

## 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. CLOVER FOR SOUTHERN FAIRWAYS IN WINTER.—We find that a number of golf courses in the South have clover on their fairways so that they may have a green turf during the winter and early spring before Bermuda starts to grow, and we are thinking of seeding our fairways with clover and Bermuda mixed. If you think this is a good idea, kindly advise us what kind of clover should be planted and when it should be seeded. (South Carolina.)

ANSWER.—Spotted bur clover is probably the commonest clover which appears in fairways in winter in your locality, but in addition there is more or less white clover and native Carolina clover. Bur clover is best seeded in early fall or as soon as the hot weather of summer is over. If hulled seed is used, it should be sown at the rate of not less than 15 pounds of seed per acre; if seed in the bur is sown, it will require 5 or 6 bushels of seed per acre. After the seed is sown it should be lightly harrowed in. The plant is an annual, but when once established it re-seeds itself naturally from year to year. Bur clover is greatly helped by the addition of lime to the soil, and indeed it is commonly found in soil where there is a good deal of either lime or marl. To succeed with bur clover the soil should be inoculated with the proper bacteria for this plant. This inoculation may be effected by the use of either the pure culture sold in glass containers, or the soil from a field already growing bur clover, alfalfa, sweet clover, or yellow trefoil. The soil-transfer method is more dependable than the pure-culture method. In the soil-transfer method, soil from the top 8 inches of a field growing bur clover, alfalfa, sweet clover, or yellow trefoil should be broadcast at the rate of 500 pounds per acre over the area to be planted. On account of the expense involved, it is generally advised to sow but a small patch the first year, which should supply abundant soil to use as inoculation for more extensive plantings. Often when seed in the bur is sown there are enough bacteria in the dust on the burs to insure inoculation.

2. IMPROVING THE DRAINAGE OF A GREEN FLANKED BY A HILL AND OF A GREEN ON A CLAY SUBSOIL.—One of our greens is flanked by a steep hill. Its surface drainage is good. Two years ago in the fall it was in very poor condition. Last spring it was given the same treatment as the other greens with regard to weeding and top-dressing. It did not respond to this treatment, and as it became thickly infested with crab grass we decided to do nothing further with it that season but to returf it the following spring. Late last fall we plowed it, removed the top soil, remodelled it, and covered it with a fairly thick dressing of well-rotted manure. The green is not at the base of the hill, there being a 5-foot terrace in front of it, and the natural drainage should therefore be good;

nevertheless it certainly gets much seepage from the hill behind it. The high point of the green is directly in the back center and in a line with the crown of the hill, and there is therefore a perceptible fall both to the right and the left. In view of this we have thought that, rather than to lay a network of tile underneath the green it would suffice to lay one line of tile parallel with the back of the green, draining to both right and left.

Another of our greens is built on a pure clay foundation. The surface drainage can be easily corrected, although there are now some low places. The turf has showed signs of lack of proper drainage, but on account of the character of the subsoil we are afraid that subdrainage is imperative. The turf is by far the best we have on any of our greens; in fact, it is a beautiful piece of bent turf; and for that reason we hesitate to disturb the surface any more than necessary. (Pennsylvania.)

ANSWER.—We feel sure from what you say with regard to the hillside green that the trouble is due to poor drainage. The wettest place on a hill is often about half way down the side and not at its base. At that point water will continually seep out from the high ground in the rear; this we have noticed on many golf courses. The best remedy is to cut a grassy hollow back of the green, say 4 or more feet in depth, sloping the hollow so that it drains any seepage water that comes out of the hill, around the green. The same results can probably be obtained by the use of tile, if it is not desirable to construct the grassy hollow. If tile is used, we would advise sinking the tile at least 4 or 5 feet below the surface in order to be sure of catching any seepage water that is working toward the green. We see no reason why you should not take it to the right and left, as you suggest; in that case there would be no necessity for connecting the two drains.

The drainage of the other green you mention would probably be best effected by running two or three lines of 4-inch tile under the lower parts of the green. If care is used in taking up the turf, installing the drain, and relaying the turf, the green should not be out of play for any considerable time.

3. HOW TO SEED NEW GREENS.—A difference of opinion regarding the seeding of a new green has come up in our club. Our old plan was to level the green as truly as possible, seed on the top, and rake the seed in very lightly and carefully. We only raked a very little, so as to get the surface and the seed slightly mixed, and then rolled it. A new plan has been suggested, namely, to seed and then cover with anywhere from  $\frac{1}{2}$ -inch to 4 inches of earth. The old-timers' view is that the seed would never grow up through this and that the seed should be as near the surface as possible. (New Brunswick.)

ANSWER.—In seeding a new green, the point to which most attention should be given is the even distribution of the seed. We recommend that 3 pounds of good bent seed be used in seeding each 1,000 square feet of surface. This is regarded as a sufficiently heavy rate if the seed is sown properly. It is usually much easier to get an even distribution by mixing the seed with top soil, as this gives a larger bulk, which is more easily distributed evenly than a small bulk. The late Fred W. Taylor, of Philadelphia, found it possible to get uniform and highly satisfactory stands of mixed bent grass on greens by mixing the seed with shredded peat moss. He used a very small quantity, probably not more than 1 pound to 3,000 square feet. His method was, however, expensive and the advantages gained by it were not in proportion to the cost. If the seed is sown alone

—that is, not mixed with top soil—it is easier to get a uniform stand by covering the seed evenly with top soil, say approximately 1 cubic yard to 5,000 square feet; but this, of course, is expensive, and unnecessary, provided rakes are used carefully for covering. Seed may be simply raked into the soil and sufficiently covered by the use of ordinary garden rakes or by an implement known as a weeder. The point to bear in mind in this case is to avoid the dragging of the seed into rows. There is also another point to watch carefully, and that is the watering of a newly sown green. Heavy watering has a tendency to wash the seed into waves and thus produce a very uneven stand. Water very slightly, simply enough to keep the surface moist, until the young plants have made a good start.

4. GRASSES FOR WINTER GREENS IN THE SOUTH.—We expect to sow winter grass in the fall and wish you would give us an idea as to the best mixture to use. (Georgia.)

ANSWER.—Our information indicates that best results are obtained in the South by sowing a mixture consisting of 4 pounds Kentucky bluegrass, 1 pound re-cleaned redtop, and  $\frac{1}{4}$ -pound white clover, particularly inasmuch as the bluegrass and white clover are immune to brown-patch. It is possible that in Georgia you will not be troubled much with brown-patch in the winter, although this disease causes considerable damage to greens in the winter farther south, as around New Orleans and in southern Florida. If you are not troubled with brown-patch in winter, you will obtain best results with redtop alone, and next best results with Italian rye-grass alone, although both of these grasses suffer severely from brown-patch. We do not think it well to mix these two grasses, as they make somewhat different putting conditions, the rye-grass being a coarser grass than the redtop. Do not use fescue, as it will not do well under your conditions. White clover will grow nicely in your location in the winter. You may, however, not desire it from a putting standpoint. All of these grasses should disappear early in the summer, giving place to your Bermuda grass for your summer greens. In order that these winter grasses may have a fair start they should be seeded, in your latitude, about the middle of September. So that you may know definitely which grass is best for winter greens under your conditions it would be advisable for you to experiment with the different seedings, sowing a few of your greens to the Kentucky bluegrass and white clover mixture, a few to redtop, and a few to Italian rye-grass.

5. ERADICATING POISON IVY AND POISON SUMAC.—Please let us know how to exterminate poison ivy and poison sumac from our golf course. We are bothered very much with these pests around the fence lines and in the brush section of some of the small gullies. (Illinois.)

ANSWER.—The most rapid and effective way to deal with small isolated clumps of these plants is simply to pull or grub them out, taking care to remove thoroughly the running underground parts, since pieces of the plants left in the ground will soon produce another crop of plants. The plants are also killed by frequent mowing carried out persistently so as to prevent the roots from developing green growth above ground. Small patches may also be killed by covering them with tarred or other heavy paper, to the complete exclusion of light. The edges of the paper should be either pegged or well weighted down. Another good method, especially for killing vines of poison ivy on fence posts and on trees, is to cut the poison ivy below the ground and then saturate the soil around the cut bases of the plants with salt brine. A second dose of brine should be

applied about two weeks later if the roots show signs of putting forth new growth. Thorough wetting with kerosene oil, applied with a spraying pump or sprinkler, will kill the plants after one or two applications. The effectiveness of the treatment will be increased if the soil is disked or cut up slightly, so as to expose the roots to the action of the kerosene. As kerosene will injure or destroy all vegetation, it is, however, not safe to use around valuable trees and shrubs. One of the most useful methods of killing the leaves of these plants (and if the leaves are killed and not allowed to develop, the entire plant will die) is to spray them with a saturated salt solution prepared at the rate of  $3\frac{1}{2}$  pounds of common salt per gallon of water. For this purpose the spray should be applied as a fine, driving mist, which may be done by use of an air-pressure sprayer. Small, inexpensive hand sprayers suitable for this work are now on the market. As soon as a new crop of leaves appears the plants should be sprayed again. If this spraying method is persisted in, the plants will gradually disappear. Crude sulfuric acid also may be used, applying a few drops of the chemical to the bases of the plants at intervals of a week until they die. This may be done conveniently by means of a copper spring-bottom oil can, such as machinists use. Care must be taken to avoid spilling the chemical on the hands or clothing, as it is a dangerous caustic. In undertaking this work of eradication, the wearing of overalls and heavy gauntleted gloves is recommended. In case of contact with poison ivy or poison sumac, infection may be avoided by the use of a grain-alcohol wash to which lead acetate, a chemical obtainable at any drug store, is added, followed with a brisk treatment with strong soap and water. If these chemicals are not available, however, the affected skin should be washed thoroughly and as soon as possible with a heavy lather, preferably in running water. Hard scrubbing of the skin with a stiff brush should be avoided.

6. FERTILIZING TO IMPROVE FAIRWAYS.—The base soil of our fairways is heavy clay and in our opinion inclined to sourness. The top soil is very thin and rests on top of the clay in an entirely separate stratum. Much of the fairway is covered by moss, in which there is some grass growing and a considerable amount of clover. Two years ago plant lime was liberally used for the purpose of sweetening, but there is considerable doubt as to whether any benefit was derived from this. We have had no practical experience in the use of ammonium sulfate, but our professional raises the point that this chemical will so kill or drive out the clover and moss that any benefit to the grass would not bring the surface to as satisfactory a playing condition as now exists. It may occur to you that our difficulties are a result of a basic condition which should be remedied by the use of sand or other substance to break the clay, and which would involve considerable expense. Because we are using leased land under such conditions as to make our continued use of the property uncertain, the club does not feel justified in undertaking expensive improvements. The policy of our green committee is to secure the best practical results from the course as it stands. In your opinion, from the facts given you, should ammonium sulfate be used, and, if so, should the mixture be heavier or lighter than that recommended by the Green Section? (Ohio.)

ANSWER.—We judge from your letter that the soil of your fairways is poor and also that there is a considerable amount of moss on it at the present time. As for using sulfate of ammonia under such conditions, we have not the slightest doubt but that an application of it at this time of the year (August 20) or a little later would be helpful for fall growth:

Ammonium sulfate is an excellent quick-acting fertilizer, but unless it is applied carefully during the hot summer months it is likely to scorch the grass. In the summer 1 pound to 1½ pounds ammonium sulfate to 1,000 square feet can be used with reasonable safety. In the fall or spring double this quantity is recommended. As for doing away with moss and white clover, there is some evidence that ammonium sulfate will so promote the growth of grass as practically to dispose of moss, but it is only after repeated applications that it has this effect on white clover. Without knowing more specifically of your conditions, we would advise an application of ammonium sulfate at this time of the year (August 20), or possibly as late as September 15, and an application of bone meal at the rate of approximately 500 pounds per acre in the early spring, about the first of March. Since you do not own the land you occupy and do not wish to go to much expense in the matter of permanent improvement, top-dressing with compost would appear to be out of the question. However, if you can get well-rotted manure for top-dressing this winter, we think it might be a profitable investment. The bone meal will go far toward improving your turf, however, and with a little ammonium sulfate this fall and a liberal application of bone meal next spring you should have reasonably good turf for next season.

7. CONTROLLING WHITE CLOVER AND CHICKWEED WITH AMMONIUM SULFATE.—This season our greens are badly infested with chickweed and white clover. We have been using ammonium sulfate on the greens at intervals of three weeks. We use 3½ pounds for a 4,000-foot green. Is this strong enough to discourage the clover and chickweed? Last year we used it stronger but it burnt the grass a little, which, however, soon recovered. It also burnt the clover and chickweed. (Pennsylvania.)

ANSWER.—We regard the rate you have used, 3½ pounds for 4,000 square feet, as a very light application. Our method of applying ammonium sulfate is to mix it with well-screened compost composed of loam or clay loam, well-rotted manure, and sand at the rate of approximately 12 to 15 pounds of ammonium sulfate to a cubic yard of compost. This cubic yard of compost is sufficient for top-dressing 5,000 square feet of green. In other words, by this method we apply approximately 2½ to 3 pounds of ammonium sulfate to each 1,000 square feet of surface. Where we can do so, we make applications of ammonium sulfate mixed with compost every month during the growing season. By applying ammonium sulfate mixed with compost and watering the greens thoroughly after the application is made, we have had practically no trouble from burning. During the hot weather we use only approximately 1½ pounds of ammonium sulfate to each 1,000 square feet. We realize that ammonium sulfate will burn grass, especially in the summer, if exceedingly great care is not taken. We believe that the continued use of ammonium sulfate in the manner here suggested will go far toward discouraging clover and chickweed, although this method is at times very slow in bringing about desired results.

8. FERTILIZING AND CUTTING GREENS NEWLY PLANTED WITH CREEPING BENT STOLONS.—We are preparing to plant a new green with creeping bent stolons from our nursery and should like to have your advice as to the cutting and fertilizing of the grass after the stolons have started new growth. (Indiana.)

ANSWER.—For greens planted in the late summer or fall, one application of a compost top-dressing containing ammonium sulfate, a short time after planting the stolons, should be sufficient for the remainder of

the year. If you have no compost for top-dressing, use good top soil. Top-dressing is something which is absolutely essential. We find in general that at the time of planting, a covering of approximately  $1\frac{1}{2}$  cubic yards, or somewhat less, of top-dressing to 1,000 square feet, is quite satisfactory. This should give a covering of approximately  $\frac{3}{8}$ -inch. For top-dressing after planting, 1 cubic yard to 3,000 to 5,000 square feet is all that is needed. For full information regarding the use of compost top-dressing containing ammonium sulfate, read the article on page 111 of the May, 1924, number of THE BULLETIN.

Stolons, after being planted, should be cut before the grass attains a height of more than 2 inches.

9. REPLACING PATCHES OF FESCUE AND RENOVATING BARE SPOTS WITH CREEPING BENT STOLONS.—We have a problem to work out in regard to our patched greens. Could the fescue patches be successfully filled with creeping bent by using bent stolons? (Rhode Island.)

ANSWER.—We have been able to convert bare spots, thin spots, and poor turf into good creeping bent turf by punching stolons of a good strain of creeping bent into the spots by the means of a dibble, or by chopping up the stolons, spreading them over the surface, and then covering as in the case of new plantings. When planted in this way the introduced bent stolons should in time replace the fescue entirely. This work should be done, in your latitude, the latter part of August or the first of September, and, if possible, the greens should be withheld from play until the following May, especially if the cut stolons are scattered on the surface. If the stolons are simply dilled in, the greens may be kept in play if this is absolutely necessary. The new growth from the stolons should be cut before it is over 2 inches high.

10. LENGTH OF TIME A CREEPING BENT NURSERY MAY BE EXPECTED TO BE USEFUL.—Is a nursery in its second year as good as one in its first year? (Pennsylvania.)

ANSWER.—A nursery in its second year does not provide as good material as in its first year. Plant the runners in the manner recommended in the March, 1924, BULLETIN, preferably in the fall or late summer. Use the material thus developed the next August or September—that is, one year from the time of planting the original row. No part of the old row should be left. A nursery one year old has served its usefulness, and if material is desired for next year's planting a new nursery should be started. This is an important matter.

11. FAILURE OF PLANTS TO DEVELOP FROM STOLONS IN VEGETATIVE PROPAGATION.—The latter part of May we got in enough stolons to enable us to plant at that time 200 linear feet of nursery row. With careful cultivating, weeding and watering they have by this time (September) developed into a matted row from  $2\frac{1}{2}$  to 3 feet wide. The several experiments that we have made in vegetative planting of these stolons would indicate that a very small percentage of the nodes make plants. Is this due to some fault on our part, or to the fact that the grass is not sufficiently mature? The variety of stolons we received produces a very fine stem with short internodes. (New York.)

ANSWER.—Doubtless the small percentage of the nodes that make plants must have been due to the bad condition of the material when it reached you. Under favorable circumstances practically every joint sends up a shoot. Your growth of  $2\frac{1}{2}$  feet to 3 feet wide since planting the latter part of May is a good growth.

12. YELLOWING OF TURF FROM POOR DRAINAGE.—Some of our greens

look so much greener than others. On some of the greens the grass has a yellowish appearance. What is the cause of this? What treatment would you suggest to correct this condition? (Missouri.)

ANSWER.—We are unable to determine, from your letter, the cause of your trouble, but it is possible that these greens have poor drainage, either poor surface drainage or poor under drainage, and possibly both. Poor drainage almost invariably causes yellowing, and the only method of overcoming this yellowing is to improve the drainage. We have found that top-dressing greens with good compost to which a little ammonium sulfate is added is an excellent method of keeping grass in good condition.

13. WEEDS IN BENT GREENS; NECESSITY FOR THEIR PROMPT REMOVAL.—We have five bent greens coming along nicely but they have a great many weeds from the manure we used in building them. We have been weeding these out, but are wondering whether there would be any danger in our letting them go, expecting that cutting and the growing bent will crowd them out. (Ohio.)

ANSWER.—We would advise you by all means to keep your greens thoroughly weeded. The growing bent will not crowd all of them out. Cutting will prevent a few kinds of weeds from producing seed, but even in the presence of such weeds the bent can not make its best growth. There is great danger of the weeds going to seed at any time and causing endless trouble.

14. PREPARATION OF THE SOIL IN RETURFING OLD GREENS WITH CREEPING BENT STOLONS.—We have one green of creeping bent planted vegetatively last fall, and it is indeed beautiful. It is our desire to convert all of our greens to this grass as rapidly as possible. Due to limitations in finances we have decided to do this on our old green beds without rebuilding them. Of course we expect to work up the surface of the greens in preparing for the planting of stolons and add such fertilizer as necessary. We should state in this connection that we have never been able to produce good greens on our soil from seeding. All of the soil in the greens, with the exception of some humus material and in some instances a little sand, is from our own course, and consists of a very heavy clay with very little top soil. None of our greens are tiled, but the surface drainage is pretty well provided for. (Kentucky.)

ANSWER.—Creeping bent can be successfully grown on clay soil of low fertility provided top-dressings of fairly good compost are applied at relatively frequent intervals. In your case we have the following suggestions to make: (1) Mix well-rotted manure and bone meal thoroughly with the top soil at the rate of about 1 ton of the former and 10 pounds of the latter to each 1,000 square feet. (2) If your top soil contains an appreciable proportion of commercial humus, this should be stripped off the green and replaced with new soil. In a great many cases, commercial humus has given very unsatisfactory results. (3) Above all things see that your greens are well drained, both on the surface and below. It is not always necessary to install tile, but good drainage is a necessity in all cases.