

dressing, screen the entire bed as soon as the weather and routine of other work permit, and store this topdressing in a covered shed. Then rebuild the compost bed. By adopting this method, dry topdressing material is always immediately available, which is a most important feature in topdressing greens at regular intervals.

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. Improving "winter-killed" turf.—A recent examination of one of our greens discloses that the turf is far from being up to the quality desired. Our greenkeeper reports that it has suffered from winter-killing. Please inform us what causes this condition and what steps can be taken to remedy it. (Pennsylvania).

ANSWER.—Injury from winter conditions rarely happens to turf that is properly drained. Water-logging of soil over winter will however seriously injure turf, and this condition can be remedied only by giving the green proper drainage. If there is a reasonably good stand of grass on a green (thin but uniform), it can be thickened by applications of compost and ammonium sulfate. An application of 1 cubic yard of compost to 2,500 square feet of surface is recommended for the first dressing, to which has been added 8 to 12 pounds of ammonium sulfate, well mixed in. This should not be applied, however, until such time in the spring as the grass starts growth. Where the grass is entirely killed out it is advisable to prepare the green as for new seeding. Where there is sufficient grass to be worth saving, though not enough to permit of thickening by the use of compost and ammonium sulfate, the seeding of German mixed bent seed and redtop seed, in equal proportions, at the rate of about 3 pounds per 1,000 square feet, is recommended, to be followed at once by a topdressing of well-screened compost to cover the seed and serve as a germinating layer.

2. Fertilizers for greens and fairways (compost, mushroom soil, sheep manure, stable manure, poultry manure, bone meal, ammonium sulfate).—For the past two years we have been topdressing our greens about every two weeks with a mixture consisting of compost, mushroom soil, sheep manure, ammonium sulfate, and sand. We are in doubt as to whether we have been using the correct proportions of these fertilizers to obtain the best result. What do you think of this mixture, and what proportions do you advise us to use to the cubic yard? We have recently been urged to use pulverized poultry manure in place of sheep manure. What is your advice as regards this? For several years we have fertilized our fairways with No. 2 ground bone. Last spring we used 20 tons and had a

splendid growth of grass. We are now advised to use pulverized poultry manure for this purpose. We should be glad to receive your recommendations in these matters. (Connecticut.)

ANSWER.—In making compost for use on putting greens splendid results are obtained with a mixture of good loam soil, organic matter in the form of well-rotted stable manure or mushroom soil, and sand, in equal proportions. Mushroom soil may however contain considerable clay or loam, and when it is used its proportion in the compost should be increased and the proportion of loam soil correspondingly decreased. One cubic yard of compost is the proper amount to apply to 5,000 square feet of green. Better results are obtained when ammonium sulfate is also included in the compost mixture. To a cubic yard of compost 15 pounds of ammonium sulfate should be added for use when the weather is reasonably cool. In hot weather the amount of ammonium sulfate should be reduced to 7 pounds to a cubic yard of compost. Poultry manure and sheep manure are rather concentrated fertilizers but do not supply the quantity of organic matter which is obtained from stable manure or mushroom soil, and if they are used in place of these latter in making compost they should have to be used in double amounts to furnish the desired proportion of organic matter. Poultry manure appears to be superior to sheep manure for this purpose. As regards bone meal, this is an excellent fertilizer for fairways. It is preferable to poultry manure unless the poultry manure can be applied in mixture with considerable loam, in which case this topdressing, though expensive to apply, will give excellent results. Bone meal should be applied at the rate of 300 to 500 pounds per acre, and in the early spring. Well-rotted stable manure is an excellent fertilizer for fairways, but is of course regarded as objectionable when it interferes with play. However, on courses that are closed for the winter it may be applied fairly lightly and evenly after the course is closed, and any litter that remains should be raked off in the spring. The organic matter furnished by stable manure is of great value in fertilizing fairway grasses.

3. Treatment of and seeding sandy soil for putting green and fairway turf.—We have two fairways on our course which run parallel across a sandy area with a sandhill extending across them. Our course was built about three years ago, and through the misguided efforts of the green committee at that time a great amount of seed was wasted on this sand, as it blew away as fast as it was planted. We were not allowed to use these fairways, and this permitted the sand to remain loose and blow away easily. Finally it was decided to play on this part of the course with what little grass had started, and the resulting trampling of the sand seemed to help it considerably and prevent more seed from blowing away. During the last two years the grass has spread some, but it is mostly in clumps with cups between, and the top of the hill is bare. Last fall we decided to start working on these fairways near the greens and gradually extend them farther out. A rather large quantity of commercial fertilizer was scattered in front of the greens for a considerable distance. In the spring we expect to haul black dirt from near the river which runs through our property, topdressing the parts which have been fertilized, and then plant seed. Do you think this will give

the desired results? What seed should we use and at what rate? Would it be worth while planting some kind of seed on the balance of the fairways and on the hill, without topdressing? One of the greens on this sandy part of the course was never satisfactory, as it had too much grass in it of a poor quality. Last fall we rebuilt this green, placing 25 or 30 loads of black dirt from the river on it, which we intend to grade in the spring and plant with creeping bent stolons. How early in the spring should this be planted? (New York.)

ANSWER.—On very sandy land it is practically impossible to get good turf of any northern grass without special treatment. The best treatment is to keep topdressing with a loam or clay loam soil until you have enough to bind the top 1 inch or so of soil. Clay alone could be used, but it would have to be harrowed into the sand thoroughly. In getting the soil in shape to grow good turf, topdressing with soil is much more valuable than the use of fertilizers, although the latter help also. Fertilizer alone will not answer your purpose. The same treatment would apply in the case of your putting greens, except that it is usually better, for putting green turf, to thoroughly mix a 1-inch to 2-inch layer of soil into the top 1 inch of sand. For planting your fairways, after you have sufficiently topdressed them, we would recommend a mixture of 12 pounds Kentucky bluegrass, 4 pounds redtop, and 1 pound white clover sown at the rate of 125 to 150 pounds per acre. White clover is particularly helpful where the under soil is very poor. For your putting greens we would recommend creeping bent stolons or else South German mixed bent seed, the latter to be sown at the rate of 5 pounds per 1,000 square feet. You should do your planting at the earliest possible date in the spring or late winter at which the ground is in a workable condition.

4. Soil foundation of a putting green.—We are ready to construct three new greens and the majority of our committee recommend that the soil foundation be prepared as follows: first, a 6-inch layer of stable manure; second, a 6-inch layer of good top soil; third, a 2-inch layer of well selected and sifted loam. A few of our committee doubt the advisability of adopting the layer formation of the greens foundation. Your advice in the matter will be appreciated. (Georgia.)

ANSWER.—We would strongly advise against your using a layer of stable manure in your soil foundation. Turf on putting greens kept properly clipped rarely forms roots over 1½ inches deep. In our opinion a layer of stable manure over 4 inches below the surface of the green would be a waste of material which could be utilized to much greater advantage in the making of compost to be used for topdressing purposes after the turf is established. Furthermore, a layer of stable manure in the soil is the best possible attraction you could establish for grubs. The most important thing in building a putting green foundation is to provide ample drainage. After you have done this, the best you can do is simply to provide a top layer of a good loam to a depth of 3 inches or not to exceed 4 inches. With a top layer of this character, fertilizing is best done by surface applications after the turf has become established.

5. Improving thin putting green turf.—A number of our greens have a very thin and mottled turf, the indications being that they were sowed to a mixture, some of the grasses of which have died out. Last fall a coating of sharp sand was spread on them with a view to improving the turf. What treatment would you suggest this spring to improve this turf? (New York.)

ANSWER.—It is unfortunate that the coating of sharp sand was spread on your greens last fall. We would suggest that at the earliest date you can, you rake this sand into the surface of the soil as thoroughly as possible. Putting additional seed on bare spots of putting greens in the spring rarely gives good results. We would advise you to stimulate the growth of the grass all you can during the spring and summer by fertilizing with ammonium sulfate and topdressing with a good loamy compost, and seed the bare spots with South German mixed bent seed in the late summer or fall.

6. Inadvisability of early summer seeding.—You speak of sowing German bent seed the latter part of August. Is there any objection to sowing that seed in June if the greens are kept well sprinkled? We should like to get the benefit from new seeding this season if possible. (Massachusetts.)

ANSWER.—From the experience we have had in sowing grass seed in summer we would advise you to wait until the latter part of August before seeding. Seedlings of our northern perennial turf grasses do not seem able to combat the conditions of summer, and it is rare that under such conditions they come through and establish themselves. Of course, it is possible that a small percentage of the seedlings might survive the summer conditions, but we have found late summer or early fall seeding much more satisfactory.

7. Shredded cattle manure as compared in value with stable manure.—What is the value of shredded cattle manure for fairways, compared with well-rotted stable manure? The costs of freight, hauling, and preparing the shredded cattle manure are tremendously in its favor, as well as the fact that less attention is needed after it is spread on the turf. (Ohio.)

ANSWER.—The best form of manure is ordinary well-rotted stable manure. It loses value when dried, shredded, or treated in any form. It is used to best advantage when composted with top soil and a little ammonium sulfate, and the compost used as a topdressing.

8. Grass for salty conditions near the seashore.—Our course is constructed on a sand-fill over a salt meadow. On one part we are bothered with salt sweating through the soil. Do you know of a grass suitable for golf that will grow under salty conditions? (New York.)

ANSWER.—On parts of the Massachusetts coast there is a native strain of seaside bent which makes an excellent turf and withstands the conditions you describe. This bent can be very readily established by the vegetative method, although no seed of it is available. It is possible also that the strain of seaside bent, of which seed is harvested in Oregon, would withstand the same conditions; but it would be well first to test this strain on a small scale before attempting an extensive planting.