CHAPTER IX

The Making of the Turf

After the improvement of the soil with regard to its texture, humus content, and drainage, there still remains much to be done before good turf is actually secured. Good grass is found on every hand, but really good turf is far from common. It is proposed here to discuss methods of sowing the seed, improvement of poor turf, sodding, and the seeds of the principal grasses that are used in turf-making.

SEEDING NEW GREENS

The importance of sowing grass seed properly for the production of fine turf can scarcely be overestimated, since upon it the quality of the resultant turf is to a very large degree dependent. With the choice of seed a settled question, the chief factors involved in seeding are the time of sowing, preparation of seed-bed, rate of sowing — by which is meant the quantity of seed used on a given area,

distribution of the seed, and the covering of the seed. These apply alike to fairway and putting-greens, even though their relative importance may be somewhat different for the two portions of the course. For a large part of this country where golf is played, the time of seeding is an extremely important consideration. With the exception of parts of New York and the New England states, and the parts of the South where Bermuda-grass is used, seeding in the late summer or early autumn is almost necessary for success. The optimum date varies from early August to early October, depending on the locality. At this time of the year the severe heat of summer is past, and with it the aggressiveness of summer annual weeds, both of which are a serious menace to young seedlings. Also at this time of the year the moisture conditions are usually very favorable, and there is enough heat to produce a sufficient growth to enable the grass to survive the winter in good condition.

Grasses, when sown in fall or at the beginning of a period of cool weather, show a conspicuous tendency to form stools, whereas if sown during warm weather this tendency is inhibited, each plant growing tall and slender. Consequently, if sowing

PLATE IX. — A general view of the operations in lifting and laying turf.

is done in late spring or early summer much larger quantities of seed are necessary to make a dense sward.

In parts of New York and the New England states, spring seeding is preferable to late autumn seeding largely because of the effect of the severe winter climate on the young grass. Fortunately the spring season in the North is usually very favorable for seeding, since no periods of severely hot weather occur until July.

Because of its quick response to frost, it is almost necessary in the South, where Bermuda-grass is used to sow it in the spring. Since this grass is a very aggressive species and delights in warm weather, it is not seriously handicapped by heat or weeds.

A thorough preparation of the seed-bed contributes largely to the success of the turf, and only by thorough preparation is it possible to obtain a uniform stand of grass, regardless of the quantity of seed sown or the evenness with which it is distributed. Good preparation of the seed-bed consists of the thorough stirring of the soil, and a sufficient packing of the sub-surface. The surface to a depth of two to three inches should be well fined,

but not compacted. When autumn seeding is to be practiced, early summer plowing is advised. The summer rains falling upon the loosened soil go far towards settling it, and by frequent disking and harrowing a properly settled seed-bed results. Disking and harrowing also destroy large numbers of weed seedlings. An excellent implement for fining the surface, which should be used just prior

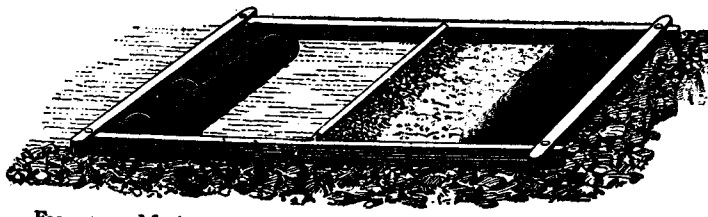


FIG. 27. — Meeker harrow, a very useful implement for fining the soil surface just before seeding.

to seeding, is a harrow consisting of four series of straight disks set in a frame in a position similar to that in which the teeth of a spike-tooth harrow are set (Fig. 27). This implement not only pulverizes the surface, but also levels it effectively. On putting-greens where an undulated surface is to be produced, this harrow can be used to advantage in preliminary preparations, and to a limited extent for the final working of the soil.

Thorough preparation is essential alike for the

PLATE X. — Lifting turves from an old green after the sod has been cut into 10-inch squares.

fairway and the putting-green, and in all operations just before seeding where horses are employed, they should be provided with special shoes in order that deep foot-tracks may be avoided. If lime or humus materials are to be incorporated with the soil during the course of preparation of the seed-bed, they should be applied after plowing and just before the first disking or harrowing. Barnyard manure, unless finely comminuted, should be applied before plowing in order that it may be turned under completely. Commercial fertilizer should be applied just before the last fining cultivation preceding the sowing of the seed. This insures its thorough incorporation with the surface soil.

In the table on the following page is shown the average number of seeds to the pound, and the average percentage of germination of the various kinds of turf plants.

There is no very definite relation between the number of seeds to the pound and the rate at which each species should be sown, since the latter depends on various factors other than the number of seeds involved. The figures of the table, however, disclose clearly why it is not necessary to sow as many pounds of seed of the bent grasses to a given

area as of the fescues. Too light seeding is practiced more commonly than too heavy seeding. Injury very seldom results from sowing seed thickly, while thin seeding is very frequently the cause of poor turf. A uniform and satisfactory stand of grass can rarely be obtained by a light rate of seeding, and for this reason it is usually poor practice to economize on seed.

TABLE SHOWING NUMBER OF SEEDS IN ONE POUND OF VARIOUS TURF PLANTS

NAME OF PLANT	AVERAGE NUMBER OF SEEDS IN A POUND	AVERAGE PERCENTAGE OF GERMINATION OF HIGH-GRADE SEED
Creeping Bent	6,000,000	85
Rhode Island Bent	6,000,000	85
Redtop	6,000,000	85
Kentucky Blue-grass	2,400,000	70
Bermuda-grass	1,800,000	80
Red Fescue	500,000	70
Sheep's Fescue	700,000	70
Fine-leaved Fescue	1,200,000	70
Various-leaved Fescue	400,000	70
Italian Rye-grass	270,000	85
Perennial Rye-grass	300,000	85
Yarrow	3,500,000	80
White Clover	750,000	90
Japan Clover	370,000	85

Practices and recommendations vary greatly with regard to the rate of seeding for both fairway and

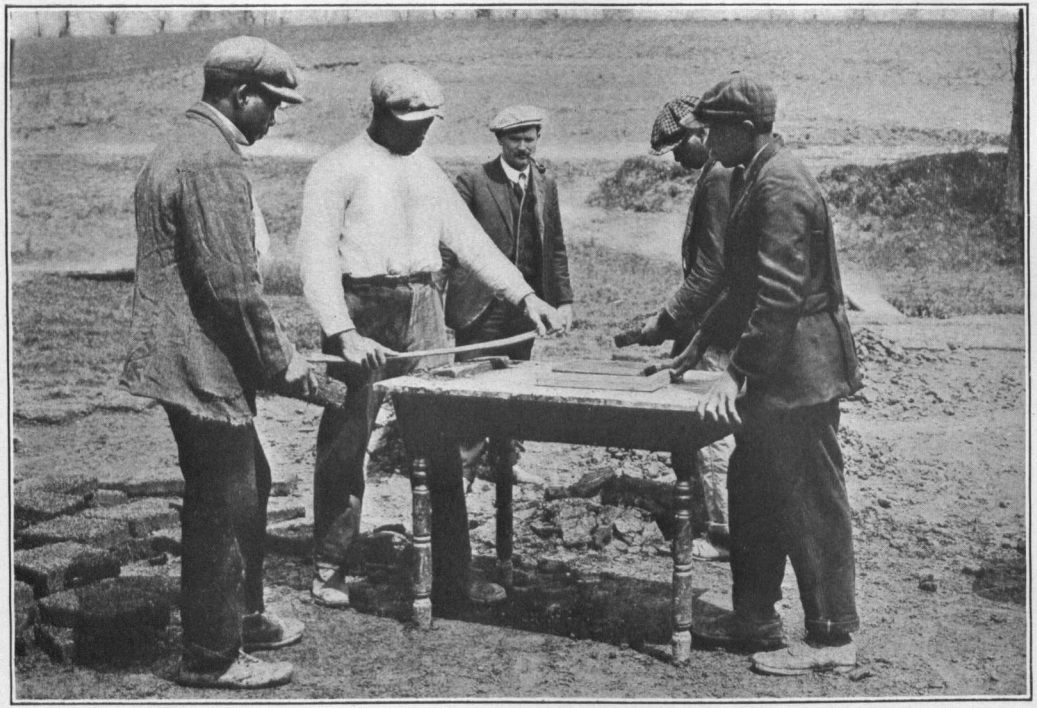


PLATE XI. — Trimming turves to equal thickness. The trimming box is 1½ inches deep and the trimming is done with an old scythe blade.

putting-greens. The consensus of opinion, however, seems to indicate that 100 to 150 pounds of seed — depending somewhat on the mixture — is sufficient for an acre of the fairway. For the putting-greens as much as twenty pounds to 1000 square feet have been recommended, but five pounds of the bent grasses, or seven pounds of Red Fescue, seem to be sufficient for this area. This is true where the ordinary methods of seeding are employed. If the seed is mixed with compost, peat, or some other germinating mixture, and spread evenly over the surface of the soil after the Taylor method, a much smaller quantity is required. This seems to indicate that the necessity for thick seeding is very largely due to poor preparation of the seed-bed and uneven distribution of the seed. Very heavy seeding frequently results in such a poor growth of roots in the young grass plants that a durable turf is very slow in developing.

Broadcasting is essential to the even distribution of seed. Ridges in the turf are certain to result if the drill is used. An experienced workman can scatter seed very evenly by hand, but a small hand-operated seeder is usually to be recommended for seeding both fairway and putting-greens. If one-

half of the seed is sown in the direction of one diameter of the area, and one-half at right angles to it, a fairly even distribution at least should result. One of the advantages of heavy seeding lies in the fact that it increases the possibility of even distribution, or at least modifies the effect of uneven distribution, which has very much to do with the success of the turf.

It is not an easy task to cover seed properly. On large areas, especially on the fairway, the weeder

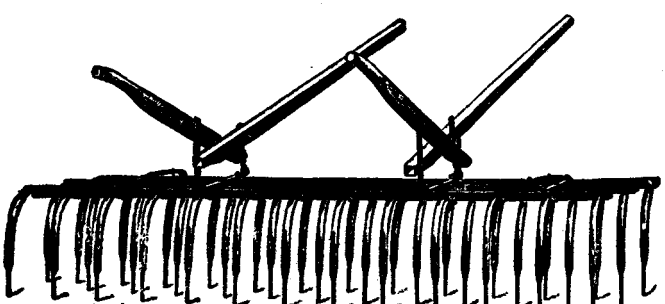


FIG. 28. — Weeder, a useful implement for harrowing the land after the seed is sown.

(Fig. 28) can be used and is the best implement available. For portions of the putting-greens the hand rake is the only tool that can be employed. On account of its continuous sweep the weeder is more satisfactory than the rake, since the short strokes necessary in connection with the use of the latter

PLATE XII. — Laying turves on the well-prepared foundation of the new putting-green.

have a tendency to leave the seed in irregular rows. Shallow, even covering, followed by light rolling, provides good conditions for germination. The roller, however, should not be used when the soil is wet.

IMPROVING POOR TURF

On golf courses it is often more convenient and not infrequently more satisfactory to improve poor turf than to prepare and seed the land for new turf. This is particularly true of fairways, the plowing up of which prevents play upon them for a period. Even where the turf is originally very poor, much can be done to improve its character without interference with the game. On steep slopes plowing should rarely, if ever, be resorted to, as the danger of injury by gullying and washing may far outweigh any advantage that may reasonably be expected from the plowing.

To improve poor turf the most important methods are top-dressing, seeding, and gentle scarifying.

Various top-dressing materials are helpful, dependent upon the conditions. Well-rotted barnyard manure is always beneficial, and one or two applications often make wonderful improvement.

Good loam soil is also excellent, and especially needed where the surface soil is very thin or stony. Liming is advisable where the grass is largely or mainly Blue-grass, but otherwise it is of doubtful

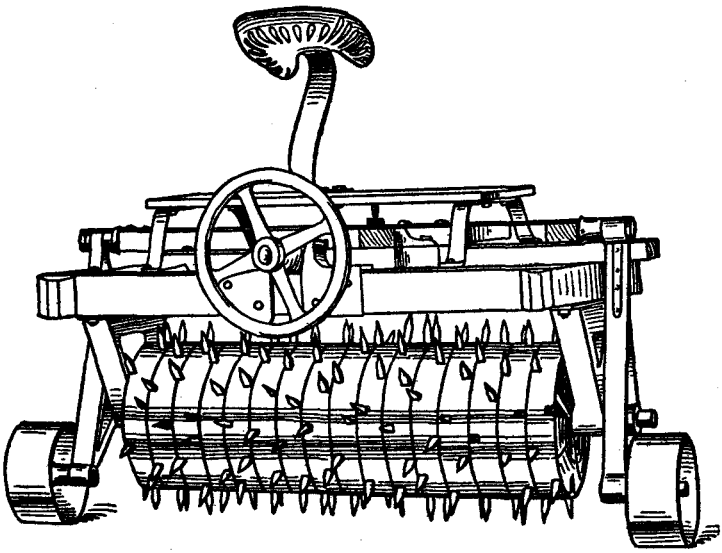


FIG. 29. — Toothed roller, useful for scarifying when applying seed or fertilizer in fall.

benefit. If fertilizers other than barnyard manure are used, they should preferably be of an organic nature such as humus fertilizers, cottonseed-meal or bone-meal, as the effect of these is generally slower and much longer continued.

Sowing good turf grass seeds in poor turf each

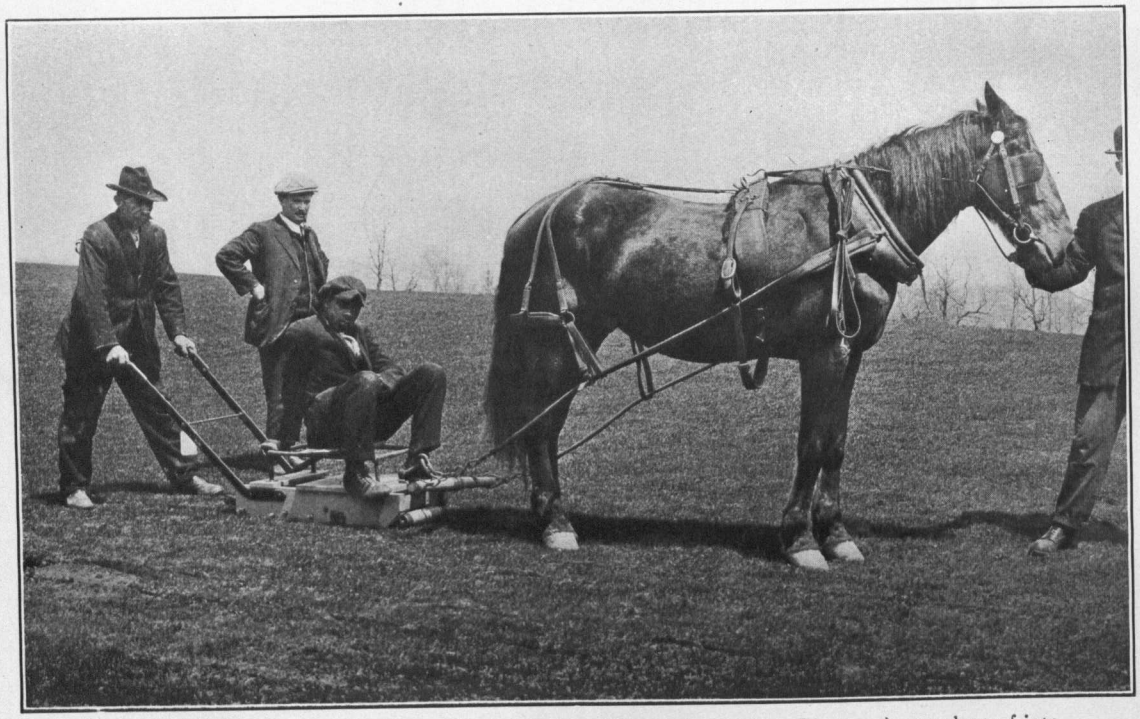


PLATE XIII. — A method of cutting turf on fairways. The implement (see Figure 31) cuts the turf into strips 10 inches wide and about 2 inches thick.

year will gradually change its character to that desired. In seeding old turf it is important to get the seeds into the ground. This may be done by the use of a cut-in seeder (Plate VIII); by the use

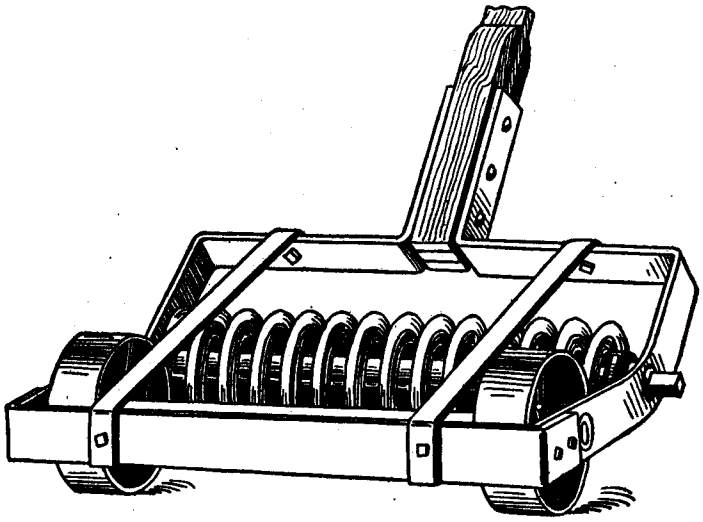


FIG. 30. — A good type of machine for scarifying turf when seed is sown or fertilizer applied in fall.

of some scarifying implement, such as a toothed roller (Fig. 29) or the cutting harrow shown in Fig. 30; or by seeding and then top-dressing with good soil. On stiff clayey soil top-dressing with sand and liming are both to be recommended. The seeding is best done in the fall at a time when moisture conditions are favorable.

SODDING OR TURFING

There frequently arise conditions in the development of a golf course in which it is desirable to lay the sod or turf instead of seeding, notwithstanding the greater expense. On steep banks sodding is always more satisfactory than seeding, especially if the soil be poor. It happens not rarely that a turf capable of being played upon is desired in the shortest possible time. For such cases sodding possesses a great advantage over seeding, as the turf may be played upon a few days after laying.

New putting-greens are sometimes sodded completely as soon as the surface is prepared. For this purpose only first-class turf should be used, and ordinarily this has to be grown especially, excepting where the turf is transferred from an old green.

In the mechanical operations of turfing, two things are of particular importance, namely, to have the turf of even thickness, and to have the cut edges vertical. There are special turf-cutting machines to be had which will do this work more accurately than it can be performed by hand. Excellent results may, however, be secured by using only a

large knife and a board ten or twelve inches in width to use as a guide so that the pieces of turf are uniform in width. It is a good plan to cut the turf both ways before lifting so that all the pieces are either ten or twelve inches square. In place of the knife a special rolling colter may be used advantageously. A double colter with the blades ten or twelve inches apart will further reduce the labor of cutting. For rapidly lifting turf that need not be cut accurately an ordinary turf cutter of the sled type (Fig. 31) may be used.

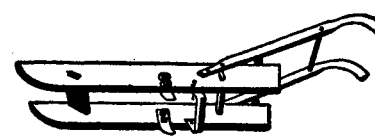


FIG. 31. — Implement used for cutting sod, also shown in operation in Plate XIII.

In laying turf the pieces should be put together only fairly close. Due care should be taken to trim to an equal thickness. The trimming may be accomplished with a large knife, first inverting each piece of turf in a frame of the desired thickness, one and one-half inches being about correct. If the turf be laid with care, there is usually left ample space to permit expansion where the laid turf is rolled. If, however, some pieces be thicker than others, a roller heavier than is desirable must

be used, and even this may not overcome the difficulty as it may cause the turf to buckle up at the joints when the pressure is released. Care in laying the turf is the most satisfactory way to avoid trouble.

When the sod is to be transferred from an old green to a new one, the various operations to be followed may be thus detailed:

1. Cut the turf to be lifted into ten-inch squares, using a board as a guide.

2. Lift the turves with a turf lifter.

3. Trim the turves in a trimming box so that each is one and one-half inches thick.

4. Lay the turves on the prepared ground on the new green, using boards to prevent the new-laid turves from being injured by the wheelbarrow or by trampling.

5. Top-dress with sand or sandy loam and sweep to fill all interstices.

6. Water to get the turves thoroughly saturated and to settle any loose soil in the interstices.

7. Twenty-four hours later, or after the turf is well drained, roll with a roller of moderate weight.

The details of the processes above described are nearly all illustrated in Plates IX to XV inclusive.

PLATE XIV. — Chopping fairway turf into approximate squares after it has been cut into strips.

The need for patching with sod is almost continuous on putting-greens. Poor pieces of turf occasioned by weeds or otherwise are best remedied by bodily removal and replacing with new turf. In patching two things are important: (1) that the new piece of turf be of the same outline as that removed, and (2) that it be rather thick. Circular turf-cutters of different sizes insure patches that fit exactly, but it is still better if the patch be slightly smaller than the hole, as then pressure with the foot will make it fit snugly. Patching is often very unsightly because the new pieces turn yellowish or brownish. This may be avoided by having the patches thick and transplanted immediately so that the grass secures practically no setback. Turf patching that is thin or which has been removed too long before replanting is practically sure to turn yellow. If the patch be taken from softer ground, it should be slightly thicker than the piece removed.

Inasmuch as patching is so often employed on putting-greens, every golf course should have a special piece of land on which to grow this turf. Such a sod patch will require practically the same treatment as a putting-green so that the turf will

be of essentially the same quality. Still better, perhaps, is to have the fairways sown to fine grasses so that patching may be secured from the fair green.

THE SEEDS OF THE PRINCIPAL TURF GRASSES

By dealing with a reliable seedsman one can be sure that he is securing the seeds desired, unless, as happens in some cases, the seedsman himself is deceived. For fine turf the principal seeds used are those of the bents, the fescues, and the blue-grasses. The seeds of these three groups are so different that they are easily recognized, but it is less simple to distinguish from one another the seeds of the three different bents, or the five fescues, or the two blue-grasses.

The bents, which include Creeping Bent, Rhode Island Bent, and Redtop have very small seeds, one pound containing 4,000,000 to 8,000,000. The seeds of Creeping Bent and Rhode Island Bent are quite indistinguishable except by the weed seeds present. The former comes from Germany, the latter from New England, and so it happens the weed seeds incidentally present betray to an expert the source of the seed.

PLATE XV. — Distributing turves for laying on a fairway. The operations are rapid, as little care is necessary.

Redtop seed (Figs. 32, 33) in bulk may be distinguished from the other two bents by its silvery purplish color, instead of a yellowish straw color. Individual seeds of Redtop are also distinguishable under a microscope to an expert. As Redtop is much cheaper than the other bents, it has been employed as a substitute or adulterant. Such practice will not be resorted to by a reliable seedsman.

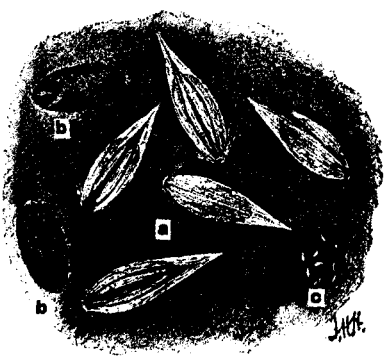


FIG. 32.—Seeds of Redtop representing the "fancy" grade of the trade. *a*, different views of seeds having the white, papery, inner chaff; *b*, two views of a grain, or kernel, with the inner chaff removed; *c*, the same, nearly natural size.

The quality of seed in all three of the bent grasses varies greatly, due to variation of the season and the degree of recleaning to which they have been submitted. Redtop as harvested weighs twelve to sixteen pounds a bushel in the hull, but with the glumes removed the "fancy" or "choice" recleaned seed as it commonly appears in the trade weighs from thirty to forty pounds a bushel. Practically the same variation in weight occurs in Creeping Bent, and for the same reason. As a matter

of fact, however, Creeping Bent is seldom recleaned, owing to its high price and to unavoidable loss which attends recleaning. The wholesale price of unhulled Redtop seed ranges ordinarily from 7 to 15 cents a pound, while the same grade of Creeping Bent sells for 25 to 30 cents a pound. The wholesale price of recleaned Redtop varies ordinarily from 19 to 26 cents a pound.

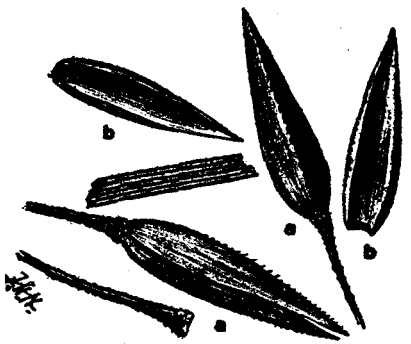
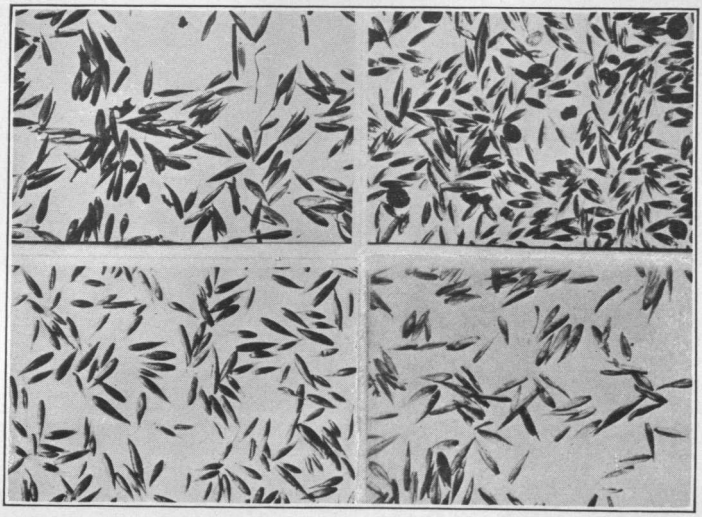


FIG. 33. — Chaff of Redtop seed. *a*, whole spikelets usually devoid of seed in "chaffy" grades; *b*, separated scales of the same; *a* and *b* represent the outer chaff of the seed. (Enlarged.)

With improved recleaning machines, numerous grades of seeds may be separated from any bulk lot of Creeping Bent or similar seeds (Plate XVI). As the cost of the seed is one of the smallest items in securing a fine putting-green, it is good policy for golf clubs to demand the best grade of seed that can be secured by recleaning. There is no valid reason why seedsmen should not supply seed equal in quality to the best grade shown. Such recleaned seed free from weeds would more than repay any reasonable increase of



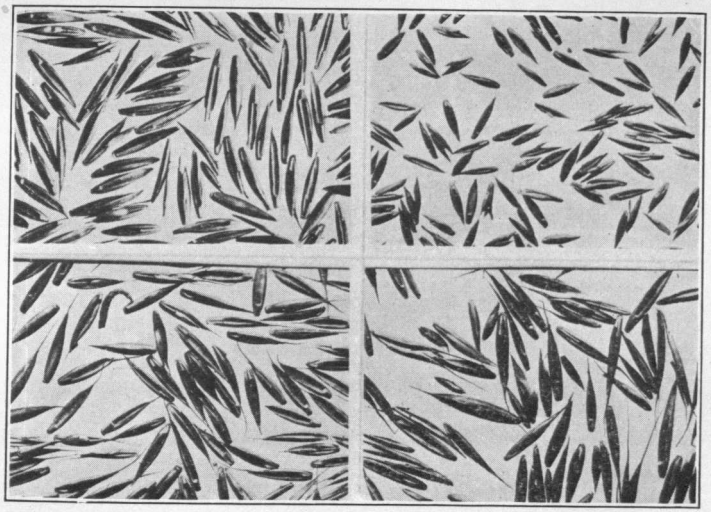


PLATE XVI.—Upper. Creeping bent seed, enlarged. The original sample, upper right, contains many weed seeds. By recleaning the other three grades were obtained, that in the lower left corner being pure.

Lower. Seeds of four kinds of fescues used for turf purposes: upper right, fine-leaved fescue; upper left, various-leaved fescue; lower right, sheep's fescue; lower left, red fescue.

price, as ordinary Creeping Bent seed usually contains several very troublesome weeds, among them mouse-ear chickweed, sorrel, plantain, and veronica.

Fescue seeds of the five kinds used for turf purposes are very much alike (Plate XVI). Indeed, in the seed Sheep's Fescue is almost indistinguishable

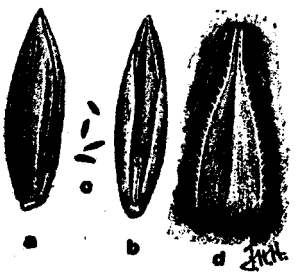


FIG. 34. — Kentucky Blue-grass seeds. *c*, natural size, the others enlarged; *a*, side view; *b*, front view; *d*, the palet, showing character of margin.

FIG. 35. — Canada Blue-grass seeds. *a*, side view; *b*, front view; *d*, palet, showing the character of the margin; *c*, seeds natural size, the other figures enlarged.

from Hard Fescue; and Red Fescue and Various-leaved Fescue are very closely similar. On the other hand, Fine-leaved Fescue is easily recognized by its smaller seeds and the absence of awns. Red Fescue is the most important of this group of grasses and the most common seed is that from New Zealand known as Chewings' Fescue. This as obtained from trustworthy seedsmen is usually of high purity, but it may contain a few undesirable weed seeds.

Seeds of the two Blue-grasses (Figs. 34, 35, 36), Kentucky and Canada, are larger than the fescue seeds, and differ from all except Fine-leaved Fescue in having no awns. The two kinds of Blue-grass seeds are much alike, but may be distinguished as indicated in the illustrations.

FIG. 36. — Seeds of Kentucky Blue-grass *a*, and Canada Blue-grass *b*, all enlarged.

Formerly Kentucky Blue-grass seed was much adulterated with the cheaper seed of Canada Blue-grass, but this is never practiced by good seedsmen. There may be various incidental weed seeds in Kentucky Blue-grass, but as this is used primarily on fairways, the few weeds can do no particular harm. Canada

FIG. 37. — Seeds of Italian Rye-grass, natural size and enlarged. Note the awn or bristle-like tip.

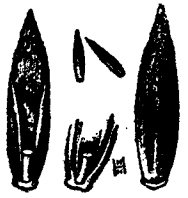


FIG. 38. — Seeds of Perennial Rye-grass, natural size and enlarged. Note the absence of awn at tip.

Blue-grass is rarely used on golf courses, but for thin or hard soil makes a good tough turf for fairways.

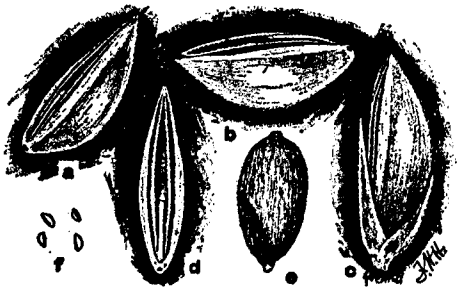


FIG. 39. — Seeds of Bermuda-grass, different views, the figures at *f* being natural size.

Other seeds of turf grasses often used include Italian Rye-grass (Fig. 37), Perennial Rye-grass (Fig. 38), Bermuda-grass (Fig. 39), and Crested Dogstail (Fig. 40).

In purchasing seeds it is well to buy only from dealers of known reliability. One should never purchase seed mixtures but make one's own mixtures from pure seed. When large purchases of seed are to be made, it is well to secure samples and prices first from different seedsmen, and have these passed upon by an expert. A little experience will convince any one that competition in the seed business is keen and that with rare exceptions seedsmen are honest.

FIG. 40. — Seeds of Crested Dogstail, natural size and enlarged. They are bright yellow in color.