

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.

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 resist-

ance. 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 FERGUSON HONORED

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.



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## 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-