

Important Northern Golf Grasses

By R. A. Oakley

One of the most important considerations in the starting of a golf course is the selection of turf for the golf course. The September, 1922, number of THE BULLETIN contained an article entitled, "Some Simple Facts About Our Northern Golf Grasses," by Dr. Piper and the writer. Interest in this subject made it necessary to reprint the information contained in the article, in the December, 1924, number. We are now making the third reprint, because of the demand for information on turf grasses best adapted for Northern golf courses. There are some slight changes in the text from the previous issues based on our more recent investigations and observations.

The only grasses of outstanding importance for our Northern golf courses, by which is meant, broadly speaking, those courses lying north of the 37th degree of latitude, are Kentucky bluegrass, redtop, the bents, red fescue, and *Poa trivialis* (or bird-grass, as it is sometimes called). Sheep's fescue, Canada bluegrass and the rye-grasses may be added to this list, since the first two are used for the rough and are very valuable for this purpose, while the latter are in a way emergency grasses, particularly for the fairway. There are a few other species used occasionally but they are of so little importance that they will not be discussed here.

THE BLUEGRASSES

The grasses belonging to the genus *Poa* are commonly called bluegrasses. There are many of them, but only one (Kentucky bluegrass) is purposely cultivated to any considerable extent on our Northern golf courses. Canada bluegrass, however, is valuable, but only for the rough, and *Poa trivialis*, or bird-grass, has a limited place particularly on fairways. Annual bluegrass (*Poa annua*) is a very common species on putting greens, where it volunteers abundantly and is largely regarded as a weed; however, it is not without merit.

Kentucky Bluegrass.—Because of its wide range of adaptation and the character of its turf, Kentucky bluegrass tops the list of fairway grasses for Northern courses. It requires fairly rich soil for its best growth, and when given such soils it makes very excellent fairway turf. Kentucky bluegrass should be used as an important constituent of fairway mixtures on all Northern golf courses. On very sandy soils, red fescue may sometimes do better, but such soils, to produce really good turf, should be topdressed with clay and manure; when so treated they will produce better turf of Kentucky bluegrass than of red fescue. The bent-grasses make excellent fairway turf, particularly in parts of Pennsylvania, New York, and the northeastern states, but usually the seed of the bents is too high-priced to permit their use except in mixture with Kentucky bluegrass.

Kentucky bluegrass seed should not be sown alone, since it germinates slowly. Furthermore, it usually requires a year or more from the time of sowing for the grass to make good playable turf.

This fact has given rise to the well-known bluegrass-redtop mixture. These two grasses make an almost ideal fairway combination. Redtop is an excellent starter but a poor finisher. Kentucky bluegrass is the reverse—it starts slowly but finishes well, provided reasonably favorable conditions are given it. The first year from time of seeding, redtop is the dominant grass; after that, Kentucky bluegrass characterizes the turf. It is a vital mistake therefore to sow Kentucky bluegrass seed alone on fairways or lawns. Redtop seed should always be sown with it. Three to four pounds of seed of Kentucky bluegrass to one pound of recleaned redtop seed is a very satisfactory proportion for a mixture of these two grasses. On a well-prepared fairway seed bed, 100 to 150 pounds of seed of such a mixture is an ample quantity for sowing one acre. In the Northeast, especially in New England, some bent seed, as much as 10 pounds to the acre, should be added if available, since conditions there in general favor the ultimate dominancy of the bents. Seeding should always be done in the late summer or early fall.

It is popularly supposed that Kentucky bluegrass is a lime-loving grass and requires a sweet soil for its best growth. This opinion probably is due to the fact that it is found in greatest abundance on limestone soils. In general, these are rich soils. Really poor soils must have added to them something besides lime before they will grow bluegrass; but rich soils will produce excellent bluegrass turf, other conditions being favorable, even though they be low in their lime content. There is evidence to indicate that Kentucky bluegrass can be grown on acid soils if such soils are fairly rich, especially in available nitrogen. Kentucky bluegrass is not at its best during the hot, dry periods of summer, but over much of the area where it is used as a fairway grass, summer annual grasses, including crabgrass, come in to produce playable turf. When the short days and cool weather of fall arrive, bluegrass asserts itself and produces turf of almost ideal quality, so that the weedy summer grasses often really are a benefit rather than a detriment.

Good Kentucky bluegrass seed should weigh approximately 22 pounds to the bushel and should not have more than 13 percent of inert matter (chaff and trash). It should have less than two percent of weed seeds, and it should germinate not less than 80 percent. However, new-crop seed, as it is called, may be potentially viable, but because of its freshness may not germinate as high as it will one year later. Conditions of harvesting and curing being satisfactory, seed one year old, if properly stored, will usually germinate appreciably higher than new-crop seed. Even under ideal conditions its germination is slow, two or three weeks usually being required from the time the seed is sown until the seedlings are much in evidence.

Canada Bluegrass.—While often recommended for the fairway and frequently included as a constituent of fairway and putting green mixtures, Canada bluegrass has no place on the fairway proper in any part of this country. The stubbly, rather thin character of its turf makes it undesirable as a fairway or putting green grass. For the rough, however, it is very good, especially south and west of New England, on clay soils. Canada bluegrass does not require as rich soil as does Kentucky bluegrass; in fact, it will make better rough on poor clay soil than on good soil. It fits in well with sheep's

fescue, and the combination makes an almost ideal one for the rough. For original seedings of the rough, 30 to 40 pounds of Canada bluegrass and 40 to 50 pounds of sheep's fescue are sufficient for one acre of well prepared soil. The seed of Canada bluegrass closely resembles that of Kentucky bluegrass, but specialists can easily tell one from the other.

Poa Trivialis (Rough-Stalked Bluegrass, Rough-Stalked Meadow-Grass, or Bird-Grass).—There is a distinct difference in color between *Poa trivialis*, the name commonly used in the trade for this grass, and Kentucky bluegrass. The former is shiny and apple-green in color, while the latter is a deep blue-green. *Poa trivialis* is much more spreading in its habit of growth than is Kentucky bluegrass, and when grown in mixtures with other northern turf grasses it has a tendency to form definite patches, as do creeping bent and velvet-bent. It is an excellent northern shade grass, especially for lawns, and is found in considerable abundance on fairways and somewhat sparingly on putting greens on many golf courses in the New England states. On fairways it will apparently withstand poor drainage better than Kentucky bluegrass and probably quite as well as redtop or the bents, but its vitality is seriously reduced by hot, dry weather. On putting greens it is not nearly so satisfactory as either creeping bent or velvet-bent. It should be sown in mixture with redtop and at approximately one-half the rate recommended for the Kentucky bluegrass in the bluegrass-redtop mixture. The present market price of the seed is somewhat less than \$1 per pound. In its germination characteristics it is much the same as Kentucky bluegrass seed but requires less time to germinate.

REDTOP

In the language of Ingalls, redtop is a "valuable servant." In making turf on Northern golf courses its chief function is to supplement other grasses. Although very closely related to the bents botanically, it is quite different from them in its turf-forming habits. Used alone it makes good turf only in the early stages of its development. After the first year it becomes too coarse and open in its habit of growth to make turf of satisfactory quality. Redtop should never be sown alone on the fairway or elsewhere where permanent turf is desired. It is an ideal grass to mix with bluegrass for seeding fairways, since it makes up the turf for the first year, or until bluegrass becomes established. Usually after the first year it gives way almost completely to bluegrass where the conditions are even fairly well suited to the latter.

The great value of redtop is the ability of its seed to germinate quickly and produce vigorous seedlings. It is because of this that it should be used extensively with other grasses, particularly Kentucky bluegrass, for the original seeding of fairways. The bents have the same characteristic, but their seed is too scarce to be used extensively on fairways at this time. One pound of recleaned redtop seed to three to four pounds of Kentucky bluegrass is the standard mixture; but considerable latitude may be allowed in the proportions.

Where red fescue is used either on the fairways or greens, redtop helps out greatly. Red fescue does not form close turf quickly and needs a grass of the habits of redtop as a temporary filler. The

usual proportions of the red-fescue-redtop mixture, either for fairways or greens, is approximately four pounds of the former to one pound of the latter. While redtop alone will persist for a relatively long time under putting green conditions, it soon gives way to creeping bent where the two are sown together.

In the South redtop seed is sometimes sown in the fall for winter putting greens. This is usually done on newly prepared seed beds and sometimes on old Bermuda turf, but it does not appear to be as satisfactory as is Italian rye-grass seed for sowing on Bermuda grass turf. Redtop seed is abundant, relatively cheap, and of good quality. Recleaned redtop seed should weigh approximately 40 pounds to the bushel.

THE BENTS

The correct common names for the bents, seed of which is now on the market, are (1) German or South German mixed bent (this is still sometimes erroneously called "creeping bent"), (2) Rhode Island bent or Colonial bent, depending upon whether the seed is of domestic or of New Zealand origin, and (3) seaside bent. Seaside bent is botanically known as *Agrostis maritima*. There is apparently more than one strain of it. Seed of it is now being harvested in the Pacific Northwest and in Prince Edward Island, so that it may be regarded as a commercial commodity. The commercial strain from the Pacific Coast is apparently somewhat different from that now harvested on the Atlantic Coast. Both strains appear to be good turf-producing grasses but their value for fine turf making is yet largely to be determined. Seed of South German mixed bent comes mostly from the Rhineland region. Some, however, is produced in Holland and elsewhere in Continental Europe. Average lots contain approximately 10 to 15 percent of seed of velvet-bent, usually only a mere trace of seed of true creeping bent, and the remainder, exclusive of weed and other seeds, is seed of the same species of grass as is commonly known as Rhode Island bent. There is no seed of true creeping bent or of velvet-bent on the market.

Rhode Island bent seed at present is harvested only in Rhode Island, although the grass is very abundant in much of the northeastern part of the United States. Colonial bent seed comes from New Zealand, and botanically is the same as Rhode Island bent—that is, it produces the same kind of plants and turf. However, the seed of Colonial bent as it is now on the market contains very much less chaff and other inert matter than does commercial seed of Rhode Island bent.

The bents taken collectively are by far the best of our northern putting green grasses. There are few who will dispute this. They make playable turf quickly from sowing and produce permanent turf that maintains itself better under unfavorable conditions imposed by soil, climate, disease, and play than does red fescue, their closest competitor for putting green honors. There is scarcely a place where red fescue does well that the bents will not do equally well or better, and there are many places where the bents thrive but where red fescue practically fails. The bents will withstand poor drainage better than does red fescue, and likewise continuously high temperatures; consequently, they can be used farther south than can red fescue. Furthermore, the bents seem to be more resistant to the brown-patch disease, which is a very important characteristic.

The supply of the various kinds of bent seed appears to be adequate for present needs.

Preference has been expressed for German bent seed as compared with seed of Rhode Island or Colonial bent. This is due to the fact that it contains a small percentage each of creeping bent and velvet-bent seed, while commercial seed of the other bents does not contain them. Creeping bent and velvet-bent are regarded as exceedingly valuable in putting green turf. On old greens that have been sown with German mixed bent seed there will be found distinct patches of creeping bent and velvet-bent a foot or more in diameter. Some greens are made up almost completely of these patches. On some of the New England courses velvet-bent constitutes most of the turf of the greens, and also covers large areas of fairway. The reason for this is not known. Southward creeping bent predominates over velvet-bent where the two are found together.

The species of bent commonly known as Rhode Island bent, the seed of which makes up the great bulk of seed of all commercial bents, makes an excellent turf for putting greens and fairways. The plants of this species spread, but not so rapidly or in quite the same manner as those of creeping bent or velvet-bent.

Trained seed analysts now can tell the seed of the bents from that of redtop. The ultimate user therefore may be fully protected if he will take the trouble to have samples properly examined before he makes his purchases.

Creeping (or carpet) bent and velvet-bent can be propagated vegetatively. The former lends itself better to this method than does the latter, because it spreads much more quickly by runners or stolons. The vegetative method of propagating creeping bent is becoming very popular for the making of putting greens. Runners or stolons of several strains are now commercially available. These strains differ in the character of turf they produce and also in disease resistance, particularly their resistance to brown-patch. It is suggested that prospective purchasers inform themselves at least in a general way of the differences between the commercial strains so that they may order the one that suits them best.

THE FESCUES

The common fescues of our Northern golf courses are red fescue and sheep's fescue. There are several others that occur to some extent but they are relatively unimportant. In the past considerable quantities of meadow-fescue seed were used in fairway mixtures, and even now there are some who recommend this grass for the fairway. It is a serious mistake to use meadow-fescue on any part of the golf course, since it is a relatively coarse, tufted grass and not a turf former. The name "fescue" doubtless has aided in placing it among the golf turf grasses, where it clearly does not belong.

Red Fescue.—Seed of red fescue is on the market under two designations, namely, European red fescue and Chewings (or New Zealand) red fescue. The former is produced mostly in Germany and the latter in New Zealand. Whatever their botanical differences may be, they appear to have essentially the same characteristics so

far as their turf-making habits are concerned; therefore the single designation "red fescue" is used here to include both. The seed of the variety known as Chewings fescue (named for a Mr. Chewings) is the kind now most abundant on our market. A careful, extensive, and unprejudiced study of golf grasses in America leads to the definite conclusion that red fescue is a much overrated grass so far as its use in this country is concerned. The reputation which it enjoys abroad and the shortage of good bent seed doubtless have helped to make it easily possible to extend the use of red fescue here. Those who are making a careful study of golf turf grasses are coming to realize that it is not all that its advocates have claimed for it. Red fescue, under the best conditions, makes excellent turf. Its leaves are usually fine, but they are somewhat wiry in texture. This is particularly noticeable in hot, dry weather of summer, and although not seriously objectionable it is not a very desirable characteristic. Red fescue is capable of making both good greens and fairways. It can withstand more shade than can our other common golf turf grasses, and it has the ability to grow on very sandy soil in the northeastern part of the United States. This, however, is not a great asset, as the turf it forms on such soils is not first-class fairway turf. The chief objection to red fescue is that it forms close turf very slowly; and on poor soils, especially poor sandy soils, it has a decided tendency to become bunchy. It is largely because of this fact that Kentucky bluegrass and the bents are very generally preferred to it. Where red fescue has made cuppy or bunchy turf it is a very difficult matter to get it or other grasses to fill in successfully. Hot weather affects red fescue much more adversely than it does Kentucky bluegrass, redtop, or the bents; therefore it can not be used successfully on courses as far south as Washington, D. C., and at that altitude. Brown-patch also seems to attack it more severely than it does the bents. Kentucky bluegrass, it will be remembered, is practically immune to this disease.

Everything considered, red fescue is decidedly second to Kentucky bluegrass as a fairway grass, and to the bents on the putting greens. The cases where it is superior to these grasses are very few indeed. It is by no means uncommon for the bents to crowd out red fescue on the greens and for Kentucky bluegrass to overrun it on the fairways; but no cases have been noted where red fescue has replaced either the bents or Kentucky bluegrass.

Red fescue will not withstand as close cutting as will the bents, because of the structure of the individual plants. The close cutting that will produce the best bent turf is quite too close for red fescue. The germinability of red fescue seed is not very dependable. The seed loses its vitality quickly. It does not remain viable as long in storage as does seed of the bluegrasses, bents, or redtop. Every lot, therefore, should be tested before it is sown. Most of the seed that is on the market is relatively free from other seeds and inert matter; this is particularly true of seed of Chewings fescue.

Sheep's Fescue.—As a grass for the rough on Northern golf courses, sheep's fescue is nearly ideal, especially if it is grown upon poor soil. It forms just about the right kind of bunches to afford the proper penalty to the player. It is also useful on bunkers to produce what are commonly called "whiskers." On most of the older courses in the North there is more or less sheep's fescue on the fair-

ways and some even on the greens. Many of the fairway and putting green mixtures formerly used contained seed of it. It should never be sown on either fairway or green, as it is not a turf-forming species. The use of sheep's fescue should be confined strictly to the rough and bunkers. For the rough it should be sown at the rate of about 50 to 70 pounds to the acre. Seed of Canada bluegrass can be sown with it to advantage. The commercial seed of sheep's fescue is difficult to distinguish from that of red fescue.

RYE-GRASSES

Grasses which grow quickly and seed of which germinates quickly sometimes have a place in the making of golf course turf. The best of such species for Northern golf courses are the rye-grasses—perennial or English rye-grass, and annual or Italian rye-grass. Neither of these is of value permanently; in fact, neither, strictly speaking, is a turf-forming grass, but each is useful as a temporary turf maker in mixtures with other grasses.

Perennial Rye-Grass.—Although resembling Kentucky bluegrass in certain characteristics, including color and texture of herbage, perennial rye-grass (*Lolium perenne*) is very unlike Kentucky bluegrass in its habits of growth. While this seed has been frequently included in putting green mixtures, it has no place on putting greens of Northern golf courses. Its use is confined to certain situations on the fairways and newly cut or filled areas elsewhere that need quick protection from washing. While perennial rye-grass is a tufted grass, it is known to persist for a number of years under putting green conditions, and on lawns it lasts indefinitely. It closely resembles Italian rye-grass in appearance and general habits of growth. The under surface of the leaf in both species is bright green and shiny, thus characterizing and distinguishing them from the other common golf turf grasses.

Heretofore most of the seed of perennial rye-grass was produced abroad. A considerable quantity is now being produced on the Pacific Coast, particularly in Oregon. The seed weighs approximately 24 pounds to the bushel and usually retails at a price appreciably lower than that of Kentucky bluegrass.

Italian Rye-Grass.—In general appearance Italian rye-grass (*Lolium multiflorum*) resembles perennial rye-grass very closely. Furthermore, it serves much the same purpose on golf courses. Although it is an annual species, it nevertheless commonly has a tendency to persist for more than a year under conditions such as are found on fairways. Where quick-growing emergency grasses are needed on the golf course to provide a grass covering for any reason whatsoever, Italian rye-grass is better than perennial rye-grass. In the South, Italian rye-grass is very useful for making a winter covering on Bermuda grass putting greens and lawns. Seed of it is sown on Bermuda grass turf in the fall, and in a short time a very good putting surface results if proper care is given. Heretofore the supply of seed of Italian rye-grass has come from abroad. Recently a considerable quantity has been produced in the Pacific Northwest, which section promises to become the important source

of supply for our American golf courses. The seed resembles that of perennial rye-grass in general appearance but has an awn at the tip which is not completely removed even in carefully milled commercial stocks. In the weight per bushel and price per pound there is little difference between the seed of Italian rye-grass and that of perennial rye-grass. Seed of neither species should be used as an important constituent of turf grass seed mixtures on Northern golf courses.

The Relationship of the United States Golf Association Green Section to the District Green Sections

The success of the local green sections established within the last few years has been such as to induce the United States Golf Association to take active steps in organizing others. The district sections have been of great assistance to clubs in matters relating to their local problems. In this field they have rendered real service. It is hoped that it will be possible to establish district green sections in all of the important golf sections of the country in the near future. Mr. J. K. Bole has been engaged by the United States Golf Association to do this work, and those who are interested in it should correspond with him, in care of Mr. J. E. MacCloskey, Farmers' Bank Building, Pittsburgh, Pa.

The relation of the United States Golf Association Green Section to the district green sections is solely a cooperative one. The former organization exercises no administrative control over the latter in the way of dictating policies or programs or in supervising their activities. It neither selects nor controls their personnel. Experience has shown that the local organizations can render certain kinds of service which it would be unwise, if not impossible, for the United States Golf Association Green Section to render. The United States Golf Association Green Section, however, will keep closely in touch with the district green sections and will cooperate with them in every way not in conflict with its established policy. Clubs should understand clearly that there is no overlapping of ground by these two organizations, that one does not replace the other, and that the district green sections, while assisting in applying locally information sent out by the United States Golf Association Green Section, are not to be regarded as performing the functions of the latter organization.

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Crawfish abounding in soil are an indication of defective drainage. The best remedy for crawfish is drainage. Where the installation of drainage is impracticable, the crawfish may be kept below the surface by underlaying the soil with 3 by 3 mesh galvanized wire mats at a depth of 16 to 18 inches. The crawfish may also be killed by squirting carbon disulfid into the burrows and closing the holes. The use of wire mats and carbon disulfid is described in THE BULLETIN, Vol. III (1923), page 241.