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A MONTHLY PERIODICAL TO PROMOTE THE BETTERMENT OF GOLF COURSES

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Why Some Greens Planted by the Stolon Method Have Been Unsatisfactory

By W. S. Harban

It was the wonderful spreading or creeping propensity of certain varieties of bent grasses such as are found in some old greens that had long been seeded to German mixed bent seed, which suggested the idea that these particular strains of bent might be grown the same as Bermuda had been in the South—that is, by spreading stolons of these species on the ground and covering with soil. To carry out this idea, specimens of the creeping bent (or carpet bent—sometimes so called), as well as of velvet bent or *canina* bent, were secured from various golf courses and planted in rows in the nursery at the Arlington Experiment Station, to produce sufficient stolons to carry on experiments in vegetative planting. The first greens, outside of the above station, were planted by the vegetative method on the East Potomac Public Course, Washington, in the fall of 1918. The success of the result was most convincing to those responsible for the idea that beautiful fine turf could be grown in this manner. The failure of these greens, however, as true putting surfaces was apparent. It was this failure that prompted the building of the 9th green at the Columbia Country Club, near Washington, where different methods of planting and upkeep were followed, which have since led to the general acceptance of these methods of turf building of putting greens.

Of the two varieties mentioned above the true creeping bent has been generally adopted for this purpose. It not only has far greater creeping strength but is better suited to the climate over a greater area of the country. The patches of creeping bent found in old greens have each clearly developed from a single seed plant. They are never in evidence until after several years, at first small, then spreading gradually until reaching a diameter of several feet, thus showing the creeping nature of this grass and why, by its restorative tendency, when once established it never requires the use of seed to heal an injury. In fact, it would be foolish to use seed on a bent stolon green at any time, as that would defeat the purpose most desired, namely the production of a turf of uniform texture throughout.

There are many varieties of creeping bent, all of which are not acceptable, as some are far more liable to disease than others, and still others indeed are almost immune to the brown-patch fungus. The Bulletin of the Green Section has so often called attention to these varieties that I will pass over that phase of the subject. My observation has been that all true creeping bents are less liable to brown-patch than is Rhode Island bent; and this is therefore a greater reason for planting greens from stolons rather than using seed, as 85 per cent of the seed in German mixed bent is Rhode Island bent seed.

I now want to call attention to why, after even using the precautions shown above and strictly following the teachings laid down by Dr. Piper, Dr. Oakley, and Prof. Carrier, some of these greens are rank failures as putting surfaces. Let it be understood from the beginning that a plant developed from a stolon is many times stronger than one from the seed. Plants developed from stolons root quickly and grow, under proper care, with the vigor of some weeds. It is very difficult indeed for the first month or two to keep them under

subjection; at such a period they should be cut as often as twice a day, and very short at that. The first cutting should be with the machine set at 5/8-inch, and the clippings should be allowed to fall to the surface. After rolling, the entire green should be again topdressed, as much as possible in the same manner as the initial covering of the stolons. This serves the purpose of a secondary planting, to fill in any weak spots. Watering should be continued as before. When after a few days the grass shows up about an inch, the mower should be set at 1/2-inch, and the grass catcher should ever afterward be used in order to prevent any accumulation of trash on the surface. The grass should be cut regularly every day, and more often if necessary. Occasional, though lighter, dressings are called for to prevent the runners coming to the surface. Unless the runners are kept down in the soil, well covered, a mass of runners will take possession of the turf which can neither be cut by mower nor covered by dressings later.

It is the tendency of creeping bent to send out these runners over the surface which has caused most of the failures that have come to my attention. Such greens play as if they were covered with feathers, and are so rank and rough that they are worthless as putting greens and make only beautiful lawns. A stolon green, if watched carefully, can be made just like the fine, beautiful patches seen in many old greens when the runners are all in the soil surface and the plant blades stand straight and erect assuring as nearly as is humanly possible a surface in all directions approximating that of a billiard table.

If I were asked the question what is the most essential thing to perfect a bent stolon green, I would say, daily close cutting; and if I were asked what next, I would say, more cutting. Remember that any bent green, to get the best results, should be cut and kept cut as close as possible all the time, especially in hot weather, for that is the time in which these greens are subject to diseases, and these are more readily controlled when the grass is short.

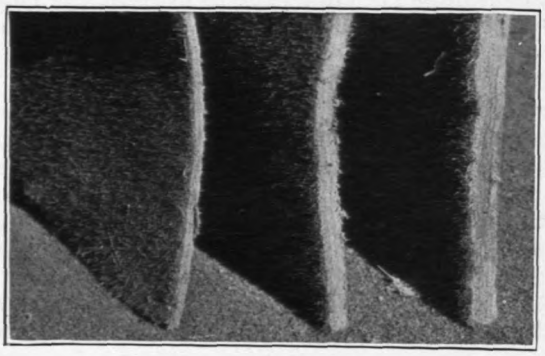
There is one other point upon which I wish to lay particular stress, and that is, that bent likes moisture, as more than 90 percent of the roots never get to a depth of more than 1 1/2 inches. It is well in dry weather to water sufficiently every day to meet this need, but never to overcharge the lower strata by excessive watering, especially on clay soils.

If a little more care than is commonly given to new putting greens is given to bent greens the first month or so they will require much less attention thereafter than any other turf used for this purpose. If these simple instructions are carried out at the beginning there will be few criticisms of stolon greens thereafter. What I am anxious to impress most upon anyone who happens to read this brief story is that creeping bent is a dwarf grass and, as such, is a shallow-rooted grass; that if allowed to grow long it will send out a number of runners on the surface, which destroy the turf for putting and make a slow, spongy surface to play to or to putt upon, and a turf which is more liable to disease and harder to treat; that creeping bent is not only healthier, but also grows thicker, when kept very short; that it requires moisture near the surface; that it is better to water creeping bent daily rather than, as is commonly done, to water every three days; that excessive watering in clay soil is harmful; that it is best to keep the soil moist rather than wet, if possible returning to the

ground each day the evaporation of yesterday; and finally, that creeping bent greens should be given special care until they are fully developed for play.

How Thick to Cut Sod for Putting Greens

In September, 1924, an experiment was inaugurated at the Arlington Turf Garden to test the matter of sodding—that is, the thickness at which sod would establish itself best when transferred to a new surface. The kind of sod used in the experiment was mixed creeping bent and velvet bent.



Three pieces of turf of mixed creeping bent and velvet bent respectively ½ inch, 1 inch, and 2 inches thick

The sods were cut at three thicknesses, namely ½-inch, 1 inch, and 2 inches respectively. The preparation of the receiving soil bed for each thickness of sod was the same, except, of course, that the bed for the 2-inch sod was 1 inch deeper than the bed for the 1-inch sod, and the bed for the 1-inch sod was ½-inch deeper than the bed for the ½-inch sod, the desire being to have a level surface over all the sods after they were laid.

The soil surface was thoroughly watered, and then the sod was laid immediately, rolled lightly, and then watered again lightly. These plots were watered liberally each day for a week after the sod was laid, and the grass was kept mowed to putting length. At the end of the week a piece of the sod in each series was lifted to see if the roots had taken hold in the soil below. These showed that the roots of the ½-inch sod had taken hold firmly in one week, while neither of the other sods had sent any roots down into the soil below. This examination was repeated in another week, when it was found that the ½-inch sod had become so thoroughly attached to the soil that it could not be lifted without breaking the roots or cutting under the sod. The 1-inch had at that time begun to send a few scattering roots down into the soil below, but the 2-inch sod could be lifted as freely as when it was laid, it having established no root-hold in the under soil. This examination was repeated every week or ten days until after frost, which was about seven weeks after the experiment was started. The latest of these examinations in the fall disclosed the fact that the 2-inch sod had not become attached to the soil underneath, while both the others had become attached firmly. There was no noticeable difference in the turf as it went into the winter, but an examination the following spring as soon as the frost had gone out of the ground, revealed that while the 2-inch sod had become attached by roots to the under soil, nevertheless, due to the action of the frost, it had become slightly raised over the others and presented an uneven surface.

These experiments, while only preliminary in their scope, indicate that the thinner sod is cut the better will be the results on the putting

greens when it is properly watered and otherwise cared for. The thickness of ½-inch was found to be the minimum thickness practicable with bent sod.

Fighting the June Beetle with Caddies

By DeWitt Gallaher, Kanawha Country Club, Charleston, W. Va.

On July 1, 1925, I noticed that the June bugs were boring into our greens to deposit their eggs. I found them forming around the greens, and nowhere else. We offered the caddies a bounty of 50 cents a hundred for the captured bugs, male or female. From that time until July 8 we paid $25 for 5,000 captured bugs. We found each female bug was prepared to lay about 40 eggs. Presuming that half of the captives were female, we have exterminated what would amount to 100,000 grub worms that would become pests the latter part of August and September. In combating the grubs the preceding year we found that two men, working continually, extracted from the greens about 200 grub worms a day apiece, at a cost of $8 per day. Eight days after we put the caddies on the job practically no June bugs were to be seen on the premises. Of course, we did not get all of them, but I am sure that in this way we have saved ourselves a lot of expense and trouble for August and September.

July Experiments For Control of Brown-Patch On Arlington Experimental Turf Garden

By John Monteith, Jr.

During the first two weeks of July there was a severe attack of large brown-patch in the vicinity of Washington. At the same time it was reported unusually prevalent in numerous other sections of the country. After the 15th there was practically no active large brown-patch on the Arlington experimental plots. The small brown-patch, however, continued to develop throughout the month on the more susceptible strains of grasses. These attacks offered an opportunity to test the effectiveness of the various disinfectants in controlling the two types of injury and also showed to what extent previous treatments could be relied on to prevent new attacks of the diseases.

The promising control obtained during the last two years at Arlington and elsewhere with various organic mercury compounds and the contradictory results reported from different clubs induced us to lay special emphasis on rates of treatments with these compounds. The chlorophenol mercury under the trade names of "Semesan" or "Uspulun" is the form which has been most generally advertised and distributed among golf clubs and for that reason received priority in the experiments this year. In these tests the chemicals have been applied at different stages in the development of the disease; on numerous strains of grasses; under various weather conditions; at different times during the day; and in general the tests were planned to give as much variation as it is possible to obtain at any single station. The results have been often contradictory, and indicate why clubs have found that in some cases the applications have not given the results expected. Some of these failures are no

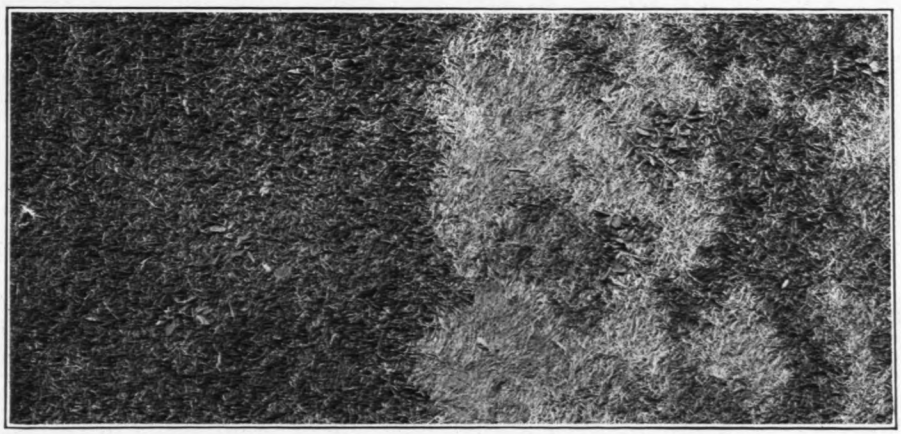
doubt due to the exaggerated claims made by those who are selling the chemicals. In other cases the failures may have been due to faulty application.

The results of our experiments so far are by no means conclusive. It appears that there will be much variation in the treatments found to be effective on different courses, since soil type, composition of the turf, amount of rainfall, climate, and other factors will no doubt be found to influence the degree of control or period of protection for any single treatment. It would be advisable to make preliminary experimental treatments to determine the best method of application for each particular course before making a general application on all the greens. Many of the clubs have already done this. The results obtained thus far at Arlington are given here, not as a general recommendation but as a guide to help clubs determine the method best suited to each set of conditions.

Our results with Semesan and Uspulun have been practically identical, and results with either or both will be referred to here together as the chemical chlorophenol mercury. The solution we found most efficient last year continues to be most reliable this year; that is, the dilution of 1 to 400, or 1 pound to 50 gallons of water. For treatments using 1 pound to 1,000 square feet or larger areas, the best results have been obtained by using the spray method with a good uniform pressure. Sprinkling cans, barrel sprinklers, and other devices may be used for heavier application provided they are handled to give a uniform application.

For checking an attack of large brown-patch we found that 1 pound in 50 gallons applied as a fine spray to an area of 3,000 to 6,000 square feet was effective. However, in severe cases the area covered should probably be limited to not more than 3,000 square feet for 1 pound of the chemical. Lighter applications while frequently giving good results will often prove only partially effective. Applications of a pound or more per 1,000 square feet will give protection for a longer period, but this period of protection seems to vary greatly with weather conditions, especially rainfall. Under our conditions we have not observed any long periods of protection such as have been frequently claimed for the chlorophenol mercury treatments. These heavy applications should be well tested at different times before a large expenditure is made in treating all the greens on a course. It is true that where such a treatment was made about July 10 the grass has been free from large patch to date (August 7). But the check plots which received no treatment except the usual topdressing and ammonium sulfate recovered soon after the treated areas and have been free from the disease ever since, as the weather conditions have been favorable for growth of grass and unfavorable for the development of large brown-patch. The lighter applications have under these conditions been equally effective in controlling the disease, and much less costly. Also the discoloration of the grass resulting from treatment is much less severe and of much shorter duration with the lighter treatments. For control of large brown-patch with these compounds our results strongly favor the application of 1 pound in 50 gallons for about 3,000 square feet. This is to check the disease, and it should be followed by topdressing and ammonium sulfate to increase the vigor of the grass so as to enable it quickly to recover from the injury.

For controlling small brown-patch it appears necessary to use somewhat heavier applications, or to give light treatments more frequently. One pound per 1,000 square feet gave good results and held the disease in check for about a month in some cases. An example of this control is shown in the accompanying photograph. The plot in this case was spotted with small brown-patch during the latter part of June. On July 1 it was divided into four sections and treated with chlorophenol mercury spray. One quarter was given the 1 pound per 1,000 square feet treatment; the second received it at the rate of 1 pound per 3,000 square feet; the third had 1 pound per 6,000 square feet; and the fourth section was left untreated. The heavy application held the disease in check for three weeks, and by July 30, when this photograph was taken, there were only a few minor patches starting to develop in the quarter receiving this treatment. The spots continued to develop in the untreated area and new patches developed. By the end of the month the spots had joined in many places and pro-



Treated portion. **Untreated portion.**

Small brown-patch control with chlorophenol mercury.

duced very serious injury to the turf. This photograph shows one section along the line between the treated and untreated section. On the left the healthy grass shows the effect of the fungicide, as compared with the untreated area on the right where the disease had been allowed to continue until a large part of the grass had been killed. Allowance should also be made for the fact that when treated there were several small brown-patches within the area of the sprayed turf shown in the photograph. The sections receiving the lighter treatments also showed complete control of the disease during the first ten days or more, and after a month they were in much better condition than the untreated section. Similar applications at different times during the month on other plots were not always as striking as on this particular plot. However, the spray of 1 pound per 1,000 square feet regularly gave at least temporary control.

One objection against these compounds is the injury to the grass which sometimes appears after their use. The grass becomes yellow or brown and in some cases may remain discolored for two weeks or more, depending on the rate of application. The discoloration caused by the 1 pound per 1,000 square feet treatment does not usually dis-

appear with the first cutting, as has been claimed for it. Neither have we been able to avoid it by making the application at any one time of day. On the other hand, it has never been permanently injurious to the grass in any of our tests. The grass gradually recovers its healthy green color, and with this recovery it usually also covers up the scars of the brown-patch.

Our tests with the chlorophenol mercury dusts have not been encouraging. Certainly the dust applications of 1 pound to as much as 10,000 square feet, as has been recommended by some of those selling the material, have been practically ineffective at Arlington. They have controlled the disease in a few cases at a rate of 1 pound to 2,500 square feet, but the same amount of material in solution usually gives much better results. A serious objection to the dust method of application is found in the danger of severe burning in cases where too much dust is put on the grass. A slight clogging of the material in the dust gun may result in an accumulation at the nozzle which, when released, results in an unusually heavy dose, which will often cause bad scars on the turf. Of course this objection is removed if one can find a reliable dust gun.

The closely related compound of nitrophenol mercury has so far failed to show much value as a control for either type of brown-patch. Bordeaux mixture has regularly proven effective in controlling the large brown-patch, but its effect is only temporary. It has been of no value in checking the small brown-patch.

Various other compounds have been tested and some have shown much promise. Results with these will be reported in another number of the BULLETIN.

Some confusion has been evident as to the effectiveness of ammonium sulfate and topdressing as a control for brown-patch. This treatment supplies food for the grass and induces a vigorous growth. It does not in itself control nor check the disease. When the disease is checked by cool weather or by fungicides, an application of topdressing with ammonium sulfate will prove of great value in restoring the turf, as it will aid the injured grass in recovering from the attack of the disease.

The Coconut Mat Teeing Surface.—The idea of using coconut mats as teeing surfaces seems to have originated in British Columbia, where they have been used for a number of years. The Tualatin Country Club, of Portland, Oreg., has been using coconut mats for the past six months, and reports very satisfactory results. The mats are imported from India and come in various sizes. The size used at the Tualatin Club is 5 by 6 feet. The mat is laid down loose in a rather substantial wooden base flush with the surface of the ground. It is then heavily sanded, and watered, and in the course of time will absorb a considerable amount of sand. In this way the mat has considerable resistance to all kinds of weather, providing a dry and smooth teeing ground at all times.

The Twenty-ninth Women's Amateur Golf Championship will be held September 28 to October 3, 1925, at the St. Louis Country Club, Clayton, Mo. Details may be obtained from United States Golf Association, 110 East 42d St., New York City.

Planting and Maintaining Bermuda Turf at Brook Hollow Golf Club

By C. B. Buxton

The course of the Brook Hollow Golf Club, at Dallas, Tex., was planned by the architect in June, 1920, and construction work was started that summer. We secured Bermuda seed from Arizona and other places, but found that with our high winds and long dry spells little turf resulted from planting the seed. Our soil, being very sandy, is soon dried out after the few rains, and what seed was not blown away failed to germinate. After that we plowed the fairways about 6 inches deep in furrows about 2½ feet apart. In these furrows we dropped Bermuda turf about a foot apart. The turf had been gathered from the heavy black land. We left considerable soil clinging to the Bermuda turf. This undoubtedly kept the turf alive until the needed rains came to its assistance.

After the spot-sodding was completed the furrows were covered up, dragged, and rolled. This same method was used in spot-sodding the greens, except the surface of the greens was first plowed and cultivated very thoroughly, and considerable fertilizer added. The Bermuda was cut up into smaller pieces than those used in planting the fairways. After the greens were sodded we covered the entire surface with good loam soil, probably about two inches thick. The greens were then well watered, and rolled with a light roller. This watering and rolling was kept up at regular intervals, and it was only a matter of a few weeks before we had a fine, true putting surface.

At first we did not have a watering system that could take care of the fairways, and a considerable part of the fairways had to be resodded on account of the damage resulting from our excessive heat and long droughts. Had we put in a watering system first it would have saved considerable expense and brought the course to a finished condition at a much earlier date and probably saved a year at least if not a year and a half.

Last spring (1924) we used ten tons of ammonium sulfate on the fairways and watered regularly. The result from this fertilizing was marvelous. Within three weeks of the time the fertilizer was used, the Bermuda grass grew in leaps and bounds and gave as fine a fairway as any golfer could possibly desire.

In the use of the ammonium sulfate, utmost care must be taken, otherwise the grass will be damaged. It can not be used without being followed by regular watering, as otherwise it will burn the grass severely. With our greens this fertilizer was always applied mixed with a sandy loam soil, and the application was followed with a heavy watering.

The Texas championship was played at Brook Hollow last year, and visitors from all over the state and from other sections commented very favorably on the condition of the course. The putting greens were excellent and compared very favorably with the greens covered by the finer grasses of the North. To keep the greens in this condition means continual work. Our topdressing with fertilizer and sandy loam is done about once a month. The watering is done very early in the morning or late in the evening, at regular intervals, depending on our rains. You can keep Bermuda grass green with intel-

ligent topdressing, but the greens get very hard unless water is used regularly.

As is doubtlessly well known, the climate in the region about Dallas is very irregular. It may rain 30 inches in the spring, and then not for six or seven months. So to keep a course in good shape here means that you have to supply the necessary water. To keep the grass on the greens in good shape, it must also be cut every day.

We really are playing on the young grass shoots and not on the old matted turf.

At the present time we water our fairways by means of a 4-inch main that parallels the fairways, with a rubber hose connection every 50 feet.

There is much interest in golf at Dallas. For example, there are six 18-hole courses at Dallas and four municipal courses, and more are planned.

The methods used in building the Brook Hollow course, along modern architectural ideas, and in the successful cultivation of Bermuda for the fairways and greens, have been used also by other clubs both at Dallas and in other parts of Texas as a basis for their operations, and as a result the old courses as well as the new courses are now in a most attractive shape, which means a greater enjoyment for the golfers of this section.

The Golf Course Beautiful

By W. L. McAtee

All golf courses are beautiful, for the expanses of smooth, green turf that are essential to golf assure the beauty of any landscape. There are degrees of charm, however, and even the course that can not boast of scenic attractions can attain a beauty of a more appealing, if humbler, kind. In many cases, also, a positive (and possibly expensive) policy of improvement is unnecessary, for much can be achieved by the negative, hence easy, method of sparing here and there beauty spots or ornamental details.

If your rough has a natural succession of wild flowers during the season, leave them there. The memory of many a spring match will be sweetened if it is played in part among the bluets and violets. Several kinds of violets thrive on comparatively barren hillsides, and one of them in particular, the birdsfoot or pansy violet, can transform forbidding rough into a bed of beauty that commands the envy of the expert gardener. Later, scattered daisies, black-eyed Susans, and the autumnal flowers will give the rough an almost festal appearance.

The sparing process of beautifying the golf course is particularly important as it relates to trees, for these can not be grown quickly when their need is felt. Therefore, in laying out the course and during alterations, consider the trees. Conspicuous flowering trees especially should be retained, as the dogwood, the redbud, wild cherry, and locust. A good putting green framed in trees whose masses of tender new leaves are splashed with clouds of dazzlingly white dogwood blossoms is a picture of perfect loveliness.

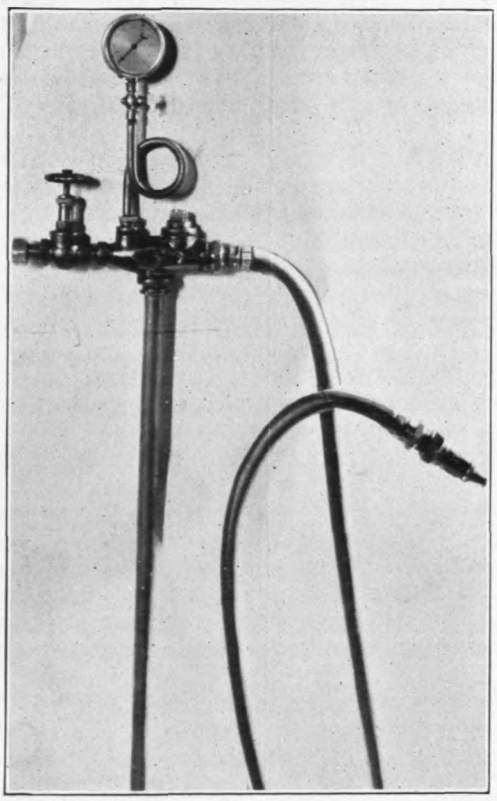
Wild cherry and locust minister pleasure not only to the sense of sight but also to that of smell. On quiet evenings, where numerous locusts are in bloom, the whole atmosphere is steeped in their fra-

grance. Honeysuckle and wild grape on fences, walls, or rockery, will, in their season, as effectively perfume the air. Sweet vernal grass and various clovers in the rough, and white clover on the fairway, will yield up incense on every warm day. The pungent fragrance of yarrow and of mint surely will somewhat divert the mind and thus tend to allay irritation of the golfer as he hunts for a lost ball in the brookside hazard.

Both the eye and the nose can be pleased by simply leaving where they are the beautiful things nature has provided. Let the golf course be so managed, therefore, that the players will be no less than truthful when they utter that familiar remark, "Well, anyway, we had a pleasant walk."

Proportioning Machine

The apparatus here illustrated is used for proportioning chemical fertilizers, fungicides, or insecticides that are soluble in water. It operates on the principle of the siphon. It consists of an ejector with ¾-inch brass hose couplings and a ¾-inch valve, a 1-inch brass suction tube about 3 feet long, and a water pressure gage. The strength of the solution proportioned varies with the water pressure. At 30 pounds pressure the ratio of stock solution to proportioned solution is about 1 to 10. The machine works well on pressure as low as 15 pounds. The water pressure is regulated by means of a valve on the apparatus. By the use of a proportioning appartus of this kind a uniform treatment can be given to all the greens. One who has used the apparatus in the treatment of little brown-patch describes the method of use as follows:



A proportioning machine operating on the principle of the siphon

Sufficient of the fungicide for the entire green is placed in a 50-gallon barrel. Twenty-five gallons of water is then added to make the stock solution. The apparatus is then placed on the barrel, with the suction tube inside, and the apparatus is connected to the water spigot with a length of hose. To the outlet of the machine sufficient hose is attached to permit the operator to cover the entire green. With a green of 6,000 square feet and 25 gallons of stock solution and a water pressure of 25 pounds, the entire treatment takes about 20 minutes. The nozzle is held downward about 2 feet from the ground. The operator can be sure of an even distribution

by walking slowly up and down the tracks left by a mower. A low-pressure nozzle is essential for restriction at the outlet, and will cause the water to run into the barrel. Such a nozzle can be purchased with the machine.

"Air Pockets" and Brown-Patch

By John Monteith, Jr.

It is usually found that certain greens on a golf course are much more frequently and severely injured by attacks of brown-patch than are others on the same course. This condition may be due to various causes. In many of these cases it is undoubtedly due to insufficient air drainage which results in "air pockets" over these greens.

Brown-patch is most likely to develop during periods of warm weather, especially when the grass becomes covered with dew early in the evening and remains so throughout the night. Grass blades, like our skin, are constantly giving off water in the form of vapor. If there is good air circulation this vapor is at once removed, but if quiet it will condense in the form of "perspiration" or dew. This formation of dew during a warm night makes conditions ideal for the development of brown-patch. Therefore, if there is a good breeze blowing over a green during the night to prevent the accumulation of dew the chances for an attack of brown-patch are much reduced, even if the temperature is high.

When going over a course it is a common experience to see the flag on a certain green hanging motionless while those on other greens are blown out by a relatively strong breeze. When one stands on such a green he notices that the air feels "dead" and sultry. If the wind continues in this manner throughout the night it is natural to expect that the grass on the greens where the breeze is blowing will be kept comparatively dry, whereas on the green with little air circulation the dew will settle early and keep the grass wet throughout the night. This "air pocket" is not necessarily on the lowest green of the course. It may be caused on any green, by a bank of trees or shrubbery serving to cut off the prevailing wind.

One clear case of such a condition was recently observed on the second green of the Algonquin Club in St. Louis. This green is located on high ground, but trees and undergrowth cut off the winds from the west and northwest. On the night of July 18 there was a gentle breeze from the northwest. On the morning of the 19th this green showed serious new developments of brown-patch, whereas on nearby greens which were exposed to the breeze there was practically no new brown-patch. Similar examples have been observed on numerous courses in various localities. In many of these cases it would not be practicable to take any action to correct this condition, but in a large proportion of the cases observed it could be corrected easily by simply cutting openings through the shrubbery in the direction of the prevailing winds. It would not be necessary to remove large trees as a rule, for if the lower branches and underbrush were taken out the wind could sweep through and over the green.

This is not to be interpreted as a recommendation supposed to control brown-patch completely. Unfortunately the problem is by no means so simple. Under certain weather conditions dew will settle on any green regardless of location. However, it is a precaution which in many cases could be quickly and cheaply accomplished and would prove well worth the effort in avoiding many attacks of brown-patch.

Suggestions For Vegetative Planting and Subsequent Care Of Creeping Bent

By O. B. Fitts

Judging from the number of inquiries received regarding the best methods of planting and maintaining creeping bent both in turf and in nurseries, there are still many who do not understand how this should be done. For this reason the following outline may prove helpful to those who are still in doubt as to the best methods to follow.

The Nursery

SOIL PREPARATION.—The nursery soil should be prepared after the manner customary in planting garden peas or beans; that is, it should be well pulverized, and then small trenches or rows about 1½ inches deep should be opened 4 to 6 feet apart for the reception of the stolons.

PREPARATION OF STOLONS FOR PLANTING.—Do not chop the stolons as in planting for turf, but simply tear the sod apart in such a way as to get it in such condition as will permit the stolons being strung out along the rows.

PLANTING THE STOLONS.—Place the stolons lengthwise in the rows and cover very lightly, not more than ¼ inch. Water well each day if necessary to keep the soil moist, until the grass has rooted and started growth.

QUANTITIES OF STOLONS NEEDED TO PLANT THE NURSERY ROWS.—One square foot of stolons will plant 100 feet of nursery row, but unless particular care is given in planting it is usually better to use 3 square feet of stolons for the purpose.

SUBSEQUENT CARE OF THE NURSERY.—The soil should be cultivated just as one would cultivate peas or beans in the garden. This will require running a light cultivator between the rows about once every two weeks. The weeds should be kept out of the rows by hand weeding. After each cultivation it is also well to follow with a light rake and comb the stolons or runners out from the center of the row. This encourages spreading, thereby producing more stolons to the row. This system of cultivation should be continued as long as necessary in order to keep the nursery in condition from the time the stolons are planted until the rows have spread to such an extent that the spaces between them are too narrow to permit a cultivator to pass through. Watering should be continued as frequently as necessary to keep the soil moist.

FERTILIZING.—With soil as good as that of the ordinary garden, no fertilizing is necessary. With poor soil it is advisable to work well-rotted manure into the soil at the time of its preparation; benefit will also subsequently be obtained from light application of ammonium sulfate or ammonium phosphate applied dry to the soil along the tips of the stolons and well worked into the soil.

TIME NECESSARY FOR DEVELOPING THE NURSERY.—A nursery planted in the fall (August 15 to September 15) will be available for use the next fall. It is not advisable to plant either a nursery or a green in the spring or summer, owing to the trouble from weeds. In fact, plantings made at any time other than late summer or early fall always involve much weeding.

Planting the Putting Green

QUANTITY OF STOLONS NEEDED TO PLANT TURF.—One square foot of well-developed nursery row should furnish sufficient stolons to plant 10 square feet of turf; thus 600 square feet of nursery row would furnish the stolons for a green of 6,000 square feet. A nursery row one year old is from 4 to 7 feet wide, depending on the richness of the soil. Such a row 100 feet long will therefore supply stolons to plant 6,000 square feet of putting green.

SOIL PREPARATION.—The same soil preparation is necessary as in the case of planting grass seed; that is, the soil should be thoroughly pulverized and the surface smoothed and rolled until a firm uniform bed is obtained. Immediately before planting, the surface should be raked very lightly so as to make it fine.

CARE OF STOLONS BEFORE PLANTING.—It is important to have all preparations made so that the stolons can be planted immediately after they are received. Stolons allowed to remain in bags or in stacks for any great length of time are very likely to be damaged from heating. Therefore, if for any reason it is impossible to plant at once, the stolons should be dumped out of the bags and spread loose in a shady, cool place where the air can get to them, and should then be kept moist.

PREPARATION OF STOLONS FOR PLANTING TURF.—The stolons should be cut up into lengths of 2 inches or thereabouts, and pulled apart or separated so that they may be distributed evenly over the surface of the green. For cutting the stolons a feed cutter or a combined feed cutter and shredder will answer.

PLANTING STOLONS FOR TURF.—The cut stolons should be broadcast uniformly over the surface. A live joint to every square inch is sufficient to give first-class turf; however, to insure an even stand, it is advisable to spread the stolons somewhat more thickly, which may be done by utilizing 1 square foot of nursery sod in planting 10 square feet of green. As the stolons are being broadcast, some one should follow closely behind the sower and apply a light covering of well-pulverized topdressing material. It is not necessary to add fertilizer to the topdressing. Do not cover the stolons too deeply. It is necessary to apply only sufficient topdressing to hold the stolons in place. Never cover more than ¼ inch; even less is advisable in most cases. This is very important, as a heavy covering tends to retard the growth of the stolons, and consequently a longer time is required for the development of turf suitable for play. In some cases excessive covering has made it impossible, or at least exceedingly difficult, for the young shoots to reach the surface, and the results have been disappointing.

ROLLING.—Immediately after planting it is essential that the green be rolled lightly so as to press the earth around the stolons. This holds the stolons in place and in contact with the moist soil, encouraging quick root establishment and immediate growth of the grass.

WATERING.—Immediately after rolling, the greens should be sprinkled with a fine spray of water until the surface is thoroughly moist, and as often as necessary thereafter to keep the surface moist. This is essential under all conditions, and especially so when the weather continues dry.

Care of the Greens After Planting

The surface of the greens should be watered twice a day at least in dry weather during the first two or three weeks, and thereafter usually once a day during dry weather. Care should, however, be taken not to water too much, as a soggy condition of the soil is harmful to bent.

Cutting should begin as soon as the young shoots or plants have reached a height of 1½ or 2 inches, and thereafter the grass should be kept closely clipped. The clippings from the first few mowings may well be left on the greens and a light topdressing applied over them, as where there is a joint or node on any of the clippings there is a bud that may develop into a plant, thereby helping to thicken the turf and hastening it toward a playable condition. The grass should never be allowed to grow rank and tall on the greens, as it makes it harder to get the turf down to a playable condition when the time comes to get the greens ready for play. Begin with the first mowing to cut the grass down to putting green length, and continue this as though the greens were actually in play.

In order to prevent the fluffy or grainy condition sometimes encountered on a green produced from some of the strains of creeping bent, it may be found necessary at times to rake the green lightly, both before and after it is put in play, so as to comb up the loose runners in such manner that they can be well mowed. This treatment, together with constant close clipping and topdressing, will prevent the condition referred to, and will finally produce a smooth and firm surface.

Topdress as frequently as necessary to keep the turf filled to such a degree that it presents a smooth, firm surface. To maintain this condition usually requires at least one application of topdressing every month in the early stages of the green. A final application of topdressing should be made in the fall or early winter just after the grass has ceased growing; and in the late winter or early spring topdressings should be resumed, the first to be made just before growth is expected to commence. The material to use for topdressing should be compost supplemented with ammonium sulfate or ammonium phosphate, with applications to be made in the fall and spring. One to 1½ cubic yards of this topdressing material should be applied to an average-sized green of 6,000 or 7,000 square feet.

In the late winter or early spring, as soon as frost is out of the ground and before the first spring topdressing has been applied, the green should be rolled lightly so as to firm the top soil and smooth out irregularities which may have resulted from the action of frost during the winter.

The green should be thoroughly and constantly weeded during the spring following planting. This has been found to be very effective in reducing later trouble from weeds.

Greens planted in September and cared for as suggested above should be ready for play by May or June of the following year.

Raised tees.—An elevated tee is justified only when it is necessary to secure proper drainage or good visibility. If the ground is well drained it is better, both for architectural reasons and for economy in turf maintenance, to leave the tee or the teeing ground on a level with the surrounding ground.

Reducing Upkeep Expenses

By Robert B. Hillis, Greene County Country Club, Waynesboro, Pa.

Clubs with limited membership or very moderate means should be careful to avoid building a course which will cost more for upkeep than they can well afford. The largest item of expense after the course is finished is cutting grass. This should be given some consideration, especially if your greens are very large, say 90 feet across and 140 feet deep. Don't make the mounds and traps so steep that they can not be cut with a mowing machine; the same consideration applies also to the banks of the greens and to the tees. Never sow timothy or other hay grasses in the rough; red or sheep's fescue will make the going rough enough. By all means use good material in the greens. Don't build them against a hillside or in a hollow, as they must have good drainage; you are in for a lot of expense and poor greens if you don't observe this rule. It is not necessary to spend much for fertilizers, as a good compost pile and about 50 pounds ammonium sulfate to a green each year will nearly cover your needs. You will find it cheaper to have tools than not to have them. A plow, a scoop, a disk harrow, and a rotary screen save a lot of time, even if used only in connection with your compost pile. Some clubs are still using a one-unit type of power mower, which does not cut more than 40 inches at a time. Such a mower is nice for a lawn, but its use on a golf course is a waste of time. Even though your course may be hilly, a triplex mower is efficient. One tractor should do all the work on a 9-hole course. I have used a tractor for cutting both the fairways and rough, plowing, scooping, harrowing, and dragging.

In applying ammonium sulfate, don't try to put it all on at once, but spread it out in about six applications. The easiest way I have found for applying ammonium sulfate is to take advantage of a rain, especially when you think you are in for a good, long rain. In this way you can cover nine greens in about two hours, and you can't go wrong, as you are putting it on the greens when they are wet, and you can always bring the sprinklers out in case the rain should stop. The only time you burn greens with ammonium sulfate is when it is not spread well; otherwise there is not enough put on at one application to do any damage. In case, however, you should burn the green in spots, use plenty of water and in three or four days all the brown marks are gone.

The same methods may be used in applying corrosive sublimate mixed in dry sand at the rate of 1 pound of corrosive sublimate to 150 pounds of sand; but the sand must be dry. I always use a little salt also. I don't know that this helps a great deal, but salt is cheap, and I have always had pretty good results doing this during a rain. Never use ammonium sulfate and corrosive sublimate together, as that doesn't work.

New Member Clubs of the Green Section.—Norfolk Golf Club, Dedham, Mass.; Butte des Morts Golf Club, Appleton, Wis.; Cincinnati Country Club, Cincinnati, Ohio; Spring Valley Country Club, Huntington, W. Va.; Royal Park Golf Course, Vero Beach, Fla.; Sherwood Forest Golf Course, Annapolis, Md.; Park Hills Golf Course, Altoona, Pa.; Glen Brook Country Club, Stroudsburg, Pa.; Pensacola Country Club, Pensacola, Fla.; Lenox Hills Golf Club, Farmingdale,

N. Y.; Lincoln Hills Golf Club, Ludington, Mich.; Elmsford Country Club, White Plains, N. Y.

Applying Topdressing to Putting Greens

By W. R. Hurd, 2d, Golf Division, United Shoe Machinery Athletic Association

For mixing and sifting the compost for topdressing on our course at Beverly, Mass., we are using a machine which operates on the principles of gravity and centrifugal force. By running the machine slowly we can eliminate most of the undesirable stones, but sufficient are left to be a detriment to the greens, in that mowers are continually hitting them and dulling the knives. To remove these stones after the topdressing is applied to the greens, we took a greens sweeper, cut out the bottom of the pan, and inserted a wire screen of 1/8-inch mesh or less. After spreading the compost on the greens by hand, and using a steel mat for distributing it uniformly, we sweep the greens with this especially devised greens sweeper. This removes all the fine stones, and in addition works the topdressing down into the turf. When a light application has been made one cannot see that any topdressing has been applied. We are now however installing a pulverizing plant for pulverizing the compost, and thus do away with the necessity for sweeping the greens after the topdressing is applied.

The Truth About Peat

By K. F. Kellerman

Peat deposits in the United States show wide diversity in texture and chemical composition. It should be remembered that these deposits are the remains of hundreds of years of accumulations of dead plants, often of different kinds; so, as might be expected, there may be variation not only between peat deposits, but between different layers or portions of the same deposit. For example, much variation in percentage of nitrogen is reported, and the deposits with a high percentage are claimed to be much more valuable than the low-nitrogen deposits.

This may be true, but for use as fertilizer or as top-dressing on grass or other crops the value of any peat is extremely slight. The nitrogen or other elements found by chemical analysis in peat are in a very inert condition; indeed, as compared with manure or commercial fertilizers, the elements in peat are practically unavailable to plants.

During the past few years peat has frequently been advertised for sale as "humus" to be used as fertilizer, or in place of fertilizer or manure. Special processes, such as the "bacterization" of peat, occasionally are alleged to give to peat unusual power to improve soil conditions and to aid plant growth.

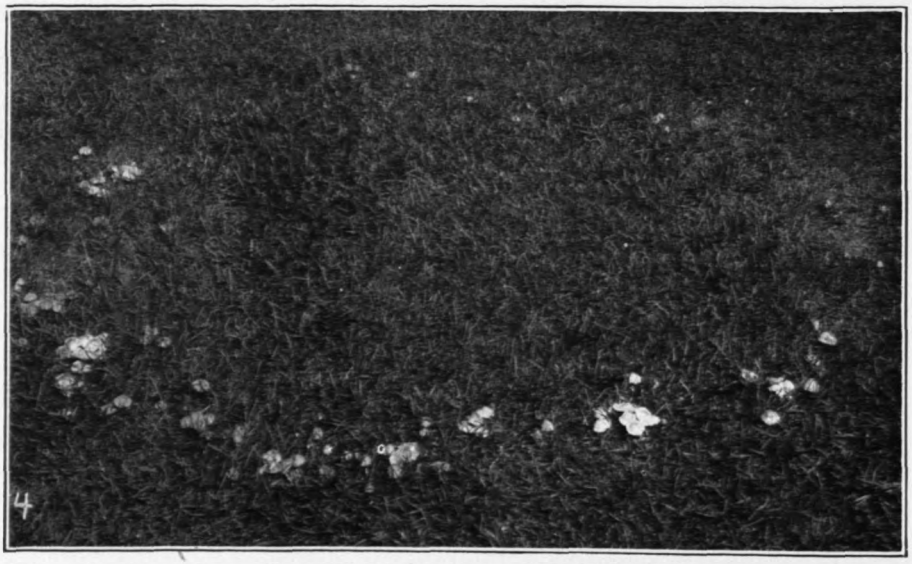
In general, extensive investigations show that peat, as well as muck and similar materials, whether "bacterized" or not, is distinctly inferior to stable manure or to mineral fertilizers for increasing crop production. The claims of unusual value for "bacterized" peat appear to be based more or less directly upon statements emanating a few years ago from Professor Bottomley, England, regarding the beneficial effect on plants of the so-called bacterized peat. Further experi-

ments in this country and abroad have failed to support this theory. No laboratory process for the "bacterization" of peat has been discovered which materially improves it for fertilizer.

The use of some kinds of peat, like straw or other low-grade or surplus material, may often be desirable for stable litter or in composting; composting a suitable peat with stable manure increases the quantity without very materially lowering the manuring value for farm purposes. While peat is too bulky and too poor in available plant food to serve as a substitute for manure or mineral fertilizers, certain kinds of peat appear to be suitable for the growing of specialties or as a potting soil in greenhouse forcing.

Fairy Rings

Fairy rings are caused by various species of mushrooms, toadstools and puffballs. The underground part of the fungus is composed of fine, white threads which permeate the soil. These spread from the center outward. Near the outer part of the circle the toadstools appear, and each year the circle increases in diameter. Our illustration is of the true fairy-ring fungus (*Marasmius oreades*)



Fairy ring fungus (Marasmius oreades). South lawn, Horticultural Building, University Farm, St. Anthony Park, Minn. Photograph taken August 4, 1924.

taken at St. Anthony Park, Minn. In the circle where the toadstools appear the grass often dies. This seems due to the fact that the underground threads weave a thick web, which prevents moisture from entering the soil. Loosening the soil to allow water to enter lessens the dying of the grass greatly.

This particular fairy-ring fungus is common at the Minikahda Club, Minneapolis. Of its behavior there, Mr. W. F. Brooks writes as follows:

"For several years the Minikahda golf course has suffered from a fungous growth commonly known as 'fairy rings.' This growth develops very rapidly in moist, warm and muggy weather. It makes

its appearance in the form of a small brown toadstool, the heads being about an inch in diameter. It spreads very rapidly, and through some unknown cause develops in the form of rings. These rings are from four to eight or ten inches wide and from three to eight or ten feet in diameter. The result of this growth is to kill the grass on the fairways where it appears; furthermore, it causes a complete change in the character and texture of the soil. Ground that originally was of a dark, rich loam variety changes to a fine, powdery, gray-colored texture, and this soil loses fertility, and it is almost impossible to reseed and grow grass where these rings have appeared. From our observations the fungous growth thrives as weeds do during periods of continued drought.

"The only effective remedy which we have discovered is to spade up the affected area where the rings have appeared, and as far as possible remove the soil and replace it with good soil, and then reseed. We have tried chemicals, and find that these will stop the progress of the growth but that they affect the soil deleteriously and that it is impossible to grow new grass.

"We now thoroughly water our entire fairway, and there is nothing of a beneficial nature which has been more apparent than this in the complete stoppage and elimination of this fungous growth. For the last two years during which we have watered the fairways, we have had absolutely no recurrence of this trouble. Where these rings had made their appearance in the past and where we had dug them up and replanted and fertilized to some extent, the growth is even more vigorous than on the surrounding area. In fact, on the fairway where this trouble was most acute, the area where these rings formerly developed now stands out plainly with a growth of vigorous new grass. One can see these dark-green circles throughout the fairways where formerly these rings had appeared. We therefore conclude that if they are dug out, reseeded, fertilized, and then watered, the trouble can be corrected."

The fungus can be killed by loosening the soil and soaking it with iron sulfate, using 1 pound to 1½ gallons of water. Bordeaux mixture is equally satisfactory, and to be preferred, as it does little or no injury to the grass.

An article on this same subject has previously appeared in the BULLETIN, Vol. II, 1922, pages 180 to 184.

Some U. S. Golf Association Decisions on the Rules of Golf

In a match play tournament one of the players drove from the tee outside of the disks. His opponent, on playing his ball between the disks, discovered that the other player had driven from outside, and called his attention to it. The opponent immediately drove another ball. The question arises as to what the penalty is for driving outside of the disks. No extra stroke was counted at the time, as it was in doubt. The match, however, hinges on this decision. We should also like to know what the penalty would be where a ball is driven ahead of the disks, but between them.

Decision.—Rule 2 of the Rules of Golf covers both points. A ball not played within the limits of a teeing ground (definition 4) is penalized as follows: In match play the opponent may, if he so desires, recall the stroke. In medal play, the player must play another stroke

within the proper limits, counting the stroke he has already played from outside the limits.

Is there a rule which permits one to loosen a ball which has become embedded in soft mud or earth on the fairway?

Decision—There is no rule in golf permitting a player to loosen a ball which has become embedded. Situations of this character are covered under Recommendations for Local Rules. It is the duty of the committee in charge to formulate local rules to cover unnatural conditions that interfere with the proper playing of the game.

A player in addressing a ball on the fairway accidentally touched it. It moved upgrade four or five inches, and then ran downgrade and came to rest in its original position. The ball moved completely over, and we do not believe this should be considered oscillation. Would this entail a stroke penalty?

Decision.—The ball left its original position and is therefore deemed to have moved and must be penalized under the rules.

Greenkeepers' Register.—We shall be glad to list the names of greenkeepers available for employment and refer these names to golf clubs who may have occasion to request them.

All applications from greenkeepers seeking employment must give the age, experience, and names and addresses of references.

QUESTIONS AND ANSWERS

All questions sent to the Green Committee will be answered in a letter to the writer as promptly as possible. The more interesting of these questions, with concise answers, will appear in this column each month. If your experience leads you to disagree with any answer given in this column, it is your privilege and duty to write to the Green Committee.

While most of the answers are of general application, please bear in mind that each recommendation is intended specifically for the locality designated at the end of the question.

1. Quantity of bent stolons necessary for planting a green and a nursery.—We want to get sufficient creeping bent stolons to plant a putting green of 5,000 square feet and a bent nursery of about 10,000 square feet. What quantity of stolons will be necessary for these purposes? (West Virginia.)

ANSWER.—You can figure on the basis that 1 square foot of sod from a creeping bent nursery will furnish sufficient stolons to plant 10 square feet of putting green surface; thus 500 square feet of nursery sod would be required for planting a putting surface of 5,000 square feet. As for your bent nursery, if you plant the stolons in rows 6 feet apart, so that the rows can be cultivated for keeping down weeds and furnishing a better soil bed for the stolons to spread in, 3 square feet of nursery sod will, under ordinary conditions, plant a nursery row 100 feet in length. Your 10,000-square-foot nursery would require 17 of these 100-foot rows, to plant which 50 square feet of nursery sod would be ample.

If, however, you have facilities for giving your nursery especial attention after you plant it, the quantity of nursery sod required to

plant your nursery could be reduced to one-third the proportion we recommend, or 17 square feet. That is to say, it is possible to produce a good nursery by planting the stolons from 1 square foot of nursery sod in a row 100 feet long. In this way the development of the nursery row is somewhat slower, and as results do not appear so quickly there is generally a tendency to neglect the row. Moreover there is a likelihood also to cover the stolons too deep, and this further tends to retard their development. By especial attention to the nursery row, we mean planting the stolons carefully and covering them lightly (not over one-fourth of an inch deep), watering carefully, and weeding carefully, until the new stolons have begun to make a good growth.

If you expect to produce sod in your nursery, the same amount of stolons would be required as for planting a putting green.

2. **Winter greens for the South.**—At a neighboring club in Virginia they sow their Bermuda putting greens, just before the last topdressing in the fall, to a mixture of Kentucky bluegrass, redtop, and white clover, and seem to have excellent greens throughout the winter. Would you recommend this as a general practice? (Virginia.)

ANSWER.—The practice you refer to has been reported in some cases to give excellent results, but there are two objections to it. First, many golfers object to white clover in greens. Second, the general experience in the South seems to be that seeding Bermuda greens to winter grasses retards the return of the Bermuda grass in the spring. It is likely that this latter objection can be overcome by stimulating the growth of the Bermuda in the spring by including a liberal amount of ammonium sulfate or ammonium phosphate in the topdressing, and topdressing at about the time the Bermuda should commence to grow. As regards bluegrass, this is very slow in growing, and more rapid results are obtained by sowing a mixture of redtop and Italian rye grass on the Bermuda in the fall. These are both rapid-growing grasses. Possibly better results may be obtained by sowing the redtop alone, or the rye grass alone, and it might be well for you to test this out on different greens, sowing one to redtop alone, another to Italian rye grass alone, and a third to the two grasses in mixture. For quick results, heavy seeding is advised, redtop at 5 pounds, Kentucky bluegrass at 7 pounds, and rye grass at 15 pounds per 1,000 square feet.

3. **Reseeding greens heavily infested with crab grass.**—Our greens, which were reseeded last fall, have been in excellent condition this summer until the first of August, when crab grass came in very thick. The crab grass plants have killed all the other grass for a space about 3 inches in diameter under each plant. It is almost impossible to cut this grass so as to afford a smooth putting surface. We now have a force of men digging out the crab grass and filling up the holes with topdressing in which grass seed has been mixed. A number of our members object to incurring the expense of this work, stating that the crab grass will not go to seed but will disappear as soon as the hot weather is over. We shall appreciate your advice in this matter. (Illinois.)

ANSWER.—In your latitude crab grass is a very bad weed on putting greens. Here at Washington greens must be hand-weeded from

the time the crab grass starts, as otherwise the crab grass will kill out the bent or fescue in the greens. No matter how close you cut the crab grass, it will seed next to the ground and the following year you will have just as much crab grass as ever. All you can do is to weed out the crab grass as thoroughly as possible and reseed the bare spots, or else cut it close with a mower after raking it up, first in one direction and then in the opposite direction, so as to leave nothing but the stubs of the crab grass plants. This latter method will be cheaper than hand-weeding, and in our opinion about as effective. After you have reduced the crab grass to stubs, the new seed may simply be broadcast, using 2 to 3 pounds of seed to 1,000 square feet of surface, if you reseed to bent. We have found that the constant use of ammonium sulfate as a fertilizer almost completely prevents the growth of crab grass.

4. Converting redtop-fescue greens into bent greens by use of stolons.—A year ago we received from you a sample of creeping bent. From that start we developed sufficient material to put in a plot 25 by 25 feet, which we have cared for somewhat as we would a regular putting green, and we have secured a wonderful turf which has stood up exceptionally well with little care. In the meantime we have also developed a fairly large stock of the bent in nursery rows. From this stock we endeavored in various ways to introduce the stolons in our present greens, but have had very poor results. In fact, it is hard to find any bent in the old turf, which consists of Chewings' fescue and redtop and is about four years old. We consider it would take years to get solid bent greens with that method on our course. We nevertheless want bent greens, and in order to reduce to a minimum the time necessary for playing on temporary greens in converting our greens to creeping bent, we have decided on the following method. We shall broadcast the bent stolons on an area as large as the combined area of our putting greens. We shall grow this to an established turf, and when it is ready shall lift the turf and place it upon the grass of our present greens, thereby maintaining our contours on the greens. The old grass remaining beneath the sod will thus be converted to humus and serve as a fertilizer for the bent. We expect to accomplish this in about twelve months, and consider it practical from a standpoint of economy and convenience, as the greens will not be closed more than twelve days at the time we change the turf. Have you any suggestions to make in the matter? (California.)

ANSWER.—There appears to be no question that the plan you have adopted will work out satisfactorily. Other clubs have employed it with good results. Regarding the method you first tried, namely, the introducing of creeping bent stolons direct into your established fescue-redtop turf, this has also been done with entire success in many places. Your local conditions, however, may not be in its favor. Nevertheless we believe it would be worth while for you to try this method again.

5. Sodding as late as October.—We shall have this fall sufficient sod propagated from bent stolons sown last year to rebuild six of our greens. Ordinarily, of course, if we were going to rebuild these greens with bent stolons, we would plant the stolons about September 1. Our chief purpose in using sod instead of stolons in returfing our greens is to interfere with play as little as possible. Would it be too

late to sod these greens about the middle of October? We rather suspect that on account of September in this part of the country being generally a pretty hot month, and in some seasons unusually dry, we would get as good, if not better, results if we wait until the latter part of October to do this work. (Indiana.)

ANSWER.—In our opinion you should get satisfactory results from sodding your greens during the first half of October. We would suggest, however, that you cut the sod thin, not over 1 inch thick, as it has been our experience that sod of this thickness takes root in the soil beneath quicker than sod cut thicker. See that the sod gets plenty of moisture after it is laid on the greens. Sodding can be done with creeping bent turf any time in the fall until frost.

6. **Improving the rough.**—Part of our rough is in such poor condition that we consider it necessary to harrow and smooth it and reseed it. What seed mixture should we use for this purpose, and at what rate of seeding? Would you consider a mixture of 80 percent sheep's fescue and 20 percent Canada bluegrass a desirable combination? (New York.)

ANSWER.—Harrowing the rough and putting on some additional seed should improve it greatly. Sheep's fescue is the best grass for the rough, and Canada bluegrass is often very useful. The mixture you suggest is very good. The rate of seeding will depend on how much grass there already is on the rough. If there is, let us say, half a stand of grass, we would advise you to seed this mixture at the rate of about 30 pounds per acre. In buying your seeds you had better buy them on the basis of samples and quotations. They should be purchased immediately so that they can be seeded about the first of September in your latitude.

7. **Fertilizer requirements in planting creeping bent stolons.**—We are building a new green and shall shortly have it ready for the planting of creeping bent stolons. We should be glad to have your recommendations as to the use of fertilizer in this work. (Pennsylvania.)

ANSWER.—It is not necessary to apply fertilizer to soil of ordinary quality in the planting of creeping bent stolons, neither to the soil itself nor to the topdressing to be used. The necessity for fertilizing will be determined by the character of growth made by the turf after it has become completely established.

8. **Spring seeding as compared with fall seeding.**—Will you kindly advise if, in your opinion, we could get satisfactory results by seeding the remaining nine holes of our golf course in the spring? We are unable to finish our entire eighteen holes for this fall and will only be able to finish and seed nine holes before the first of October. (Long Island, New York.)

ANSWER.—At your location the best time for seeding is between August 15 and September 15. Spring seeding, if done at all, should be done very early, but it is never as satisfactory as late summer seeding. Even if your results from spring seeding should not be entirely satisfactory, the deficiency can be remedied by further treatment the following fall.

BOOST THE GREEN SECTION

Meditations of a Peripatetic Golfer

If you disagree with the "Peripatetic Golfer," go after him. Have the courage of your convictions, if you have any at all.

Yarrow on steep banks! An excellent plant for the purpose.

A salesman recently sold 100 tons of "commercial humus" to a Metropolitan District golf club. Other gold-brick artists are apparently missing a bet.

Every golf district containing twenty or more clubs should organize for cooperation—both for purchasing and for exchange of knowledge and experience.

It is perfectly true that some muck areas the world over grow wonderful vegetable crops. This has led to the erroneous idea that such muck is valuable as a fertilizer, and a lot of people who should and probably do know better are selling it to suckers as a fertilizer.

Abuse your opponent if you can't answer him. This may be an effective method in politics—but it is rotten ethics in science.

There are only two kinds of grass so far as putting greens are concerned. One is bent—the other isn't.

The continued use of ammonium sulfate will in time make the soil acid. Where the soil is originally alkaline, as in a limestone region, the process is slow. But stick to it, and success will surely come.

If any one of your putting swards is more than 8,000 square feet in size, better study it carefully. It is rare that so large a green can be justified.

In developing a golf course, men of long experience say that the first twenty-five years are the hardest.