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USGA GREEN SECTION RECORD

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by the United States Golf Association

BENTGRASS IN THE SOUTH

Henson Maples, golf course superintendent of Pinehurst, N. C., Country Club, examines a green planted to Nimisila bentgrass. Mr. Maples is one of the pioneers of bentgrass in the South.

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Jimmy Dudley is pleased with the bentgrass turf on the Athens, Ga., Country Club test plots. Mr. Dudley is not only a pioneer in the use of bent in the South, but is also a member of the USGA Green Section Committee and has been Green Committee Chairman at his club for 12 years.

Bent Moves South

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

Experience in using bents in the Lower Piedmont, until the last five years, has been unfavorable. However, the constantly recurring poor transition from cool season grasses to bermuda has been a persistent reminder that a year-'round grass would be desirable.

After the severe winters of 1962 and 1963, the desire to use a grass other than bermuda has become greater than ever. Now, the most recent loss of bermuda on greens in 1964 has caused even more clubs to consider the use of bent. Many bermuda greens did not show complete recovery and coverage until August of this year.

The only use of bents south of the Lower Piedmont, except in the sandhills area of Pinehurst, N.C., has been for overseeding bermuda greens. Only one attempt has been made to grow bent in Florida. This occurred a good many years ago and the effort was abandoned.

The area soil scientists call the Lower Piedmont was originally a plain about 120 miles wide lying at the foothills along the southeastern edge of the Appalachian Mountains, extending from Alabama into the southern part of Virginia and varying from about 600 to 1,500 feet in altitude. The rainfall is from 45 to 60 inches annually and, in most cases, the humidity is high. In the summer, temperature and humidity can often be the deciding factor as to whether the bents survive.

Also, when the night temperature does not go below 70°, a condition favorable to fungus disease development exists and bentgrass turf may suffer from disease attacks. This is the type of weather that makes the growth of bent a rather touch and go situation.

The 20-year average daily temperatures for Athens, Ga., which lies in the Lower Piedmont, are as follows:

	July	August
Extreme max. temp.	103.0°	105.0°
Average max. temp.	90.2°	89.6°
Mean temp.	79.7°	79.0°
Low min. temp.	69.2°	68.4°

The average number of days during which the maximum temperature reached 90°F or above in a 20-year average was July—16 days; August—17 days.

Twenty-year average daily humidity for Athens is:

	July	August
7 a.m. maximum average	88%	90%
1 p.m. maximum average	56%	58%

The humidity can drop as much as 2 to 3% by 3 p.m. and then it can start rising as the temperatures cool in late afternoon.

Construction of greens has not always received the attention it is receiving today and, unfortunately, some poorly constructed greens are still being converted from bermuda to bent. In September 1960, the USGA Green Section published an article entitled "Specifications for a Method of Putting Green Construction." Where this method has been followed closely, the results have been very satisfactory. This type of construction should be used for both bent and bermuda greens. If the decision is made later to convert to bent, then the bermuda can be eliminated and the greens planted to bent.

There are a few natural occurring soils that support good growth in this region. One of these exists in the sandhills of North Carolina but even this sandy soil will compact after heavy use. Cultivation of this natural occurring soil is necessary for best growth and good sub-drainage is advisable.

Bentgrass at Athens

Jimmy Dudley planted a few plots of bentgrass in 1957 at the Athens Country Club, Athens, Ga., using a native, sandy loam soil. The bents used were Seaside, Penncross, Washington, C-1, C-19, Old Orchard, Cohansey, and Nimisila. The bents showing the best growth are Old Orchard, Nimisila, Cohansey, and Penncross.

In 1958, Dudley and Jim Latham, at that time a member of the staff of the Green Section, planted four replications in a soil mixture prepared according to the laboratory physical analysis described in the September 1960, USGA JOURNAL. The physical attributes of this particular soil mixture were:

Bulk density	1.49 inches
Capillary porosity	19.3%
Non-capillary porosity	19.9%
Total porosity	39.9%
Permeability	1.09 inches

Sixteen plots, each 10 x 10, were planted and maintained as nearly identically as possible. A marked difference in the selections was evident. Those giving the best growth have been Old Orchard, Nimisila, Penncross, and Cohansey.

The soil mixture used in these tests has physical characteristics which fall within the range prescribed by the Green Section. However, because soils, sands, and sources of organic matter are subject to great variation, the mixture used in this case should not necessarily be considered a model for other areas.

The plots at Athens Country Club are a part of the putting green and have at least two cups placed in the bent area at all times. Most players try a few putts on the bent plots, especially during the winter months when the bermuda greens are overseeded or when the player intends to play a course elsewhere with bent greens. The bent plots are used to some degree throughout the year and are subjected to especially heavy traffic during competitions such as the Southern Inter-Collegiate tournament. About 200 college golfers use the course during the week of the tournament. Such traffic gives the grass a severe test and indicates what to expect when bent is excessively used.

The plots established adjacent to bermudas showed little invasion by Tiffine (127) into the bent but Tifgreen encroached readily. Insects causing the most concern are sod webworms and cutworms, but these pests can be eliminated with one of the many insecticides. The plots are maintained with a preventive fungicide spray program using thiram and an organic mercury base fungicide.

Dwight Nevil, a member of the North Texas State University golf team, is practicing on the bent plots at Athens, Georgia. These plots are used heavily during the Southern Inter-Collegiate and the Southeastern Conference golf tournaments.

Penncross has been used extensively for seeding bent greens in the Piedmont area. The aggressiveness, ease of seeding, and the lower unit cost have in all probability led to the preference of seed over stolons for establishing bent greens. The seeding rates used have been from ¾ to 1½ pounds per 1,000 square feet. This grass will utilize a total of 1 to 2 pounds more nitrogen per 1,000 square feet per year than will most bents and will call for a close watch on thatch formation in the spring and fall. There has been a noticeable difference in the turf produced by Penncross seed coming from various sources. It is advisable that the seed be obtained from reliable dealers and that the best grade of seed available be purchased.

Bent at Pinehurst

Vegetative planting of bents in the Piedmont area has been practiced only on plots or small areas, except at the Pinehurst Country Club, located in the North Carolina sandhills. These sandhills are on the southern edge of the Piedmont and are the transition area between the Piedmont and the coastal plains. The soils have sandy surface layers with sandy or firm heavy loam or clay subsoils. The landscape is rolling, broken and hilly in some areas. Pinehurst Country Club began with a sand green golf course and progressed

to bermuda greens and now to bent. Currently, two of the five courses at Pinehurst have bent greens.

Henson Maples is Pinehurst's golf course superintendent. In 1963, he planted 14 greens to Nimisila, after having compared it with other bents in observation plots. These plots were near the golf shop and were used as a putting green the year-'round. The selections tested were Congressional, Arlington, Cohansey, Penncross, Seaside, and Nimisila. After six years, Maples eliminated all bents except Nimisila from the observation plots and then used this area as a nursery. From a 5,000 square foot nursery of Nimisila, he stolonized the 14 greens. Greens average 6,000 square feet, and about 4-5 bushels per 1,000 square feet were planted. Maples believes he could have used as little as three bushels because ample time was available for turf development.

The planting of stolons has always been a slow, tedious job, but with modern machinery it is almost as easy as seeding. The Pinehurst greens were planted the last week in June, 1963 with a machine which deposits seed or sprigs, water and mulching material. Originally, this machine was developed for seeding steep banks along highways. The stolons were harvested with a vertical mower and then placed in the tank which contained water and a commercial fibrous mulch. Forty pounds of the mulch was used per 1,000 square feet. The fresher the stolons, the faster they will begin to grow and to retain their natural color.

Maples feels that the convenient nursery location was one of the key factors in fast establishment of the bent greens. The greens to be planted were sprayed rapidly with the prepared material and the stolons held their color. The mulch helps to retain the moisture so valuable to the stolons, and also helps hold them in place. It reduces the frequency of syringing and prevents fast drying of the stolons. Three men were used in operation of the machine, supplying of the stolons and the mulch, and the spraying of the greens. The greens made excellent growth during the hot summer; the first planted were covered in six weeks and all were ready for play by September 20, 1963.

There are three other courses in the Pinehurst area which have greens seeded to Penncross. All were seeded after the Pinehurst Country Club observation plots had given evidence of good Penncross performance. In the vicinity of Atlanta there are four courses seeded to Penncross and one Par 3 course seeded to Seaside.

There are times when the growth of bent is a very touchy situation in Atlanta—one mistake and it can be lost. East Lake Country Club and Cherokee Country Club are leaders in Atlanta in the use of bent. Mel Warnecke, superintendent of East Lake Country Club, had the course in superb condition for the Ryder Cup Match in October, 1963. George Barnhart, superintendent at Cherokee, had to alter his soil mixture in order to grow bents during the hot summer. He aerified twice in the spring and fall and topdressed with the altered soil mixture. Both of these superintendents realize the hazards of growing bent satisfactorily during June, July, and August and keep a close surveillance at all times for disease, wilt, and insects.

Factors to Consider

There are several important factors that need to be considered in the maintenance of bentgrass in an area where the teetering balance between loss and

survival may be tipped by a single mistake. First, the location of the course should be considered. Greens are best located where there is free air movement over the putting surfaces. If a green is located in a dense stand of trees, a path should be trimmed to create a movement of air. Sometimes, trimming of tree limbs 15 to 20 feet from the ground will cause enough movement without cutting trees. Hills influence the flow of air and should be taken into consideration. It is not advisable to locate a green near a lake, river, or creek, where water could overflow onto the green.

Traffic is another important factor in determining whether or not bent survives high temperatures and high humidity. If most of the members leave for the summer, the maintenance becomes a less arduous task. With heavy play, a large portion of the green should be allotted to cupping space. Frequency in moving the cup setting will help to prevent discoloration of the grass from excess traffic. Many clubs have barred certain types of shoes on greens because of the marking left on the grass. During two separate studies involving the ratings of turf wear, the conventional spike shoe was found more damaging and produced a longer lasting effect as measured by the recovery of the grass than any other type of shoe tested.

Use of Water

One of the key management tools in maintaining good bent turf is water. Good water is essential but how it is handled is one of the tricks of the trade necessary for success. In most instances, too much water is applied at one time. Far too often greens are watered excessively at the request of players so that golf balls will stop more readily. It is advisable to water to the advantage of the grass growth rather than to the whims of the golfer. Too much water in the summer months is a sure way to ruin bentgrass greens.

Quality of water is essential, but quantity is necessary at times. Correct installation is the key to a good irrigation system. The greens should be ringed with sufficient outlets to provide complete coverage, both for irrigation as well as for syringing to reduce a wilt condition.

Fertilization of bent causes less overall trouble than misuse of water but is nevertheless a key management tool. There are times when mistakes are made with fertilizers. These cause a major concern, but it is seldom that more than three greens on a course have burns. When this happens, you have to sod, seed, or be humiliated until the grass recovers. The bare area can be seeded with pre-germinated seed or planted with stolons. In either case, special care will be needed.

There is a wide choice of fertilizers. How much, when, and the method of application will depend upon the kind of fertilizer. Matching the material and the method will give a healthy grass. Fertilizer for bent greens should provide nitrogen (N), phosphorus (P_2O_5), and potash (K_2O) in the ratio of 3-1-2. A good formula is 1/2 pound of nitrogen or less per 1,000 square feet per month on bentgrass in hot weather, and one pound per month during cool months. This practice will provide about nine pounds of nitrogen per 1,000 square feet per year. If the 3-1-2 ratio is used, you will apply three pounds of P_2O_5 and six pounds of K_2O. These two nutrients do not leach readily and may be applied in the spring and fall when the weather is cool. The amount of fertilizer may vary slightly and this must be an individual course program. But practical experience has shown it is not wise to overstimulate

bentgrass during hot summer months in the Piedmont.

Summing up, it would not be advisable for clubs in the Lower Piedmont area to plant bent without full investigation of the hazards involved in its growth. Portions of putting greens provide excellent opportunities for observation and practice in the care of bent. In a transition area where both cool and warm season grasses can be grown, either one or both can be lost if good management is lacking at any time.

Bent Grass for the South - Varieties

By **MARVIN H. FERGUSON,** Mid-Continent Director & National Research Coordinator, USGA Green Section

Because bentgrass is relatively new in the South and because there is no fund of experience, the choice of a variety may be difficult to make. An examination of the attributes of the available strains may provide some clues upon which to base a decision.

First, shall the choice be a vegetatively planted grass or one which may be established by seeding? Among seeded bents there are only two choices —Seaside or Penncross.

Seaside bent is perhaps the most widely used bentgrass in America. Perhaps it is incorrect to call it a strain or a variety. Seaside bent is a creeping bent and most of the seed supply is harvested from stands indigenous to the coastal regions of Washington and Oregon.

Seaside bentgrass has a broad genetic base and the population exhibits great variation in individual plants with respect to characteristics such as color, texture, vigor, disease resistance, and tendency to form thatch. Consequently when individual plants from Seaside are allowed to develop they may produce a growth entirely different from one another. A new stand of Seaside bent produces a turf that is uniform in appearance. This is simply because the single plants have not had time to express their individuality. When the stand is three or four years old, the more vigorous plants will have begun to crowd out the weaker ones and to have occupied the area on which the weaker plants first grew. Older Seaside greens present a mottled appearance because relatively few strong plants have survived and many millions of weaker plants have perished. Some of the more vigorous types may occupy an area several feet in diameter.

Thus an old green which is mottled is a good example of the natural law characterized as "the survival of the fittest." The plants which are most nearly suited to a particular environment will persist and those which are unsuited will die.

The heterogeneous and multiform nature of Seaside bent allows it to be used over a tremendous range of environmental conditions. There is always a strong possibility that within the population there will be some individuals which will be suited to the environment and will persist and form a turf. There is also the certainty that a large proportion of the seeds planted will produce unsuitable plants and that these will disappear. At normal rates, bentgrass seeds will be sown on an average of about 83 per square inch. If one of these produces a vigorous plant, there will be a good turf.

Given these background facts, we may conclude that Seaside bent contains enough genetic variability to be adaptable to a wide range of conditions. There is strong likelihood that some plants from a Seaside population would thrive in the South. There is the accompanying knowledge that most plants in the population will not do well and that their contribution to the putting green will be negative. They will occupy space and will use water and nutrients at the outset and in passing out they will not only leave the turf thin but will provide a substrate for the development of disease-producing fungi by the fact of their susceptibility. Because of the very high percentage of plants which are not, in their young stage at least, capable of surviving the conditions of the South, Seaside bent has not been a popular choice. It appears likely, however, that variability will be the source of the genetic characteristics which must eventually be combined to provide a suitable putting green turf under southern conditions.

Penncross

The other alternative in using a seeded bent is Penncross bent, a synthetic variety developed by a device known as the polycross technique. In the case of Penncross three selected vegetatively propagated strains (which probably came originally from a population of Seaside or South German mixed bent) which had been evaluated by the Pennsylvania State University were planted in adjacent rows. These selected grasses were allowed to cross-pollinate. The seed of the first generation cross harvested from these rows is Penncross.

The strains used as parents of Penncross were chosen because of desirable turf characteristics such as vigor, color, fineness of leaf and disease resistance. They were similar with respect to flowering dates, so that hybridization would effectively occur in the field.

By using only three parents in the synthesis of Penncross, the plant breeders eliminated much of the variability which is characteristic of a heterogeneous population such as Seaside. By choosing only parents which had demonstrated desirable characteristics, they eliminated many weaknesses such as disease susceptibility and lack of vigor. The heritage factors which determine color were limited. By using only seed of the first cross many inherent characteristics of an undesirable nature never have an opportunity to be expressed.

The result is a synthetic variety of remarkable uniformity. Penncross is vigorous, relatively disease resistant, fine textured, and offers a pleasing color. Despite the fact that the parent strains were selected in Pennsylvania, an area quite favorable to the growth of bentgrass, it has performed creditably in many parts of the United States. Some comparative tests in the South indicate that it is one of the better choices currently available.

Vegetatively-Planted Bent

Numerous vegetatively planted bentgrasses are commercially available. All of these represent selections that were taken from old putting greens. Wherever single plants have developed to the point where they have occupied a sizable part of a putting green, the opportunity for making a new selection is present. During the 1930s more than 100 selections were made and evaluated by the USGA Green Section. Only the best of these were chosen and later evaluated in "pie green" tests at golf clubs throughout the United States. From these studies came Arlington (C-1), Cohansey (C-7), Toronto (C-15), Congressional (C-19), Collins

(C-27), Norbeck (C-36), Washington (C-50), and Metropolitan (C-51). Old Orchard bent (C-52) was included in the studies, but it was a proprietary selection and was marketed by an individual firm. Of these strains, Cohansey has been one of the most widely grown in the southern portion of the bentgrass range. Cohansey is a very pale apple-green color. While the color is objectionable to some, the behavior of the grass on putting greens has endeared it to many users.

A combination of Arlington (C-1) and Congressional (C-19) has also found considerable favor in hot, humid areas. The combination turf is produced by mixing equal parts of stolons and planting the materials vegetatively. Surprisingly, there is a limited amount of separation and each of the grasses apparently contributes only its virtues to the turf.

More recently, vegetatively propagated selections such as Evansville and Nimisila have been made available. Because they are newer, these varieties have not been subjected to the extensive testing of the older ones. Therefore it is not possible to adequately characterize their potential use in the South. However, Nimisila has been sufficiently impressive in test plots to have been planted on some greens at the Pinehurst Country Club.

Both vegetative and seeded bents have their virtues and their shortcomings. The grower must make his choice with an awareness that either grass will leave something to be desired.

The outstanding quality of the vegetatively planted bents is that of uniformity. All the grass is the same color, the same texture, the same vigor, and therefore lends itself to a maintenance procedure that will reproduce similar results on every part of the green. By contrast, the greens planted with seeded bents, particularly Seaside, may after a number of years develop numerous patches of turf which are variable in mowing requirements, brushing requirements and fertilizer needs. Thus, if one area of the green becomes grainy, the superintendent may not be able to brush because the remainder of the green may be thin.

If a nursery of vegetative bent similar to that used on putting greens is kept, patching by means of plugs or sod pieces may be done with such skill that it is scarcely discernible. On a seeded green, even the most artistic sodding work will show that it has been patched.

On the other hand, there is no rapid way of thickening the turf on a vegetatively planted putting green. On a seeded green one can help his turf simply by planting more seed.

As more bent is grown in the South, more troubles will be encountered and more solutions will be found. It seems reasonable to assume that selections can be made which will exhibit an ability to survive the conditions of heat and humidity that prevail. The grasses which are presently grown are surviving because they just happened to have the inherent ability to survive and because the growers are providing skilled management. It is possible for plant breeders to select the types most suitable for these conditions and by combining the desirable characteristics of several plants to produce varieties which will further reward the skill of the grower. Bentgrass greens in much of the South seems a certainty for the future.

Dr. Marvin H. Ferguson, Mid-Continent Director and National Research Coordinator of the USGA Green Section, has been elected a Fellow in the American Association for the Advancement of Science. Membership in the Association honors meritorious contributions to science.

The aims of the AAAS are to: Further the work of scientists; facilitate cooperation among scientists; improve the effectiveness of science in the promotion of human welfare; and increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

Dr. Ferguson, 46, lives in College Station, Texas, and in addition to his other USGA duties is Editor of the USGA GREEN SECTION RECORD.

DR. MARVIN FERGUSON HONORED

Bentgrass for the South-Management

By **MARVIN H. FERGUSON,** Mid-Continent Director, National Research Coordinator, USGA Green Section

Whenever a species of plant is grown near the border of its area of natural adaptation, manipulation of the environment can become very important in determining success or failure. Thus it is with bentgrass in the South.

Little things, factors that would normally produce negligible effects, things like the direction of slope, the amount of air circulation, or the occurrence of a midafternoon thunderstorm, become matters of major importance as they influence the culture of bentgrass greens in the South. Mistakes here don't result in a simple situation like discolored grass and an embarrassed superintendent. They may result in the complete loss of turf and sometimes, unfortunately, in the loss of a superintendent's job. Inordinate care in routine maintenance practices is a requisite.

MOWING

The mowing of bentgrass in a difficult area is not simply a routine operation. Plant physiologists have long known that damage to tissue causes an increase in temperature and respiration in the damaged area. Mowing creates injury. Careful mowing may create much less injury. The mower should be sharp and well adjusted. The height setting should be carefully checked at frequent intervals. Loose bushings should be replaced promptly, the clippings box should be emptied before the weight of clippings begin to affect the height of cut, and mud or other foreign matter should not be permitted to collect on rollers. Above all, the workman must be instructed to turn carefully. It is preferable to turn well out on the collar, but if the collar is bent, it may be damaged by a spin-

ning drive roller. It is better to disengage the clutch and turn with the power off. It's a much slower way, and the workmen will resist turning in this way, but it's the price of a bent collar in a difficult area.

In particularly hot, humid weather, when wilting is a problem, some superintendents like to mow in late afternoon or early evening. The grass appears to be damaged less when mowed late in the day and it has the cool hours of night time to recover from the injury and the bruising.

FERTILIZING

The use of fertilizers on bentgrass in hot weather is a touchy matter even in areas where bent is well adapted. Experienced superintendents fertilize greens very lightly in summer months and a great many of them use either organic sources of nitrogen or slowly available synthetic materials which are unlikely to produce burning of the turf. Experienced men pick a cool day or they wait to fertilize until late afternoon.

Usually about ½ pound of nitrogen per 1,000 square feet per month is the maximum during June, July, and August. In the South, May and September can also be very warm and humid. It is a good rule to apply most of the fertilizer to bentgrass during the cool spring and fall months and to fertilize very lightly in summer.

In some areas, superintendents add small amounts of soluble nitrogen carriers and sulfate of potash in the form of a liquid. Such applications are necessarily very small. They serve to keep the grass growing without allowing it to become lush.

WATERING

Watering is a practice worthy of much thought because it is the practice most frequently carried out incorrectly. It can cause serious trouble and it can cause trouble quickly.

It is simple to state the correct procedure for irrigation. It is quite another thing to achieve proper irrigation in practice.

In theory, the soil should be moist enough throughout the root zone to supply the plant's needs for water. It must not be so moist that air is excluded from the larger pores. Soils either too wet or too dry will cause wilting of the turf. Irrigation then should simply restore the moisture that is removed from the soil by evaporation and transpiration.

The natural tendency of workmen is to overwater. It is easy to impress upon a man the fact that the plant roots need adequate water. It appears much more difficult to persuade him that too much water will exclude the air and result in wilting.

In irrigating bentgrass, it is important to apply water slowly enough so that it goes into the soil without runoff and to apply a sufficient amount to replace the moisture lost from the soil since it was last irrigated. The time required for a given sprinkler to restore the proper moisture content to a given green may be learned from experience. In gaining the experience, however, it is extremely important to use a probe to ascertain the moisture status of the soil.

In hot weather, bentgrass roots are usually rather short. Thus the critical area insofar as moisture is concerned may be no deeper than two inches. When plants are transpiring rapidly, it may be difficult to keep enough moisture in this shallow zone to adequately supply the plant. At such a time, it becomes necessary to depart from the "heavy but infrequent watering" theory and apply small amounts of moisture at frequent intervals. It may be necessary to shower greens several times a day

to help overcome the deficit of moisture in the leaves.

In showering greens, the workman who has not gained an understanding of his purpose may do more harm than good. If greens are adequately irrigated at night or in early morning, the soil is not likely to be seriously dry by midday. Grass needs moisture because the demand of rapid transpiration exceeds the supply gained through a limited root system. The purpose of showering then is to provide a little moisture to the leaf surface where the deficit exists. Showering cools the air in the grass leaf's micro-environment, it raises the humidity and the loss of moisture from the leaf surface is reduced sufficiently to allow the root system to catch up to the leaf's demands. The soil does not need water. It is usually wet enough. Therefore the person doing the showering should be instructed to "wet the turf but not the soil."

Now if the irrigator is overzealous and puts on too much water in the heat of the day, what happens? In hot weather soil and water will hold very little oxygen. When enough water is applied to fill all the pore spaces in the soil there is no room for air (oxygen). In the absence of oxygen cell walls become impermeable. The roots will not take up water even though water surrounds them. Transpiration occurs at the leaf surface, but the lower portions of the plant, though bathed in water, can supply none to the leaves. The leaves wilt and we say the turf was "scalded."

DRAINAGE

The foregoing discussion is a good background for stressing the importance of good drainage. Drainage begins at the soil surface. As soon as water enters the soil we become concerned with its drainage. A compacted or layered green which impedes water movement in the top three inches is poorly drained just as is one which suffers from a plugged tile line.

Drainage and aeration are inseparable because pores in the soil must be filled either with water or air. Ideally there should be an adequate supply of each. When water enters the soil, air is pushed out and when water drains out air is pulled into the soil.

One of the first requirements of bent in a difficult area is adequate drainage that cannot fail at a critical time.

NO MISTAKES ALLOWED

Vertical mowing a bent green on a warm day in April has resulted in the loss of a green—and a job!

Fertilizer applied too heavily and watered in too late will sometimes cause loss of turf. An overdose of fungicide may start a green downhill.

The grower of bent should place a great deal of emphasis on planning. Get jobs like cultivating, topdressing, thatch removal, grain removal, herbicide applications, and patching done in cool weather when bent is growing well and can recover from any mistakes you or your workmen may make.

Begin your irrigation regime early to encourage as deep roots as possible going into the summer months. Plan fertilization so that grass can "harden off" a little before the advent of hot weather.

During hot weather, do as little to the greens as possible. Practice careful routine maintenance and move the flagstick as often as possible.

Keep a sharp lookout for diseases, insects, and localized dry spots.

Remember that in a borderline situation it frequently is a seemingly small thing that will tip the balance. Attention to these little things may be enough to tip the balance in your favor.

The Individual's Responsibility for Golf Course Care

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

Not all course improvement comes from the superintendent or the green chairman or the Green Committee. Each individual that plays a course carries with him a responsibilty to improve the course by his consideration of the people who follow him and for the course itself.

Golf course maintenance is fast coming to the point where a good portion of the successful superintendent's planning must be done by first figuring out the psychology involved. How are the people going to react when faced with a change in the status quo? Are they going to help you or hinder you?

No one can say for sure how people will react in any given situation, but over a period of years we learn to guess pretty well what the general reaction is likely to be. For example, people are always prone to walk the shortest distance between two points unless given a reason to do otherwise. Now we can sometimes control where people walk by signs and barriers but wouldn't it be much better to coax them to follow another route by means of an inviting vista beyond or by a subtle row of flowers across the old path to beautify as well as direct?

We can demand that people dispose of litter properly but what good is it going to do if we do not provide handy containers for the trash and better yet, containers which are also attractive?

Someone must set the example. What good is it to talk about holes in the fairway if the general practice of the green chairman and members of the Green Committee is to take divots and let them lie where they fall?

Another problem is the large number of golfers who have not yet been educated in the love and care of a course. Here again, it is up to the golfers of long standing to set the example. According to statistics from the National Golf Foundation there are presently about 6 1/4 million golfers in the United States who play more than 15 rounds of golf a year. This figure indicates a tremendous growth over the last few years and we can well imagine that many of these golfers, along with nearly a million golfers who play fewer than 15 rounds a year, give little thought to what they can do to make the course more pleasant for others.

The big question now is how are we going to correct this situation. At least one answer is by holding group meet-

COMING EVENTS

September 18
Illinois Turfgrass Field Day
University of Illinois
Urbana, Ill.

September 22
Mississippi Valley Golf Course Superintendent's Field Day
Westwood Country Club
Clayton, Mo.

September 23-24
Lawn and Turf Conference
University of Missouri
Columbia, Mo.

October 8
Metropolitan GCSA Annual Field Day
Winged Foot Golf Club
Mamaroneck, N. Y.

October 8-9
New Mexico Turfgrass Conference
New Mexico State University
State College, N. M.

October 21-23
Central Plains Turfgrass Foundation
Kansas State University
Manhattan, Kans.

November 4-6
Oklahoma Turfgrass Conference
Stillwater, Okla.

November 15-18
American Society of Agronomy Meeting
Kansas City, Mo.

ings and exchanging ideas among ourselves. Next we must improve our public relations in every way possible so that even the once a year golfer has a sense of responsibility to the course. We must do a good job ourselves so that our members feel a sense of pride in what we are doing and want to help.

In the spring of 1963 almost every course in the Northeast experienced winter damage. This was a real headache and a disappointment to us in many ways. But in at least one instance many of the pains were soothed by a simple letter from the Grounds Committee to the membership stating the general conditions, what was being done about them and asking for cooperation in helping make the course one of the best. Such a letter lets the membership know what is going on and also makes members feel more a part of the activity.

There is another means by which we can make the individual feel a sense of responsibility toward the course. That is by putting him on a committee for some phase of the operation such as tees, greens, fairways, trees and shrubs, traps, etc. By taking part in some of the decisions being made for the course the committeeman is likely to think about his responsibility next time he plays the course. Soon he begins to set a proper example for others.

We should keep good records to show the expense of raking sand traps, picking up trash and the cost of machinery breakdown due to objects discarded by golfers. Everyone is interested in getting the most for the club dollar. The members should certainly be made conscious of what their thoughtlessness is costing.

Last of all, the superintendent and the Green Committee have a responsibility to try to provide the best facilities and grounds possible so that the user cannot help but be aware that much time and effort is spent in his interest. Only by encouraging a feeling of personal responsibility and pride in the work being done can we expect help from the individual.

Supt. Bob Peters of Gulph Mills Golf Club, King of Prussia, Pa., constructed boxes of cement to store irrigation hose in close proximity to each green. Some are constructed so they can be padlocked.

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

TURF TWISTERS

FAIRWAY WEEDS

Question: Our fairways are infested with crabgrass and goosegrass. Disodium methyl arsonate has been recommended as a spray for controlling these grasses. Is this material effective? At what rates? Is it economically feasible to use this procedure? (NEW MEXICO)

Answer: Disodium methyl arsonate is an excellent material to use on these weeds. Many superintendents add about 1/2 pound of 2, 4-D per acre to the spray solution when there is much goosegrass in the turf. It appears to increase the effectiveness of the DSMA. Usual rate of application on bluegrass turf is about 4 pounds per acre. On bermudagrass turf, as much as six pounds per acre may be used without appreciable injury. Use of disodium methyl arsonate is actually a very low cost method of weed control. Since the discovery that DSMA will control johnsongrass in cotton fields, the volume of sales has increased greatly, and the price of the material has been drastically reduced.

DRAINAGE

Question: A putting green at my club is located on a hillside. The surface of the green slopes gradually; about 18 inches from back to front. Because the cup stands full of water for most of the day following night time irrigation, we have been told that the green is poorly drained. How can this be? (TEXAS)

Answer: The green probably has good surface drainage. The slopes you describe should be adequate to remove surface water provided there are no low spots.

It is likely that the soil within the green is tight or that layers exist and that water is transmitted downward rather slowly. Therefore you have poor "internal" drainage and water fails to vacate the larger voids in the soil. Good water percolation characteristics within the soil may sometimes overcome the effects of poor surface drainage, but good surface drainage can do little to alleviate the effects of layered or compacted soil.