Vegetative Planting

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It would seem that the vegetative method of planting grass has been described sufficiently in detail so that every reader of THE BULLETIN should understand it clearly. Nevertheless, after sending a correspondent our circulars on vegetative planting, we often get by return mail the question, "Where can I buy seed of this grass and how much is it a pound?" Such inquiries are the excuse for treating the whole matter again.

First of all, *vegetative planting is not seeding.* The creeping bents, which are planted by this method, seldom produce viable seed. There is no pure seed of them on the market and no good prospects of there being any in the near future. There is usually a very little creeping bent seed in the German mixed bent. Plants of creeping bent can nearly always be found on courses where the German seed has been used in the past.

Creeping bent has an efficient means of spreading. It sends out long, jointed runners, kown as *stolons,* which can take root at each joint and thus form new plants, much the same as do strawberry vines. The seaside strain of creeping bent produces both seed and stolons; so there is a possibility of getting seed from that variety, but there is none on the market now.

Grass stems are always jointed. These joints (or *nodes,* as botanists call them) are in some grasses very close together; in others they may be several inches apart, as in corn, sorghum, or bamboo. The part between two nodes is called an *internode.* At each joint there is imbedded in the stem under the base of the leaf a bud. Botanists have a big word for these buds; but *bud* is clear enough for our purpose. In most grasses these buds on the erect stems do not grow unless the plant meets with an accident, as for instance, if the tip of the stem is cut off. In that case the buds develop into branches. A grass that seeds freely has little need to use these buds. In grasses with creeping stems, like creeping bent, Bermuda grass, crab grass, and quack grass, these side buds may start to grow at any time the joint comes in contact with continual moisture in the presence of air. In other words, whenever the stem gets down on moist earth the bud begins to develop into a branch. Just as soon as the bud starts to burst, roots begin to grow out of the joint and penetrate down into the soil. So far as known, no roots or other growth can be produced from any growing part of a grass plant except the joints.

Vegetative planting is as old as written history. The sugar-cane crop has been planted by this method for centuries. The point should be kept in mind, however, that there are only a few grasses which are suited to vegetative planting. Any grass may be transplanted—that is, a tuft of the grass with roots attached may be put in a new location, as in sodding; but that is not vegetative planting in the sense that the term has in connection with the vegetative method of planting creeping bent. *Joint* or *node planting* would be a more definite term than the one in use. In an experiment, we have trimmed the stem of creeping bent, leaving only the node with

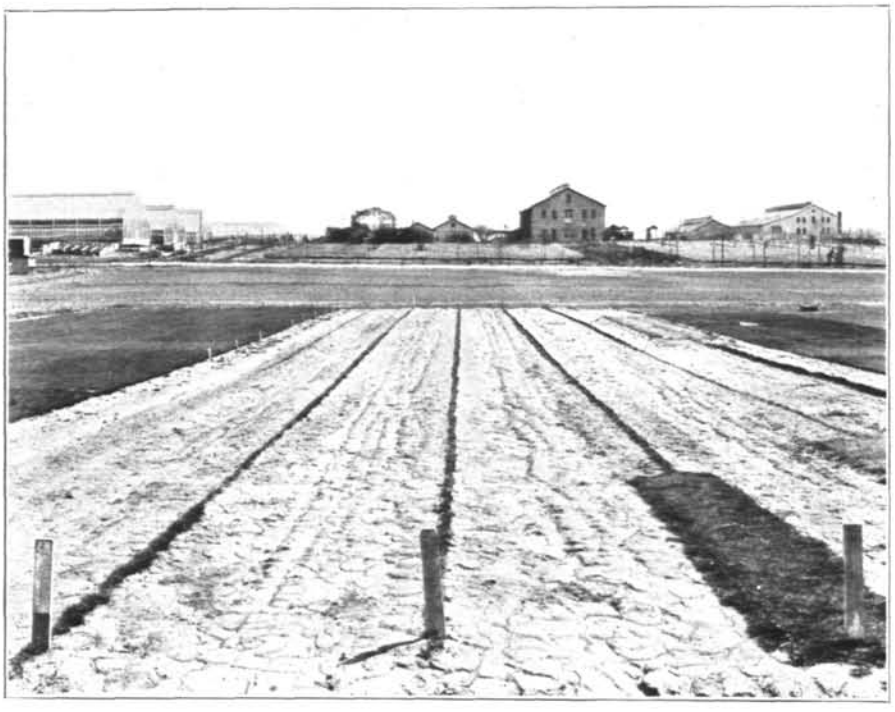

Fig. 1. Nursery rows of creeping bent planted September, 1922. The wide side strip at the right represents the growth made the preceding season. Picture was taken in April, 1923, at Arlington Farm, Va.

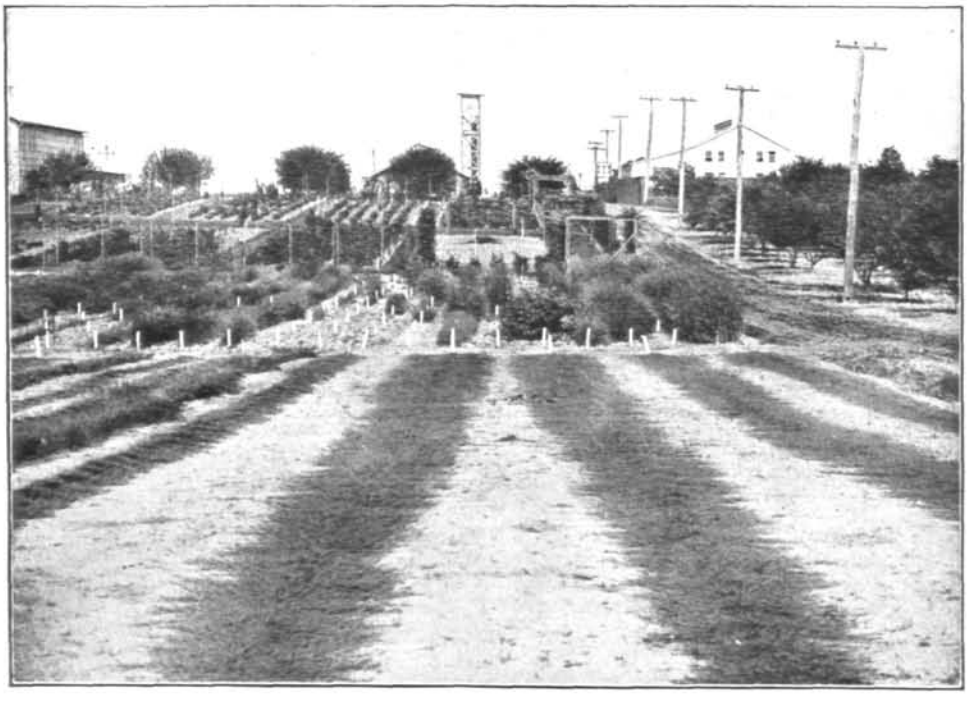

Fig. 2. Rows of carpet bent at Arlington Farm, Va. Photograph taken in June, 1919. The rows were planted the previous October and when planted each consisted of a single row of runners; the following June these rows were 3 feet wide, and by the first of October 6 feet wide.

the bud attached, and have had it grow like seed. Let us make this point clear: It is not necessary to have roots on the creeping bent joints when they are planted, in order to have them grow. If the stolons are alive the buds will grow whenever the conditions are favorable.

Geographic Distribution of Creeping Bent

Creeping bent is a northern grass and thrives only under humid conditions. There appears to be no reason why it can not be grown anywhere in the northern part of the United States if water is supplied when the rainfall is insufficient. It is not a dry-land grass, and no attempt should be made to grow it under arid or semi-arid conditions unless plenty of water is available for irrigation. In fact, we do not advise any one to attempt this method of planting putting greens unless a watering system is available so that the grass can be watered; nevertheless, we have grown several plots successfully without any artificial watering. At present we can not say how far south the grass can be successfully grown. We have no definite information in regard to its success south of Richmond, Virginia. It is worth trying as an experiment throughout the South wherever it can be kept well watered during the summer.

Time of Planting

Creeping bent can be planted at any time the ground is in condition to be worked. We have made plantings from early April till late in November. The late plantings make very little growth during the winter, but they start off earlier in the spring and grow faster than spring plantings. Plantings made in midsummer have made excellent turf in a remarkably short time when kept well watered. We rather prefer late summer plantings, in order to take advantage of the good grass-growing weather of September. Judging from our experience and much observation, it is safe to plant creeping bent by the vegetative method any time. I would not hesitate to plant in midwinter if there were any good reason for doing so. While the grass would not grow at that time of the year, the stolons would not rot and they would give an account of themselves when growing time came.

Nursery

The first thing necessary in vegetative planting is to get the stems, with their all-important joints, to plant. These have to be grown just as a crop of seed has to be grown. There has been much confusion between nursery planting and planting for turf. These are two separate and distinct features of the method. Nursery planting is done in rows kept cultivated and free from weeds, the same as is done with any row crop, like corn, beans, or potatoes (see figures 1 and 2). Any soil which will grow tame grasses in the region indicated above is suitable for growing bent in nurseries. Bent thrives under a great variety of conditions. Moist clay loams will give the most abundant growth, but a nursery on a sandhill at the Sylvania course, Toledo, Ohio, where there was little other vegetation, gave an excellent crop of creeping bent stolons. A hard clay hilltop is the

most unsuitable location to select, but good grass can be grown even under such conditions if given an occasional watering.

The land should be free from other turf grasses. Sod land should be plowed some time before planting a bent nursery. It is a good plan to prepare the nursery at least six months before it is to be planted, if cultivated land is not available. Ordinary tall-growing weeds are easily taken care of after the nursery is planted, but white clover, bluegrass, quack grass, and redtop cause a lot of trouble if they are present.

After the ground is plowed, harrowed, and raked to give a fine seed bed, the rows should be laid off five to six feet apart. The grass is planted in trenches not over one inch deep. It is a good plan to stretch a string to locate the trenches in order to get them regular and straight. The trench may be made with a sharp-pointed hoe, point of a pick, or a sharp stick. The sod for planting is next torn apart and spread in a continuous row down the trench and covered immediately with not over one-half inch of soil. Single stolons end to end in the trench are sufficient to give a good stand. Ordinarily, however, we stretch three or four along side by side. But the line had best be continuous, not in hills. One square foot of stolons as they grow naturally without being cut, will plant 100 linear feet of nursery row. If nursery material one year old or less is used, the stolons separate easily. If, however, one uses old turf, say a selection from an unusually good patch formed by a single plant, this should be cut or torn into very small pieces and these pieces planted 4 inches apart in rows. A square foot of old sod will not plant as long a row as a square foot of nursery stolons. Hereinafter, the term *sod* refers to a piece of old turf; *nursery sod* to pieces of nursery rows. If some of the green leaves are left exposed, so much the better. The row should then be watered. A sprinkling pot without the nozzle is handy for this. While creeping bent sod with a little dirt adhering may be shipped long distances, the stolons when torn apart should not be exposed to the drying effect of the sun any longer than it is possible to avoid. Remember, no one has yet succeeded in restoring life to hay.

After the nursery is planted it is necessary to weed it continually and to cultivate it occasionally in order to keep the soil loose between the rows. Artificial watering for the nursery, while not imperative in a humid climate, is very helpful. A few applications of ammonium sulfate or any other *quick-acting nitrogenous* fertilizer will make the runners grow faster. It is safer to scatter the fertilizer alongside the row than to put it directly on the grass, as it is an easy matter to apply enough to burn. The stolons grow out from each side of the row in a tangled mass which becomes from two to three inches thick. The length to which they will grow in one year depends on the richness of the soil. Ours on very poor soil usually grow two to three feet on each side, making rows four to six feet in width; on rich soil they grow much larger. In order to get good growth it is necessary to give continual attention. If you plant the nursery and neglect it for several weeks or months you need not expect to have a good crop of stolons. The growth

is continuous throughout the summer, provided the moisture conditions are satisfactory.

No attempt is made by the grass to send up seed-stalks the first season after planting; but if left undisturbed there will be a large number of seed-heads formed the second year while the stolons continue to spread vegetatively from the outer margins of the row. As previously stated, there is very little viable seed produced.

When a row of stolons is taken up, the place it occupied should be planted with fresh stolons. A row one year old cut back to the original planting will not spread like a new planting. Why this is so we are unable to explain.

Planting Putting Greens

Some mistaken notions have arisen in regard to the method used for planting the stolons where turf is desired. Some greenkeepers have confused *nursery planting* with *turf planting* and have the idea that a few stolons planted here and there will mat together and form turf; some have tried to combine vegetative planting with seeding; and some have simply made a mess of it and quit. No claim is made for perfection in the following suggestions. They have developed from the writer's experience gained from numerous experiments conducted during the past five years at the Arlington Experimental Farm and from supervising the planting of twenty-five putting greens in the fall of 1922.

Preparing the green. The preparation given a putting green which is to be planted by the vegetative method does not differ from what is needed for a good seed bed; that is, the soil should be firm beneath, with a fine, loose layer on the surface. There should be available a pile of top-dressing sufficient to cover the entire green from three-eighths to one-half inch in depth, located conveniently with reference to the green. It requires about 10 cubic yards of top-dressing for 6,000 square feet of surface. As additional applications of top-dressing will be needed after the grass begins to grow, it is advisable to have an ample supply on hand. The top-dressing should be screened, and it should be friable—that is, it should be of materials which do not run together and bake into a crust. The ordinary top-dressing mixture of one-third loam, one-third sand, and one-third manure is excellent. But it is not always necessary to go to the trouble of making compost for this purpose. Good loam with an addition of 25 to 50 per cent of sand will usually answer. Swamp soil or woods earth are also good for top-dressing if they have sufficient body so that they will not dry out on the surface and blow away. To put the whole thing in a few words, one should make up the best top-dressing he can from the materials which are available, and if he can not do any better, screen ordinary top soil and use that.

No quick-acting fertilizers, such as sodium nitrate or ammonium sulfate, should be used before planting, nor after planting, until the grass is well rooted and growing vigorously. Stable manure, bone meal, and similar

materials may be used in the preparation of the green, but it is an easy matter to get too large a quantity of soluble salts in the soil moisture for young grasses.

Moisture is the important thing in vegetative planting. If it is a dry period it is a good practice to water the greens thoroughly a few hours before the work is started; this insures having plenty of moisture in the soil, but the surface should be allowed to dry before planting, so that it is not sticky when the planting is being done.

PREPARING THE STOLONS. If the nursery is on the course where the planting is to be done, it is not necessary nor desirable to take up any appreciable amount of dirt with the stolons; they may be cut off at the surface with a sharp hoe, spade, or edging tool. But if you do not take up dirt with the stolons, remember that you must use additional precautions to keep them from drying. It is a good plan to wrap them immediately in wet burlap or put them in wet bags. They may be stored in a pile in the shade if kept wet. It is not advisable to take up at any one time in this way more than will be used in a few hours.

The stolons should be run through a chopping box or fodder cutter with the knives adjusted to cut at 1½- to 2-inch intervals. With most of the hand machines it is necessary to take off all but one knife from the revolving cutter. It is sometimes necessary to run the material a second time through

Fig. 3. Separating the stolons preparatory to running them through the fodder cutter. The nursery sods may be run through the cutter first and the pieces picked apart afterwards.

the cutting box in order to get it cut finely enough to spread easily. This rough treatment does no harm. Nothing is likely to hurt the joints except drying, so the work should be done in the shade as much as possible and the material must be kept moist. (Figure 3.)

STOLONS SHIPPED FROM AWAY. When stolons are to be shipped for some distance it is necessary to take up about one inch of soil so that they will keep alive. In this condition they can be shipped anywhere in the United States. We have had stolons shipped from Sweden to Washington, and they came through alive. Very frequently pieces of turf sent to us from the Pacific Coast for identification come to us through the mail in first-class condition. These nursery sods should be handled in much the same way as is described above. If it is not possible to plant immediately, the sods should be spread out in a shady place, green side up, and watered. Treated in this way there is no danger of losing any of the material. If the nursery sod is dry when shipped there may be some heating. But even if the leaves have turned brown, the stolons are all right for use; the leaves are not essential to the success of vegetative planting.

The sods should be torn apart as much as possible and much of the dirt shaken off before running the stolons through the cutting box. After a sod has been cut into chunks, these should be picked apart. This has been the most tedious part of the whole operation. It would seem feasible to have a machine to do this picking and save a large amount of hand labor, but so far no one has produced such a machine.

Fig. 1. Scattering the pieces of stolons for sod. The top-dressing has been spread in the background but not rolled.

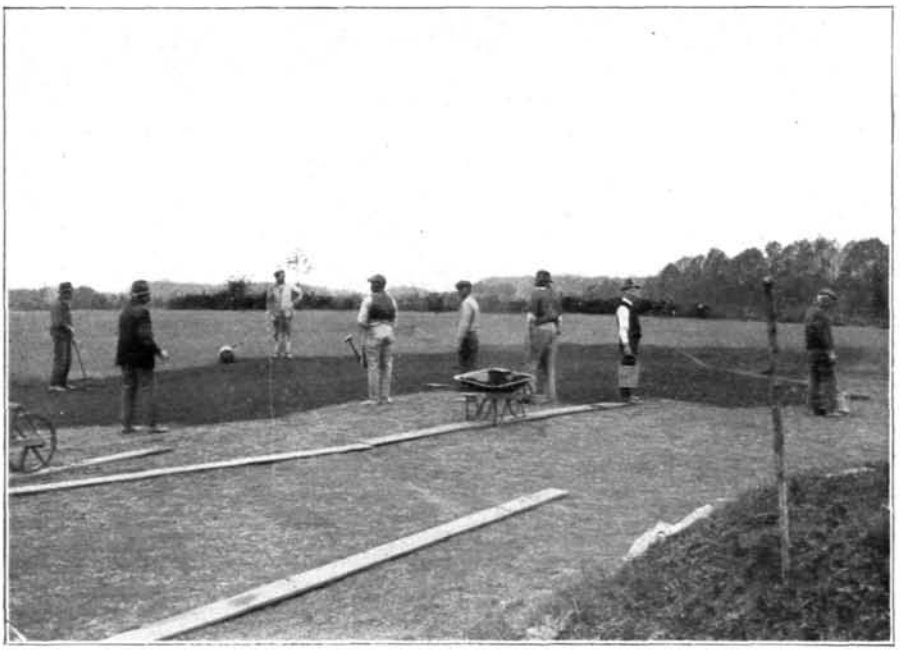

Fig. 5. Covering the cut runners with top-dressing. Picture taken at the planting of No. 9 green at the Columbia Country Club in November, 1919.

PLANTING THE JOINTS. The cut material is best handled in ten-quart pails. The sower carries the pail of material in one hand and spreads the cut stolons with the other hand. It is a good practice to plant in strips, allowing a five-foot strip to each planter, and move across the green in the same direction each time. There should not be more than two men spreading the stolons on a single green; this allows for covering evenly, and some pieces are not left uncovered longer than others. The cut pieces should be spread evenly. There should be no spots of ground larger than one square inch in size which do not have a piece of stolon after the planting is done. One square foot of stolons will plant about ten square feet of green, depending on the thickness of the nursery material and the care taken in planting. It is better to put on more joints than are absolutely needed than to use too few. A thick planting not only gives turf fit for play in less time than a sparse one, but the subsequent expense and care is less. It is poor economy to scrimp in the use of stolons in planting. (Figure 4.)

If there is a strong wind blowing when the planting is going on, it is necessary to protect the workers with a windbreak while they are scattering the joints, as otherwise the cut pieces will be blown about and a poor, unsatisfactory stand will result. A strip of muslin four feet wide, on a movable frame with large, flat feet, makes a good windbreak.

COVERING THE JOINTS. The top-dressing must be put on immediately after the joints are scattered. Do not wait until the green is planted, or

Fig. 6. Watering after the green has been planted, top-dressed, and rolled.

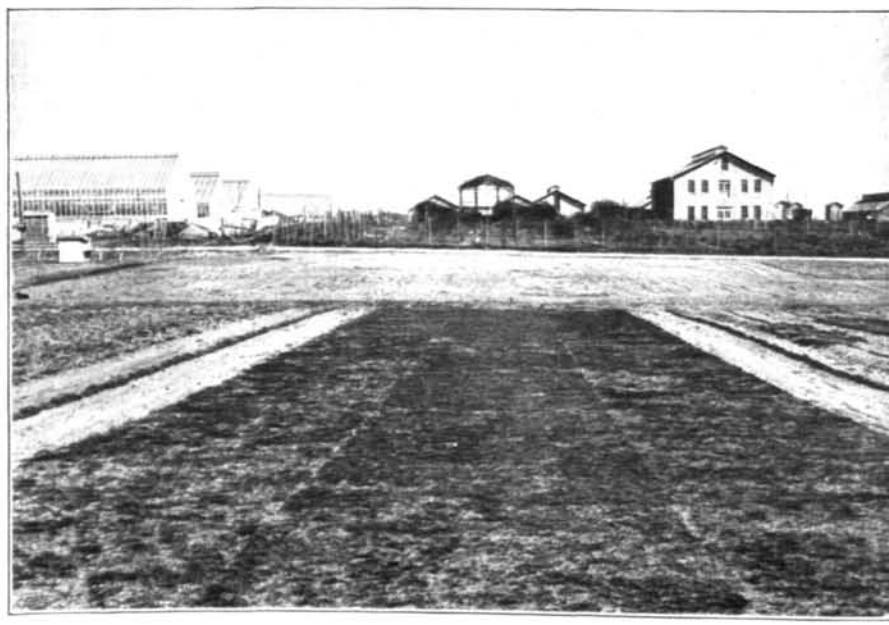

Fig. 7. Middle strip, creeping bent; side strips, velvet bent; planted by the vegetative method in late October, 1921. Picture taken in April, 1922 at Arlington Farm, Va.

half planted, or even one-fourth planted, but start the covering at once, and make the top-dressers keep up with the sowers. This top-dressing can not be spread satisfactorily with a shovel; such a procedure drives the pieces into waves, leaving bare places (figure 5). The method which the writer has used is to take the top-dressing to the green in a wheelbarrow and spread it by hand. The first strip of planting is covered from the outside margin of the green. This is then rolled and a line of planks laid on it to wheel on in order to cover the pieces of grass. Three-eighths of an inch is ordinarily thick enough for a layer. In a very dry period, or if there is any trouble with the water supply, the layer should be thicker. Heavy top-dressings, up to one inch in thickness, will not smother the grass, but they delay the sprouting very decidedly and ordinarily should be avoided.

A method worked out by Mr. H. C. Toomey last fall for spreading top-dressing appears to be an improvement over hand spreading. He constructed a box about 2 feet wide and 3 feet long and 6 inches deep. The sides of the box projected beyond the ends and were cut down to serve as handles. The bottom of the box was covered with three-eighths-inch-mesh wire screening. In use the box was filled at the pile of top-dressing and carried onto the green by two men, who shook it over the scattered grass until they had the material sufficiently covered.

Watering. After the green is about one-third to one-half planted, top-dressed, and rolled, the watering should be started. This is best done with a hose with a rose nozzle. The pressure should be cut down so as to avoid any washing. One man or boy should be set to the task of holding the nozzle, and another to holding the hose so that it does not drag the top-dressing and misplace the pieces of grass, as it will do if drawn about the

Fig. 8. Same view as in figure 7 but taken one year later

Fig. 9. An acre of creeping bent turf, Friendship Golf Course, Washington, D. C. Planted by the vegetative method in May, 1922. Picture taken two months after planting.

green by one person. Automatic sprinkling devices are not good for this purpose before the grass is well rooted and they have only served to damage the plantings where they have been tried. (Figure 6.)

SIZE OF CREW. The work of cutting up the stolons, picking the pieces apart, sowing the pieces on the green, covering with top-dressing, rolling, and watering should go along simultaneously. It is poor economy to work short-handed. A crew of about the right size consists of a foreman, one man to operate the cutting box, six men or boys to pick the grass apart, two men to scatter the cut pieces, two men to spread top-dressing, and two men to water, or fourteen in all. Caddy boys can sometimes be used for a few hours a day picking the grass apart. The foreman can look after the rolling, as that is not a very strenuous job. Such a crew should plant from 1,500 to 2,000 square feet of green an hour.

CARE AFTER PLANTING. The surface of the green should not be allowed to become dry after it is planted, until the grass has covered the green. It should be watered twice a day during dry weather for the first ten days or two weeks. After that, watering thoroughly once a day will suffice. The grass begins to send up green shoots in four or five days. In about three weeks it is usually far enough advanced to need a light top-dressing (about one-eighth of an inch) and a rolling. A week later it should have its first cutting. The clippings may be allowed to fall on the ground, and if the stand is thin they may be covered with a little top-dressing, as the clippings will take root and grow. The grass should be kept cut down to putting condition, and whenever loose runners appear a light top-dressing should be applied. With such care as has been indicated above the green should be in condition to play on after six weeks of good growing weather from the time of planting. (See figures 7, 8, and 9.)

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