Cool Season Grasses* In Today's Turf

By H. B. MUSSER

The quality of the turf on a golf course is the result of many closely related and interdependent items. The type of grass used is only one of these. Things like weather, soil, management, and use, also have a very direct bearing on what is ultimately produced. Consequently, to say that if such and such a grass is used, the results will be thus and so, is covering a lot of territory. It is true that there are inherent differences in the ability of individual grasses to produce good turf. But it also is true that they may perform differently under a given set of conditions. Any evaluation of a particular type must be based on its performance for a sufficient period of time and under a sufficiently broad range to make our conclusions at least reasonably accurate.

This is especially important in attempting to evaluate the cool season grasses. They are grown over a large area under widely varying conditions. What is good in one section may be mediocre in another. So we cannot say that even such a standard grass as Kentucky blue is the right or wrong choice for a given location, unless and until we have enough evidence of its performance over a wide range to provide reasonable support for our conclusions.

The quality of turf which an individual grass will make is dependent upon a number of specific characteristics of the grass, and how these are affected by its surroundings and the treatment it gets. When we have determined what these qualities are, and to what extent they may be affected by weather, management, and similar factors, then, and only then, can we make a sound appraisal of its value.

If we examine the cool season grasses from this angle, we find that they fall into 3 rather sharply defined classes: 1. Those which we can judge quite accurately, because of long experience with them, 2. Those relatively new types which are commercially available in limited quantities, and which we have known for a comparatively short time, and 3. Types that have had only limited local usage or are still entirely in the experimental stage.

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Quality of Cool Season Grasses

Class one includes the common commercial types of most of our permanent species — Common Kentucky bluegrass, and red fescue, colonial bent grass, the older kinds of creeping bent, such as Seaside, Washington, and Metropolitan, and the velvet bents. All of these have been with us for a long time. We have had a chance to watch them under widely different conditions and we think we know pretty definitely just about what we can expect from them. Let's take a brief look at some of their more important characteristics. It should help us to determine more easily whether new types are actually improvements over what has been available in the past.

Common Kentucky bluegrass has been the most widely used of the cool season grasses for a long time. Probably the particular characteristics which first drew attention to it were its ability to form a dense pleasing turf under moderate cutting heights, its tolerance to a wide range of climatic conditions and its ability to make an amazing recovery after unfavorable growing periods when other grasses were completely killed. The secret of its recovery powers lies in its underground stems. These are fleshy structures in which surplus food materials are stored in periods when growth is normal. When the top growth is destroyed by bad weather or other causes they persist in the soil and sprout new plants when growing conditions become favorable.

It has long been recognized that Kentucky blue is not a poor land grass. It needs a constant supply of nitrogen and liberal quantities of phosphate. It will not tolerate high acidity and does not like wet feet. It dies out rapidly on soil that is heavily compacted or poorly drained. Hot weather will not kill it but it grows slowly during the summer. Consequently, it does not make much recovery when anything injures it during that time.

It is highly susceptible to several diseases and is severely injured by them. The most troublesome of these are the leaf spots which not only affect the leaves but may destroy the roots, also.

Kentucky Bluegrass and Close Cutting

There is a common belief that bluegrass will not stand constant cutting to heights of less than 1¼ to 1½ inches. Also, that it cannot be held on watered fairways. There is no doubt but that the weight of practical evidence justified this conclusion. There is a real question, however, whether the clipping and watering are the primary offenders, or whether they are merely "the last straw that broke the camel's back". Evidence is accumulating that the true explanation of why common Kentucky bluegrass will not tolerate close clipping and high soil moisture is its inability to survive under such treatment when weakened by disease, heavy compaction, or other causes. When it is healthy it will survive close clipping, and at least some overwatering, for a long time.

Chewings and creeping red fescues are very similar to common Kentucky bluegrass in their dislike of wet soils. Also, they are attacked by the same diseases and suffer equally from soil compaction and poor physical condition. They grow even more slowly than Kentucky blue, and consequently close clipping and heavy watering injure them very severely when they have been weakened by disease or other causes.

These fescues differ materially from common Kentucky blue in their greater tolerance to low fertility and high acidity. The differences, however, are not very real because there is abundant evidence that fescue does not grow because of these conditions, but in spite of them. They will make the best turf when fertility levels are high and acidity is controlled.

They also differ from Kentucky blue in their greater shade tolerance and in their almost complete lack of ability to survive long periods of high temperatures and humidities. They are among the coolest of our cool season grasses and are injured quickly and severely by hot humid weather.

The fescues have one additional bad fault. Dead roots from the previous season and dry clippings are highly resistant to decay. It is common to find this material forming a dense felt of from 1 to 2 inches in thickness under old turf. Very often this effectually prevents water penetration and normal root growth. Unless it is broken thoroughly and systematically it can cause serious turf deterioration. The aerifier or any tool that will do a similar job is good for this purpose.

Chewings Versus Creeping Red Fescue

Up to this point we have considered the general characteristics common to both Chewings and creeping red fescues. There are points of difference. Chewings is essentially a non-creeping grass, while creeping red, as the name implies, spreads by underground stems like Kentucky blue. True to type Chewings that is available at the present time is somewhat hardier than most commercial creeping red. This is not necessarily a true comparison of the two types. Unfortunately, most of the present seed supply of creeping red stems from a type which tests have shown is not well adapted in much of the fescue growing area. The newer strains of creeping red have shown as good or better performance than the best Chewings.

The bents are the hardest of the common cool season grasses to evaluate accurately. Perhaps the best approach would be to first classify them and then try to arrive at some general points of agreement on their characteristics and quality. We recognize 3 basic forms — the Colonials, the Creepers and the Velvets. These are distinct species and show wide differences in the type of growth and quality of the turf they produce.

Colonial bent is offered commercially under a number of different names. These include Oregon colonial, Highland, Astoria, New Zealand Colonial, and Brown Top. We may even still find an occasional quotation on Rhode Island Colonial. These names serve chiefly to identify the source of the seed. Although there are some differences in the characteristics of the various types, the points of similarity far outnumber the differences. Performance reports on them are so variable and contradictory that it is impossible to arrive at any satisfactory assessment of their relative value. About the best we can do at the present time is to see what we know about them as a class.

The Colonials are essentially upright growers that have only a very few short rootstocks or none at all. They do not make as dense a turf as the creeping and velvet bents and do not thatch and felt as heavily or as readily as these types. This makes them much more useful on fairways where it is difficult to control thatching.

As a group the colonials are less

affected by acidity and wet soils than Kentucky blue. On the other hand, they are fast growers, and need good fertility and soil moisture levels. Their high leaf density and rapid growth rate permits quick recovery from injuries and makes them tolerant of close cutting. They are highly susceptible to the brown patch disease and are attacked to a greater or less extent by other diseases common on the bents. This lack of disease resistance is one of the most important limiting factors in their use. However, it is not as vital as for Kentucky blue and fescues because the faster growth rate of the bents enables them to recover better, and so reduces the degree of permanent injury.

A Good Colonial Bent is Needed

It has been generally recognized that the colonial bents are desirable for use on watered fairways where frequent close clipping is necessary. Unfortunately, it has been difficult, during the past few years, to secure seed that is not contaminated with varying percentages of creeping bent. Since the latter spreads more rapidly it soon takes over and we are confronted with a serious thatch control problem. This could be handled much more easily if the creeping types were kept out of the seed we use.

The creeping bents include the many vegetatively propagated individual strains that have been selected and multiplied during the past 30 years. Seaside bent, seed of which is available commercially, also belongs to this group. While there are wide differences among the individual types, there are some general characteristics of the entire group that should be recognized.

A very rapid growth rate is one of the most important of these. The creepers produce a dense mat of creeping stems and leaves in a comparatively short time. A seedling plant may spread to a diameter of 2 feet or more in a single season. This vigor and aggressiveness may be very desirable on limited areas such as greens and tees, where it can be controlled by frequent close clipping, brushing, topdressing, and other management practices. It creates a serious problem on large areas where such treatment is not practicable.

Creeping bent needs fertile soil and liberal quantities of water. It will do better under poor drainage and high acidity than most of our cool season grasses. But, here again, it should be noted that it grows in spite of these conditions, not because of them. It is severely injured by dry weather and is highly susceptible to practically all of the most serious turf diseases. It thrives under close cutting. In fact, if clipping heights average much over ½ inch as a maximum, we soon find ourselves battling a spongy mass of sod that makes for very poor playing conditions.

The velvet bents also consist of a number of distinct types that are somewhat different in quality and performance. The best known of these are the Piper, Kernwood, and Raritan. Originally, these were developed as individual plant selections and propagated vegetatively. A very limited quantity of seed has been produced commercially. Each strain has the usual limitations in adaptation common to individual plant selections. One does best in one location, and another somewhere else. All are characterized by very dense fine textured foliage. They spread by above ground creeping stems, but growth is slow. This is one of their weak points. Because of their soft texture the velvets injure quite easily and the scars heal slowly. They need at least high average fertility and are quite acid tolerant. Because of their slow growth rate they require less moisture than creeping bents.

Thatching in Velvet Bents

As a class, the velvets probably are less susceptible to disease than either the colonials or creepers. However, where disease strikes they are hurt badly and are very slow to recover. They form a very dense thatch of roots and stems. This is an excellent medium for the growth of disease organisms and it is difficult to get fungicides into it in sufficient strength to kill them. It also retards the penetration of water and nutrients.

These, then, are the major characteristics which we have come to recognize, through long observation and experience, as typical of our common cool season grasses. They form a basis for determining whether the new types or strains that come out from time to time are likely to be better than what is already available. But to make comparisons of the old and new, we must know what the new has to offer. Which brings us to a consideration of the second general class of the cool season grasses.

It includes these comparatively recent developments that are available commercially to at least some extent. What do

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1953 TOURNAMENT SCHEDULE

MARCH

5-8 —BATON ROUGE (LA.) OPEN,
12-15—WOMEN'S TITLEHOLDERS GA OPEN, Augusta (Ga.) CC
12-15—ST. PETERSBURG (FLA.) OPEN
15 —AMER. SENIORS GA CH., Ponce de Leon GC St. Augustine, Fla.
16 —LA GORCE PRO-AM., Miami Beach, Fla.
17-18—SEMINOLE PRO-AM., Palm Beach, Fla.
18-23—51st WOMEN'S NORTH & SOUTH INV., Pinehurst (N.C.) CC
20-23—JACKSONVILLE (FLA.) OPEN,
25 —AIKEN (S. C.) PRO-AM., Aiken, S. C.
27-29—GREENSBORO (N. C.) OPEN,

APRIL

2-5 —WILMINGTON (N. C.) OPEN,
3-5 —BABE ZAHARIAS OPEN, Beaumont (Tex.) CC
9-12 —THE MASTERS, Augusta (Ga.) National CC
11-12—WOMEN'S TRANS-MISSISSIPPI OPEN, Arizona CC, Phoenix
14-19—WOMEN'S TRANS-MISSISSIPPI AMATEUR, Arizona CC, Phoenix
16-19—VIRGINIA BEACH OPEN, Cavalier Yacht & CC, Virginia Beach, Va.
16-19—CHARLOTTE (N. C.) OPEN,
20-25—53rd NORTH & SOUTH INV., Pinehurst (N. C.) CC
23-26—TOURNAMENT OF CHAMPIONS, Desert Inn CC, Las Vegas, Nev.
29-May 3—2nd PAN AMERICAN OPEN, Club de Golf Mexico, Mexico City

Greens Condition Sets Course Standard

By LEO VINCENT
Supt., Omaha (Neb.) Field Club

Usually on a golf course there's more to do than the staff possibly can accomplish with the money available so the superintendent instead of scattering his work too much finds that when he gets the greens in fine condition he and his players are better off than to have the entire course at a medium standard.

We have a severe problem with greens but I think we've got it pretty well licked. We had hard spots that wouldn't take water. Aerifying corrected those and helped get a root system established. I also fertilize when I aerify.

We aerify and top-dress in spring and fall. The top-dressing consists of black earth, horse manure and some peat. The dirt and manure have been conditioned for a couple of years. Our compost machine grinds and loads in one operation. We have a spreader for applying the top-dressing to the greens.

The mechanized operations keep the costs down.

I used ammonia sulphate on the greens to eliminate clover. The bent crowded out the little clover that the chemical treatment left.

Flexi-combs on our fairway mowers stand the crabgrass up for cutting and that has enabled our bluegrass to improve its showing on our fairways.

COOL SEASON GRASSES

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we know about them, and is such information as we have sufficient to enable us to estimate their value?

New Strains of Bluegrass and Fescue

Seed of three strains of Kentucky bluegrass is being produced commercially, to at least some extent. These are the Arboretum, the Delta, and the Merion. What do we know about them that would help us to determine whether they are enough better than the common type to warrant recognition? I believe that sufficient records, taken under comparable conditions, are available, to show that both the Arboretum and Delta strains are just as highly susceptible to the leaf spots and other common diseases of Kentucky bluegrass as the parent type. We recognize that disease susceptibility is a major weakness in large sections of the bluegrass growing area. It is extremely doubtful therefore whether any strain which does not show resistance to at least the bad diseases, particularly the leaf spots, should be considered an improved form. Certainly, not unless it has some other characteristics that is so desirable that we can afford to ignore the disease factor. Neither Delta nor Arboretum has shown anything of this nature to date.

Records on the Merion strain are much more extensive than on Delta and Arboretum. So we have an even better basis for judging it. They show that it has a high tolerance to the leaf spots, but susceptibility to dollar spot, rust, and some minor troubles. Common bluegrass is similarly susceptible to most of these latter ailments. So, from the standpoint of disease, the principal difference between Merion and Common is in tolerance to the leaf spots. This is important because of the wide distribution of these diseases and the extent of the damage they cause.

Merion has another outstanding characteristic. It survives hot weather better than common Kentucky blue. This may be due to the fact that it is healthier and more vigorous because it has not been weakened during the early growing season by repeated disease attacks, which also may partially explain its ability to withstand closer clipping. Its low grow-

ing habit undoubtedly also is a contributing factor.

Since Merion is no poorer than common Kentucky blue in other characters and is significantly better in the important items noted it deserves recognition as an improved type. The fact that it is making a good quality turf under such a wide range of conditions where common Kentucky blue has failed justifies this conclusion.

The list of new fescues for which seed is available is just as limited as for Kentucky bluegrass. It is confined to two named strains of creeping red — Illahee and Trinity, and one strain of Chewings, which, although never named or officially released, has come to be called Penn State Chewings.

Are any of these types materially better than the common Chewings and Creeping Red? Results of comparisons in areas where it is relatively easy to grow fescue show that all three of these new types will make a slightly better quality turf than the common. Apparently, this is because they have a little better density and slightly greater recovery powers when injured by disease and summer heat. There is no good evidence of greater disease tolerance or less injury from close clipping for any of them.

In areas where high temperatures and humidities are a controlling factor these new strains are no better than the parent types. There is so little difference in the relative ability of all to withstand the unfavorable conditions that none will maintain a satisfactory turf.

Creeping Bents are Temperamental

It would be impossible to examine in detail the many vegetative strains of creeping bent that have been selected during the last 30 years. We have grown over 100 of these in the test plots at the Pennsylvania Agricultural Experiment Station and we have over 200 in the nursery at the present time. Most of these are known only locally. A few have received more widespread attention and

some have been named. Best known of the latter, are the old Washington and Metropolitan strains, and the newer Congressional, Arlington, Cohansey, Old Orchard and Collins. When we strike a balance on the performance of all of them, several facts begin to emerge which deserve consideration. First, the evidence shows that the average turf quality of the better vegetative strains is materially higher than that of Seaside, the only creeper for which any appreciable quantity of seed is available commercially. Disappointingly, it is not always the same vegetative strain or group of strains that is responsible for this better performance. Strains which may be exceptionally good in one location in one year, may be just average or even mediocre at another place, or in another year. A strain that may show a high degree of resistance to a disease under one set of conditions may be severely injured by the same disease a year later. One that maintains excellent quality at a given rate of nitrogen in one season may mat and thatch badly the next. Many other characters fluctuate in the same way.

This general inconsistency in performance is the second fact that emerges when we total the records. It emphasizes the fact that we should approach the selection of a vegetative strain for our greens with a great deal of caution. Results will depend upon how carefully we have evaluated the things that are available, in the light of the local conditions to which they will be subjected. Perhaps, after we have had these grasses for a longer period, we can reach more definite conclusions about their individual value. At present, their use must still be largely on a trial and and error basis.

In the Offing

The third class of cool season grasses consists of the new things that are "in the offing". Considering the widespread need for better grasses, they are pitifully few in number. I shall limit the list to those types for which sufficient records are available to indicate that they may have possibilities. They deserve watching and as seed becomes available they should be tried on a small scale. It is only as we accumulate evidence of their performance under a wide range of practical conditions that we can reach a fair estimate of their value.

One of the new grasses that may be further along, from an experimental standpoint, than most of the others is the synthetic or polycross creeping bent.

This has resulted from selection and breeding work at the Pennsylvania Experiment Station. Seed of the polycross is produced by planting 3 selected parents vegetatively in alternate rows and permitting them to cross at random. The parents used are strains that have shown a high disease tolerance and exceptionally good turf quality in tests over the 5 year period 1947-1951. Tests include both vegetatively planted and seeded plots.

The polycross has been in our turf quality test plots for the last 3 years. During this time it has been compared with 99 of our best vegetative and seeded strains of creeping, colonial, and velvet bents. It has been as good as the best of them in good years and outstanding in bad seasons. During the past 2 years it has been used on a small scale by a number of Golf Course Superintendents over a quite wide range of conditions.

Performance reports received to date have been very encouraging. If they continue to be as good we shall give the strain a name and release it as an improved type. We believe there is a definite need for seed of a good creeping bent. Seeding is much simpler and less expensive than vegetating. Certainly it is more desirable where an unsatisfactory type of grass needs to be replaced or turf density increased on a green, without taking it out of play. Since it takes two years to bring plantings into full seed production only very limited amounts of polycross seed will be available until 1954.

A better creeping red fescue is also a definite possibility. It is hard to evaluate fescues. They are highly variable in disease tolerance and are extremely sensitive to temperature and humidity. We made several hundred selections of creeping red in 1938 from various sources. World War II interfered with this work, but finally enough seed was produced to establish turf quality tests of 40 selections at State College in 1947 and at Beltsville in 1949. These locations probably represent extremes in growing conditions. It is comparatively easy to grow good fescue turf at State College. It is difficult at Beltsville. It has been encouraging to find that the same strains have led at both locations throughout the entire testing period.

The three strains that gave the best average performance in both series of tests have been combined. Seed of this cross has been distributed to a number of experiment stations for testing. Records are being secured on it in such widely

separated locations as Ohio, Indiana, New Jersey, Oregon, South Dakota, Saskatchewan, and at several locations in Pennsylvania. Reports to date have been so encouraging that we have started to increase seed and we hope to have some available to plant commercial seed fields next season. If reports continue to be good it will be named and released as an improved variety.

One other development must be added to the list of improved grasses that are in the offing. There is a good possibility that we may have a better Colonial bent within a reasonable time. This may come from either or both of two sources. Many of you are aware that Dr. Jes DeFrance of the Rhode Island Experiment Station has been working with this species for some time. Originally, he collected over 5,000 individual plants from many locations in the North East. His first study of these indicated that 352 might have possibilities. These were put into turf quality tests where they were kept at a height of 1 inch under minimum maintenance. He has found eight strains that show superior performance for disease resistance, upright habit of growth, and density. Sufficient seed will be available next season from 5 of these to permit distribution to other stations for further testing.

The Oregon Experiment Station has been making new Colonial selections for some years. In 1950 they were kind enough to forward to me small quantities of seed of about 15 strains. These were planted in small plots and we now have two full years of records on their disease resistance, growth characters and general turf quality. Two of these strains have been exceptionally good under our conditions at State College. We have sent these records out to Oregon and are advised that they will increase enough seed to permit more comprehensive tests at Eastern stations.

This is the report of what is around the corner. The development of a really superior strain of grass is a slow process. It requires just as much patience on the part of those who are doing the work as of those who are waiting for it. I assure you that by far the easiest way would be to jump to conclusions and "jump the gun". And the result would be the usual one — just another specimen, about which nobody knows much of anything, to add to the confusion and increase our suspicion that there is no such things as a truly better grass.