

Earthworms, Grubs, and Rich Soil

By rich soil in this case is meant soil containing much organic matter, particularly humus and manure. In such soil earthworms and grubs are most abundant. All animal life must have organic matter available in some form to sustain life, differing in this respect from plants, which are able to subsist alone on the inorganic contents of the soil when they have access also to light, air, and water. The attraction of rotted manure to earthworms and grubs is readily noted on golf courses. Much therefore can be done in controlling these pests by the use of inorganic fertilizers alone, particularly ammonium sulfate and ammonium phosphate. The evidence seems to indicate that fine turf can be maintained by the use of inorganic fertilizers alone. Of course there is no way known by which the organic content of a soil can be extracted in a single operation without destroying the growing turf. Steam sterilization and baking of soil will destroy the vegetable and animal life in the soil, but will not remove the organic matter unless sufficient heat is applied to reduce the organic compounds to pure carbon.

This is a feature which may well be borne in mind in the matter of fertilizing turf, but especially so in the matter of preparing soil for growing new turf.

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 poor fairway turf.—Three of our fairways have large areas which are entirely bare, and on the remaining 15 fairways there is about a 25-percent stand of Kentucky bluegrass. The soil is very poor, which is doubtless the reason for the bad condition of the turf. It is our purpose thoroughly to renovate the turf this season, if it can be done, and we are requesting that you outline a program which we can follow with hopes of success. (New York.)

ANSWER.—We would recommend that you thoroughly disk manure at once into the bare areas to which you refer, then smooth the surface with a spike-tooth or chain harrow, then sow a mixture of equal parts of Kentucky bluegrass and redtop seed at the rate of 150 pounds to the acre, then cover the seed with a weeder or light harrow, and then roll. On the remaining fairways, on which there is about a 25-percent stand of bluegrass, we would recommend that you apply bone meal to these at the rate of about 300 pounds to the acre, then sow a mixture of equal parts of Kentucky bluegrass and redtop seed at the rate of 100 pounds to the acre, then cover the seed and bone meal with a weeder or light harrow, and then roll. After the new growth of grass is well established, you can hasten its

development considerably by applications of ammonium sulfate. In this you should be guided by developments, but it will probably be well for you about April 15, and again about May 15, to apply about 125 pounds of ammonium sulfate to the acre, mixing and applying it with sand in order to obtain an even distribution, as if it is distributed unevenly burning will result in places. If the ammonium sulfate is applied in cool weather, and especially shortly before rains occur, no burning of the grass will result. If applied in warm weather, however, the grass is liable to be burned. If water is available it would be advisable to water the ammonium sulfate into the soil.

2. Rate of seeding Bermuda grass on fairways; fairway grasses for middle latitudes.—We shall seed about 50 acres of fairways this spring and have obtained a good price on 10,000 pounds of Bermuda grass seed for the purpose. Before placing the order we should appreciate any advice you are in position to give. (Virginia.)

ANSWER.—There is some doubt whether Bermuda grass will be satisfactory as far north as your latitude. In our judgment the best grasses for your fairways would be a mixture of 4 parts Kentucky bluegrass and 1 part redtop sown at the rate of 100 pounds per acre. Bermuda grass seed is very fine and is sown for pasture purposes at the rate of 5 pounds per acre. For fairway purposes 30 pounds of Bermuda seed per acre would be heavy seeding. If you wish to try Bermuda grass alone on your fairways, for your 50 acres of fairway 1,500 pounds of seed should be ample. We would advise you to try the Kentucky bluegrass and redtop mixture.

3. Controlling *Poa annua*.—What is the best method of controlling *Poa annua*? (New York.)

ANSWER.—The only certain way to get rid of *Poa annua* in a putting green is to weed the plants out by hand in early spring before they have had a chance to make seed. If you do not do this it is sure to spread in your greens and make trouble. One club reports that it has rid its greens of *Poa annua* and kept them clean by the constant use of ammonium sulfate. We have not experimented with this, however, and therefore can only offer it to you as a suggestion.

4. Use of muck in building new greens.—We have an unlimited supply of muck in a piece of swamp land on our course. We are building 7 new greens, which are already contoured, and 6 inches of fairly good top soil has been placed on top. We are planning to cover this top soil with a seed bed composed of a 3-inch mixture of 60 percent muck and 40 percent sand. The muck and sand will first be screened. We have used this method before and it has produced wonderful results, but we would nevertheless like to have your opinion with regard to our plans. (New York.)

ANSWER.—We hesitate to object to your plans inasmuch as you have followed them previously with good results. As a better plan we would favor the working of the muck, unscreened, thoroughly into the soil by the use of a team and disk-harrow, and the use of manure in conjunction with it. Muck in itself is generally very poor in immediately available plant food, and it decays very slowly. On our experimental grass plots we can still find muck in the original con-

dition that it was in when we applied it 6 years ago. Furthermore, muck is a very light material, consisting mainly of vegetable matter, and dries out quickly when spread on a green, so that a good deal of it blows away. In our opinion a heavy rain would be sure to wash the bulk of the material off the green.

5. Putting turf of bluegrass and clover.—Our course is located between two rivers. We have a clay soil to contend with, with limestone formation underlying, which gives splendid bluegrass fairways, but we have had poor success indeed in obtaining first-class putting greens. We have tried various grasses for putting greens, such as redtop, fescue, and bent, but none of these grasses seem to thrive in our soil and climate. Last fall we seeded one of our poorest greens to clover, and this year it is one of the best greens on the golf course. Some of our members, however, seem to question the use of clover for putting green purposes, offering the objection that it burns out in midsummer and also gets coarse and stubbly. Do you recommend the use of clover for putting greens? Will clover give first-class results by itself, or should it be mixed with any other grasses? (Kentucky.)

ANSWER.—Offhand we do not see how it could be any more difficult to grow bent greens in your locality than it is here at Washington, where we have admirable success either by seeding or by the vegetative method. Redtop always makes poor greens and is not to be recommended except as a temporary expedient. Fescue in our vicinity is not a success and we are sure would not be under your conditions. We should urge you to try, on an experimental plot, further work with the bents, with which it seems to us you ought to succeed. Clover alone makes very slow greens, and we have never been able to keep a patch of pure clover, although we have planted areas vegetatively, but the clover does not hold. Bluegrass and white clover together make a fairly good green, and there is no question whatever that these will succeed with you. They are not of the high type of bent greens, but are satisfactory. We would therefore recommend that you use bluegrass and clover for your greens and continue in an experimental way to work with bent to see if you can make it succeed. Do not attempt to grow greens of clover alone, as we are sure they will not prove satisfactory to you.

6. Effect of heavy machinery on soil.—We have been using a very heavy tractor for pulling our mowing equipment. We find a number of clubs are changing to the use of lighter tractors. Do you consider the use of heavy machinery to be injurious to turf? (Tennessee.)

ANSWER.—We believe that the superior advantages of lighter tractors have been exaggerated. It is true that the use of very heavy machinery is injurious to turf on heavy soils, but on lighter soils it is rare that any injury occurs. Turf must be sufficiently rolled in some manner so that the soil becomes firm enough to prevent heel prints being made. We think there is no question but that soil should be compacted at least to that extent; whether it should be still more solidly compacted is a question about which opinions differ.

7. Value and use of sewage disposal refuse as a fertilizer.—We are offered by our local reduction plant the residue from drying out

garbage. This is a very fine powder and it seems as though there ought to be considerable fertilizer value to it. Have you any knowledge as to whether this would be good to apply with topdressing on putting greens? We can get this material for simply the cost of hauling it. (Ontario.)

ANSWER.—The chief objection to the use of dried organic fertilizers of all kinds, including commercial humus and animal manure, is their inert character. It is hard for them to absorb moisture and thus decompose and become readily available plant food. Furthermore, if the material is also pulverized, much of it is lost by being blown away, which will occur even after the material has been wetted and dried out again. Another point that should be considered, especially in connection with the use of sewage disposal, is that of sanitation, and authority from the local board of health should be obtained before an attempt is made to use the material. If it is decided to use the material we believe it can be used to best advantage by composting it for at least a year and using the compost as topdressing. In any event it can not be expected to take the place of fertilizers high in quickly available nitrogen, such as ammonium sulfate or ammonium phosphate, which are particularly desirable for use on putting green turf and which produce the acid condition of soil so necessary in the control of weeds.

8. Using a creeping bent nursery over one year old.—Are creeping bent stolons in a nursery two years old as suitable for planting purposes as stolons in a nursery one year old? Last spring we put in a rather large creeping bent nursery but were unable to make use of the stolons from the nursery in the fall. Would the stolons from this nursery be all right to use next fall? (Minnesota.)

ANSWER.—In a creeping bent nursery over a year old the growth in the middle of the rows will be found to consist mostly of upright shoots, and not entirely of the creeping stems. It is these creeping stems of creeping bent which are needed for best results in vegetative planting of putting greens. It is for this reason that we advise against the use of stolons from a nursery over one year old if a club can arrange to plant its nursery anew each year. It will however be found that the margins of the nursery rows, unlike the middle of the rows, will consist almost entirely of creeping stolons. You should therefore be able to obtain good planting stock by making use of only the margins of the rows, discarding the middle portion.

9. Rate of application of bone meal and mowrah meal; weeds from creek water.—How is the best way to apply bone meal, and what quantity per green; also mowrah meal and quantity per green? Should these be applied to the greens before the topdressing or after the topdressing? Is there any danger, in using creek water, of introducing seeds of weeds or marsh grasses to the greens? (Wisconsin.)

ANSWER.—In applying bone meal all that is necessary is to scatter it as evenly as possible over the green at the rate of 10 to 15 pounds per 1000 square feet; it never burns the grass. Mowrah meal is applied at the rate of 15 pounds per 1000 square feet and is then watered in with a hose. These applications can be made either

before or after topdressing. We do not consider creek water a serious menace as regards the weed problem. The great majority of the weeds that might be introduced with creek water could not withstand the close cutting given to putting greens. In the East there are probably only half a dozen troublesome weeds. The weed problem is easily solved if the greens are once freed from weeds by hand-weeding and then watched carefully to see that all weeds are pulled out as they appear. The whole weed nuisance is due to neglect—letting the weeds get a firm foothold before any attempt is made to eradicate them. Bone meal in itself has a tendency to encourage the growth of clover and a number of weeds, while ammonium sulfate has a marked tendency to discourage them. Our suggestion therefore is that you will get far better results by fertilizing with ammonium sulfate instead of bone meal.

Boost the Green Section

On the following 7 pages is printed a list of golf clubs now enrolled in the Green Section. The list totals 886 clubs. This is about one-fourth of the total number of clubs in the country.

If the Green Section means something to its 886 member clubs, it would mean vastly more if its enrollment were enlarged to include every golf club in the United States and Canada. That would mean an addition of approximately 3,000 clubs to its membership. The Green Section is a cooperative enterprise. The benefits of its services are enhanced as the extent of cooperation is increased. Each member club of the Green Section is an asset to every other club in the Green Section. It is therefore evident that at present the Green Section is functioning only twenty-five percent of the possibilities.

There is a very easy way to increase the Green Section membership. That is, to talk about the benefits that are obtained from it and to urge clubs which are not members to take out membership. Our BULLETIN reaches only one-fourth of the golf clubs in the United States. The value of the Green Section is attested by the continued support given to it by its member clubs and its continued slow but certain growth.

A sample copy of the February number of the BULLETIN will be mailed to every golf club in the United States and Canada which is not a member of the Green Section. It will be addressed, "Chairman of the Green Committee." Now is your chance to boost the Green Section by sending us the names of men connected with non-member clubs so that we may also write each an individual letter laying before them in detail the benefits of membership in the Green Section. Sample copies of the BULLETIN and circulars describing the work of the Green Section are available for distribution, and will be promptly mailed, accompanied by an individual letter, to each address that is sent in to the Washington office.

Get busy, Member Clubs, and boost the Green Section!