



*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 sand-

hills 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 sand-hills 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.

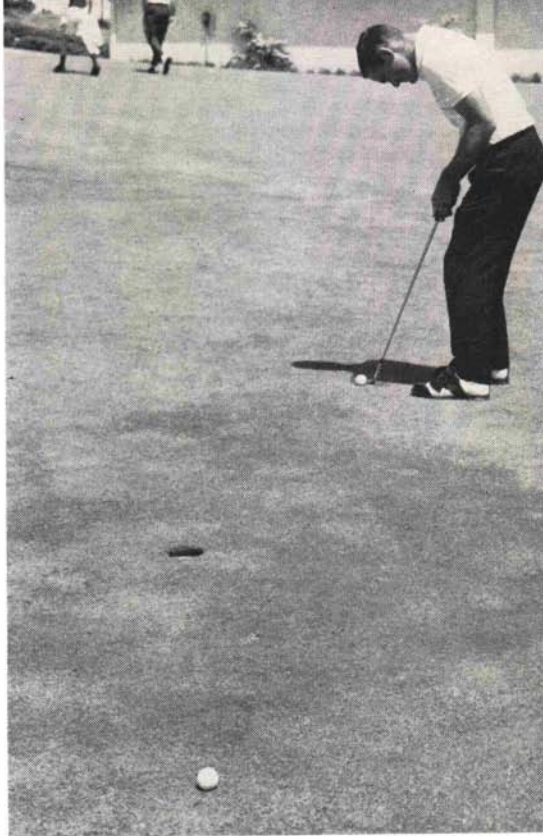
The soil mixture used in these tests has physical characteristics which fall within the range prescribed by the Green Section. However, because soils, sands, and sources of organic matter are subject to great variation, the mixture used in this case should not necessarily be considered a model for other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

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  $\frac{3}{4}$  to  $1\frac{1}{2}$  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



*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.*

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 pre-

pared 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

**B**ecause 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.