

2. A mixture of $\frac{3}{4}$ Rhode Island bent and $\frac{1}{4}$ redtop seed sown as to produce a good stand of grass makes very satisfactory putting turf.

3. A mixture containing $\frac{1}{2}$ Rhode Island bent seed and $\frac{1}{2}$ redtop seed may be counted upon to make very good turf but the redtop plants are likely to be more abundant in it than they should be for good putting quality.

4. A mixture of $\frac{1}{4}$ Rhode Island bent seed and $\frac{3}{4}$ redtop seed results in too many redtop plants. Even two-year-old turf from this mixture is likely to have a superabundance of redtop plants.

5. In plots sown with seed of Rhode Island bent and redtop, the number of redtop plants is very appreciably reduced the second year if the turf is kept in putting condition, but even at the end of the second year there are still a good many redtop plants in evidence.

It is thought that the results at Arlington will be applicable in general elsewhere. If seed of German mixed bent had been used in the experiment instead of seed of Rhode Island bent the percentage of redtop plants in the resultant turf might have been reduced more quickly.

Nothing in this article should be taken to justify the careless, accidental, or fraudulent mixing of redtop seed with the seed of any of the bents, and anyone buying bent seed should see to it that bent seed is delivered to him. If for any reason he wishes to mix redtop seed with bent seed he should buy the two separately and pay only the market price for each. If mixtures of bent and redtop seed are offered for sale they should be offered at a price determined by the relative proportions of the constituents.

Seeding Fairways and Rough

By LYMAN CARRIER.

Much of the fairway seeding which was done last fall on newly-constructed courses in the northeastern quarter of the United States turned out badly. It is advisable to study the causes of these failures and guard against having a repetition of the heartaches and disappointments with the new seedings this year. Several courses with almost perfect greens were delayed for months in opening because the fairways were unplayable.

TIME TO SEED.—One cause of failure was the lateness of the season when the seeding was done. There is no question but that late summer or early fall seeding is safer and more satisfactory in the northern parts of the country than seeding in the spring. This does not mean that the seeding can be delayed until frosts and freezing weather have come and expect the young seedling grasses to survive the winter. Farmers have learned that the latter half of August is the safest time to seed grass if a crop of hay is expected the following year. It is true that much grass seeding is done later in the fall with wheat; but the farmer does not expect a hay crop in that case until a year after the wheat is harvested. Fairway seeding from Virginia and Kentucky northward should be done between August 15 and September 10. It is not necessary to wait for a rain before seeding grass if the seed bed is in proper condition. Farmers have a saying which golfers should adopt as a guide—"it is better to dust in seed than to mud it in." If the ground is dry the seed will not germinate,

but it will be there when the rains come, and one week of good growing weather in the fall often makes the difference between success and failure in grass seeding.

There is seldom a year when there are no rains in September. There were two or three last year which were quite general. But after those rains there was a protracted drought over much of the North which lasted until freezing weather. As a result, even where there was good germination the grass seeded after the rains did not become sufficiently rooted to go through the winter.

PREPARING THE SEED BED.—Saving of expense in the proper preparation of the ground before seeding the fairways is false economy. Harrow and roll, and roll and harrow until there is a fine, mellow layer of two or three inches of soil on top of a firm, compact subsoil. Be sure that there are no ridges and hollows to interfere with the mowing after the grass is up. While you are about it you had better roll and harrow again.

SCATTERING THE SEED.—Few seem to be able to do the seeding without having the grass come up in rows as if it had been put in the ground with a grain drill. This drill effect is very objectionable and makes the playing on the fairways unsatisfactory for a year or more. These rows of grass where the broadcast or the wheelbarrow types of seeders are used, are caused by the seeds collecting in the harrow marks. Dividing the seed into two portions and seeding one part at right angles to the other will not do away with this objectionable feature of rows if the land is not harrowed between the two seedings. One caution should be observed: the seed must not be covered deeply. A spike-toothed drag is the coarsest working type of harrow which should be used after seeding, and this should have its teeth slanted well backward. A weeder with slender spring-teeth is better for covering the seed than a drag. A well-made brush harrow is perhaps better than either for this purpose. Rolling after seeding is usually beneficial.

The writer would suggest the following procedure in seeding fairways:

1. Have the seed bed prepared as described above, the last operation being a light harrowing.
2. Sow half of the seed, using a broadcasting type of seeder.
3. Harrow lightly.
4. Sow the remainder of the seed crosswise of the line of direction of the first seeding.
5. Roll. If the soil is a heavy clay which is inclined to bake, it should have a light harrowing after the rolling in order to leave the surface slightly rough. A harrowed surface is not as likely to wash in case of a heavy rain, nor will the soil blow as badly as if it had been left smoothly rolled.

KIND OF SEED TO USE.—We have seen no evidence which makes it advisable for us to change our previous recommendations for fairway seeding in the North. Four parts of Kentucky bluegrass and one part of redtop, using 100 pounds of the mixture per acre, has given very satisfactory turf.

SEEDING THE ROUGH.—The rough is often treated like a stepchild. Usually a thin covering of vegetation is all that is desired, so the seeding is delayed until all of the other work is over. Rough which players have

to walk over in going from tees to greens or greens to tees should be seeded at the same time as are the fairways, otherwise the players will have to walk in mud during wet spells. Sheep's fescue and Canada bluegrass appear to be the best species for the rough. In case the land has been broken during the construction work, it is advisable to add some redtop to the sheep's fescue or Canada bluegrass, as the case may be, in order to get a covering quickly on the bare places.

A Rapid Renovation of Putting Greens

By ALMON BROOKS WILDER

On our northern Michigan course, where the soil is very sandy, it was decided to introduce water and to renovate the greens. These greens had irregular turf with a poor growth of redtop, Kentucky bluegrass, and a few scattered bunches of red fescue. In previous years the unwatered greens had been mowed and rolled regularly and had been seeded occasionally on top of the turf, the seeding probably being of no benefit. Also, to overcome the roughness of the greens, there had been frequent top-dressing with finely screened sandy loam. By the time the work of renovating the greens was begun there must have been over an inch of this good top soil directly on top of the original sand soil.

Late in May a water system was installed. The old turf of the greens was thoroughly scarified with a spiked roller (a 10-inch log full of spikes protruding 1½ inches), first thoroughly soaking the turf so as to provide for good penetration of the spikes. Redtop was then seeded broadcast at the very heavy rate of 25 pounds to 1,000 square feet, and a thin coating of sandy loam mixed with pulverized sheep manure was applied, and the greens were then again heavily watered. The watering was continued every day except when it rained, and in about a week's time the redtop had sprouted, and it grew rapidly. Every fortnight during June and July the greens were reseeded, but much less heavily, and more sandy loam was applied. Sheep manure was omitted after the second treatment, as it was found that it burned the young grass considerably.

By July 1 there was a very heavy stand of fine young grass which had apparently crowded out the old stiff grass, the greens having a soft, velvety surface very pretty to see and perfectly accurate for putting. Once the grass was well under way, say by June 12, biweekly mowings had been commenced, and after July 1, when the greens began to be used regularly, they were mowed daily.

The loam used for top-dressing had enough clay so that it tended to cake a little with the frequent watering and drying. To overcome this, several times during the summer finely screened beach sand was used as a top-dressing. The greens continued in perfect condition throughout the summer, being beyond criticism, neither too fast nor too slow, and of perfect surface.

It is clearly recognized that these greens are not in permanent condition. The expedient was adopted simply to save time. Our present intention is to plant these greens with creeping bent stolons, letting the bent gradually run the redtop out. It is, however, gratifying to know that perfect greens of this emergency type may be grown any spring if the per-