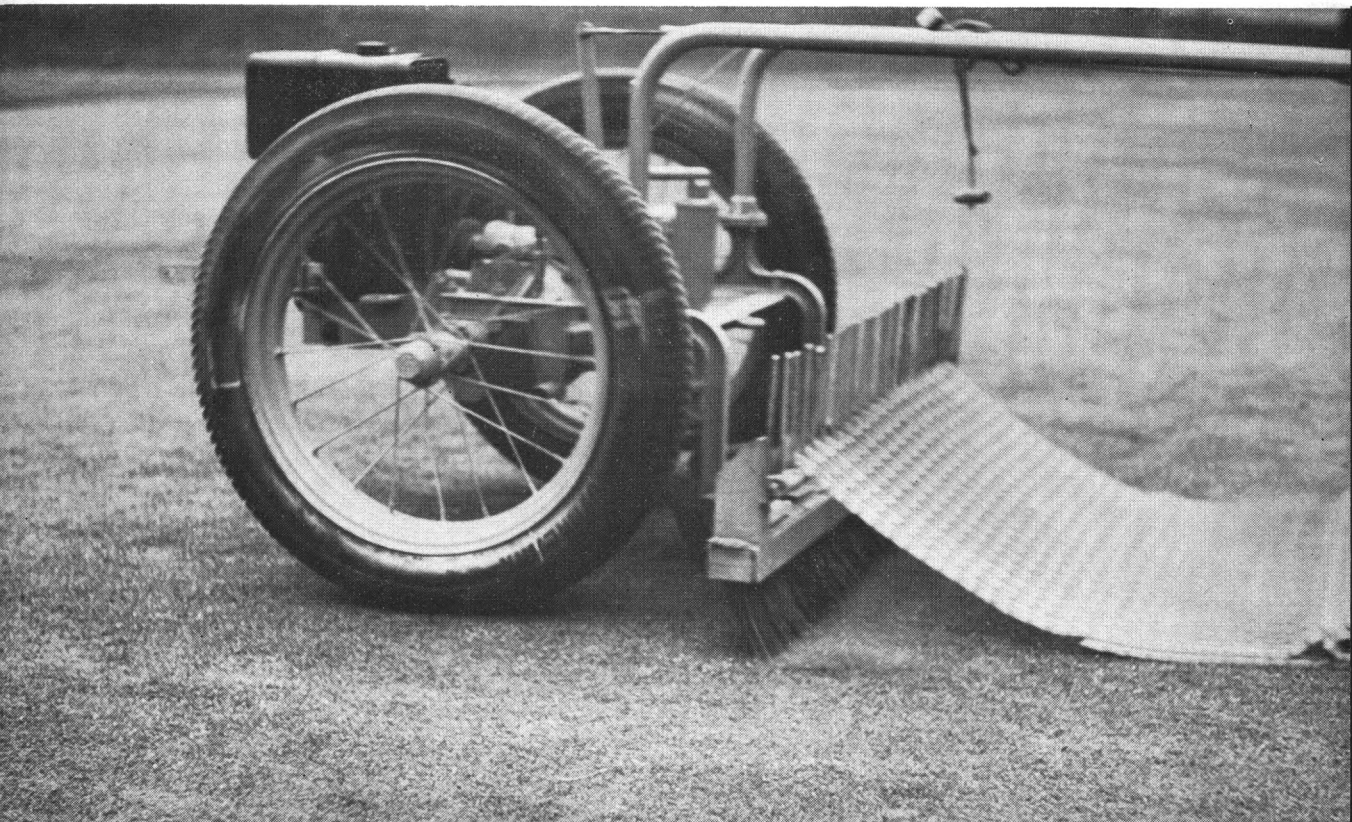
I try to topdress as often as possible, which is once every three or four weeks throughout the growing season. The soil is applied with a spreader and allowed to dry. The soil is then worked into the green with steel drag mats and wooden rakes. In addition it levels the surface, cleans the green, and, most important, removes the pebbles and rocks which can damage a mower. The green is then thoroughly watered by hand so that the new soil reaches the old soil.

Topdressing is also valuable in decreasing the formation of thatch. Greens which have been topdressed regularly do not have a serious thatch problem.

I want to emphasize that I believe very strongly in this practice, and I am sure my greens would suffer if I didn't continue this important phase of greens maintenance.

*The topdressing soil is backed into the turf with the back of the rake.*

***Brush and steel drag mat behind modified Overgreen work topdressing soil into the putting green. Note the small wheel directly in front of the brush which keeps the brush from gouging-out or digging into the turf. This device was put together by Superintendent Norman Mucciaroni of Woodland Country Club, West Newton, Mass.***



# Repair of Ball Marks

by JAMES R. FULWIDER

The repair of ball marks appears to be a very simple, non-scientific, and relatively unimportant part of turf maintenance. However, I have found that keeping greens free from ball marks is about the most difficult task I have encountered.

Of course, there would not be a serious problem at all if each player would repair his ball mark as soon as he reached the green. We know this is not done in many instances, so the marks are either repaired by the maintenance crew, or not at all.

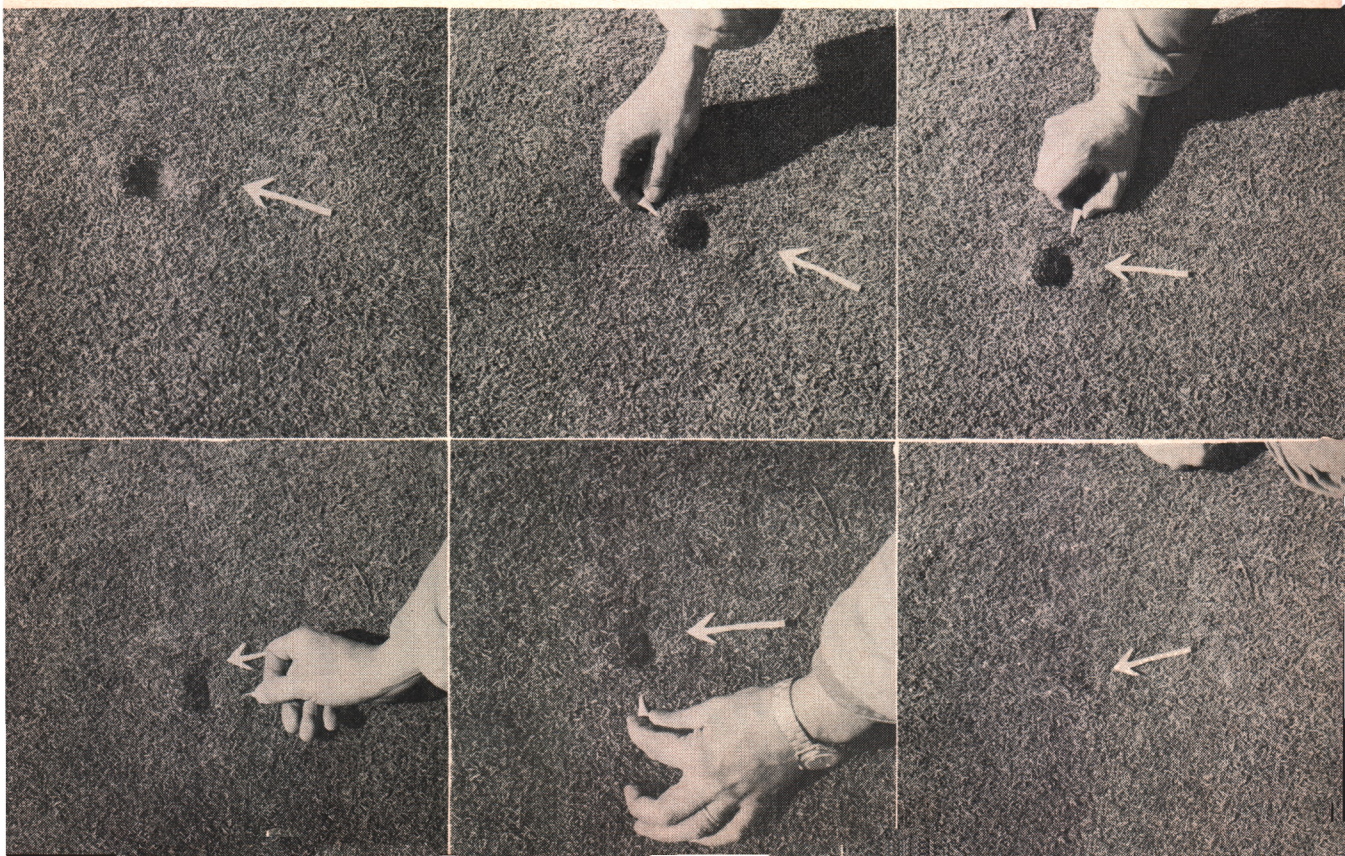
I think it is most important to recognize that this is a serious problem, and to try to find better ways to get this point across to the membership. This is one area where the golf course Superintendent must have a great deal of cooperation from the Green Committee. If the players are lax and do not repair their own ball marks, the maintenance crew will have to do what is left.

Each member of my crew carries an ice pick on his greens mower, and they are instructed to repair ball marks before they cut the green. For several reasons, but mainly because of the amount of time required, this job is seldom done satisfactorily. Many marks are missed, and in many instances the repair is done hurriedly and improperly.

Superintendents should take the time to train each member of their crews in the proper method of repairing marks. It would be nice if we could demonstrate the proper method to more of the members, but this is very difficult. We have control of the employees under our supervision, so a more concentrated effort could be made to instruct them in proper methods.

The actual repair of a ball mark amounts to stretching the turf back over the bruised area with a golf tee or similar tool, and loosening the soil beneath.

*The first photograph below shows the damage caused by a ball hitting into a green. To repair the ball mark, a probe, most often a wooden tee, is inserted into the ground at points all around the mark, the soil loosened and the turf stretched over the depression. Then the soil is pressed down and made smooth. The final picture shows the result of a properly repaired ball mark.*



# Fertilization of Greens

by JAMES R. FULWIDER

The fact that fertilization of golf course turf is such a common practice and has been done for so many years might make one think that it would have been completely standardized by now. We know this is far from true. Many variables enter into fertilizing. Researchers are still searching for the answers to plant requirements and the effect some plant nutrients have on each other. They are also still trying to find better methods of determining these requirements. Factors such as soil texture, grass management practices, soil structure, kinds of fertilizer and the individuality of the growers all affect the manner in which turf is fertilized.

Even though nitrogen (N) is the most important nutrient used in fertilization, we know that the other basic nutrients such as phosphorus (P) and Potash (K) must be kept in balance. O. J. Noer's tissue test with grass clippings, which indicated the amounts of plant nutrients extracted from the soil by the plant, had much to do with the 3-1-2 ratio many of us use to fertilize grasses today.

One of the trends noticable in recent years is the reduced rules of fertilizer applied to fine golf turf grasses. Perhaps the reason for this is that superintendents find they are likely to experience far less difficulty if grasses are kept on the hungry side. However one could go too far, and this could result in thin, unhealthy and undesirable turf.

The Superintendent must weigh many things in his fertilization program. The only scientific approach he can rely on is a chemical analysis of the soil, which should be taken periodically. And again, this is only a guide. Therefore his fertilization program depends a great deal on his own observations and his ability to make adjustments. Fertilization of greens and the program the Superintendent follows is very much influenced by the type of putting surface the members demand.

My fertilization program for greens is fairly basic and simple. Mixed fertilizer, usually a 12-4-8 analysis, is applied each spring and fall. The spring treatment is applied around the latter part of April, and the fall application in the middle of September. The spring and fall rates are approximately ¾ pound of nitrogen per 1,000 square feet. During the remainder of the warmer growing season organic fertilizers are used almost exclusively in small but frequent applications. Total nitrogen for the year approximates five pounds per 1,000 square feet. This will vary with the season and with weather conditions. The nutrients derived from top-dressing soils, which are sometimes overlooked, definitely would increase the nitrogen total. Some nutrient variations exist from green to green, and even at different areas on the same green. A few years ago we enlarged two greens, and the soil composition of the new parts was much sandier than the old greens. This new sandy section required more fertilizer than the old portion of the green, and I found that the fertilizer had to be applied more frequently because of the greater leaching effect.

As most Superintendents, I study the greens for turf quality, and note the amount of clippings being removed almost daily. This is perhaps the most effective yardstick in deciding what the fertilizer program should be.

USGA GREEN SECTION RECORD
40 East 38th Street, New York, N. Y. 10016

# TURF TWISTERS

## EFFECT OF CHARCOAL

**Question:** *There are some new* **Poa annua** *preemergence control materials available referred to as bensulide products which prohibit any seed from germinating for several weeks after these materials are applied. Recently I was told that this residual action could be nullified with activated charcoal, and I would like to know if this is true.* (W. Va.)

**Answer:** Initial studies at Virginia Polytechnic Institute Research Station indicate that much of the residual action of the two preemergence controls mentioned may indeed be overcome by applying activated charcoal.

The rates which seemed effective as well as most practical economically were between 75 and 150 pounds of activated charcoal per acre.

## NAMES FOR POA ANNUA

**Question:** Is **Poa annua** universally known as annual bluegrass or it is also known by other names? If so, what are some of its other common names? (Conn.)

**Answer:** Poa annua is known by many names other than annual bluegrass, as follows:

| | |
|---|---|
| Annual Bluegrass | — United States |
| Annual Meadow Grass | — Britain |
| Annual Spear Grass | — * |
| Common Meadow Grass | — Britain |
| Dwarf Spear Grass | — * |
| Low Spear Grass | — * |
| Spear Grass | — * |
| Walk Grass | — South Africa |
| Winter Grass | — Australia |

* Origin not known. Taken from old literature on turfgrass without reference to when the name was used.

## BROWN PATCH IN APRIL?

**Question:** On our greens in early spring we sometimes notice diseased patches which resemble brown patch. Is it possible to have brown patch in April? (N.Y.)

**Answer:** Normally not. This affliction, however, is a disease and it is one of the snow mold variety. The disease is known as **Fusarium,** and it looks very much like brown patch except that it doesn't have the customary smoke ring around it. Like all snow mold afflictions it disappears quickly with warm weather. It normally doesn't cause loss of turf.