

Correction—Through an unfortunate error there is published a misleading statement in Dr. Harban's article on "Winter Work on the Golf Course" printed in the preceding issue. In line 12 the author is made to state that the club was "led to the permanent employment of a dozen or more of the most desirable men." The Doctor really wrote "a half dozen," but the copyist omitted the word "half." The greenkeeping at Columbia has been exceedingly efficient, and this was accomplished with a small force of men, not the large one that the error indicated.—Ed.

Questions and Answers

All questions sent to the Green Committee will be answered as promptly as possible in a letter to the writer. 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.

1. *How early is it wise to treat putting greens for earthworms? W. S. F.*

Here at Washington earthworms begin to work as soon as the frost is out of the ground. This year they were very active by February 14. It is quite likely that this habit of the worms becoming active even before the grass begins to grow is its normal behavior. Arguing from theory it has seemed that a worm-killer applied while the ground was still very moist would not penetrate well, but it seemed best to test the matter. Accordingly, on March 2 an area 3 by 5 feet was treated with corrosive sublimate in solution of the ordinary strength, one-half ounce to 15 gallons of water, applying three gallons of the solution. The solution soaked into the wet soil readily. Twelve worms appeared in 15 seconds and 20 by the end of one minute. This is about six times as many as is usually secured in our experience. Half of the worms were 2 to 3 inches long, the remainder 5 to 7 inches long.

It would seem, therefore, that worming might be done with great advantage just as soon as the frost is well out of the ground, even if the soil is still very moist. An extensive series of experiments is being carried out and will be reported on soon.

2. *Is a layer of cinders or rubble under a putting green desirable? H. A. L.*

Several clubs have built greens with such a layer, with the idea that it would furnish good drainage and also prevent earthworms from infesting the soil. The latter idea seems to be wholly fallacious as in at least one instance where an 8-inch layer of cinders is only one foot from the surface, the green is just as much troubled by worms as are others without a cinder layer. For drainage, tiles are to be preferred. Cinder layers in time become clogged with soil and fail to function. The clubs that have tried cinder or rubble layers are not enthusiastic about them, at least none have as yet given favorable reports. If any club has gotten as good or better results with cinders as with tile, it should publish its experience in the Bulletin. Theoretically there is a rather serious objection to such artificial layers as they completely destroy the normal structure of a soil as regards capillarity. The free movements of water in a soil both up and down are desirable characteristics of a well-drained soil.

3. *Is one foot of top soil enough on a putting green?* H. A. L.

Good results are often secured with only six inches of top soil but one foot is much better. On putting greens the soils should be as good as the club can well afford in order to insure permanent turf of high quality. The ideal soil for a putting green is about the same as a good rich garden loam or clay loam.

4. *How can winter-killing be prevented?* J. C. S.

It is very questionable whether any of the northern turf grasses are ever killed by low temperature alone. Where areas of grasses are found dead in spring, it seems always to be correlated with very poor drainage. On such spots the water-logging not only deprives the soil and the roots of air, but results in sheets of surface ice being formed, which still more excludes the air. Ice sheets on well drained soil seldom if ever cause injury even if they last several weeks, but on water-logged spots grasses as well as trees are often killed. Good drainage is the best insurance against winter-killing.

5. *Is twenty per cent of sand enough to mix with a stiff soil for putting greens?* H. C. L.

This amount of sand should help greatly but probably twice as much is desirable if the clay is decidedly stiff. Humus material also helps greatly in ameliorating clay. The end to be achieved is to get the soil in a loamy condition, a matter rather easily determined by observation but practically impossible to state in terms of percentages. Some clays are much more sticky than others and consequently require more admixture of other materials to put into a really desirable form.

6. *Is dynamiting of the soil desirable?* H. A. L.

If the subsoil is impermeable or if there is a definite hardpan layer the use of dynamite to blast holes in which to plant trees is advisable. To thus blast the subsoil on fairways or even under a putting green would seem rarely or never to be desirable, or on a larger scale economical. If better drainage is the end sought, tile is best to use. If the land is underlaid at a depth of one foot or so by an impermeable subsoil it is not particularly desirable for golfing purposes. Fair turf can be grown on such land if the surface soil is one foot deep or even six inches deep, but it will suffer severely during periods of drought.

7. *With a very limited amount of funds available, what fertilizers should be purchased to use on our putting greens?* E. J. M.

Barnyard or stable manure, either well rotted or else composted with other substances like sod, is the safest and most effective fertilizer for use on putting greens, and if available at all, usually the cheapest. Manure has the great virtue of being "fool-proof," that is, it is easy for anyone to get good results by its use, and almost impossible to do any harm. If manure can not be secured, the organic fertilizers are the next best, especially bone meal, but fish-scrap and tankage are also excellent.

8. *Parts of our golf course are full of crawfish. How may they be eradicated?* H. A. L.

Crawfish live only in very wet soil. The best remedy is good drainage. If for any reason some places cannot be drained sufficiently well, the crawfish may be destroyed by systematic poisoning. Carbon bisulphide is most satisfactory. If a little of this liquid is put in a crawfish

hole and the opening tightly plugged with earth, the animal will be killed by the gas that the chemical forms. An oiler with a long spout is excellent to apply the poison. One squirt of the liquid is sufficient. Many other chemicals are more or less useful, but carbon bisulphide is known to be very effective.

9. *Our town has about 12,000 people and we are struggling to maintain a nine-hole course. Can you advise how other clubs in towns of about this size finance and maintain their clubs?* E. J. M.

The Green Committee is particularly interested in the problems that confront golf clubs in small cities, and is collecting information from clubs that have been successful with the view to aiding others that are similarly situated. It will assist the committee greatly in its task if each club in town of 25,000 people or less will tell us how it solved its problems; and particularly the financial details as to sources of revenue and to costs of maintenance both of the course and of the club house. The stories of successes, and indeed of failures, ought to be of great assistance to every club that does not have a large city for its support.

10. *How can we keep our tees in good condition? They are always ragged or cut-up.* E. J. M.

If tees were given a fraction of the attention devoted to putting greens they could be enormously improved over the present average. Practically total neglect or else good attention once a year is the usual treatment given to tees. It is not enough. One little scheme that will preserve the grass on the tee for those who wish to use it is to have the tee plates at the extreme front and have the first yard of the tee bare. Ninety per cent. of the players to gain this yard will tee on the bare place, and thus reduce divoting to a minimum. Perhaps the best way to cover bare spots formed in the turf on the tee is by inserting a piece of sod when necessary. Indeed resodding all or most of a tee every spring is a method used on some courses.

If any one has discovered how to keep grassed tees perfect, we want him to give us his method.

11. *Can you give us the names of seedsmen who can supply genuine South German bent seed?* W. H. S.

A good many lots of such seed have reached the market recently. Names of dealers will be sent on request. It must be understood that such information does not imply a guarantee by the Service Bureau. Seeds should never be purchased until a sample has been secured and verified. Seedsmen as well as others are sometimes mistaken or deceived as to the quality and identity of bent seeds.

12. *Please tell us about Mascarene grass, Zoysia tenuifolia, which we believe has a great future for putting greens.* O. H. L.

Mascarene grass is a subtropical species that is adapted only to Florida and a narrow strip along the Gulf Coast where the temperature rarely falls below 15° Fahr. It is an exceedingly dwarf grass forming a dense sward never over two inches deep. The rootstocks are very numerous, as large as a goose-quill, and buckle so that the turf is thrown up into little billows, a matter that can be corrected by frequent rolling. The leaves are very stiff and wiry so that the putting surface is slow. It may prove to be an excellent grass for tees, a matter that has not yet been

tested. It is a beautiful grass to cover hard walks and it seems to enjoy continual trampling. In Miami, Florida, there is such a walk built of coquina limestone, covered with a perfect green carpet of Mascarene grass that is a triumph of horticultural beauty. The grass is worth careful testing by southern golf courses, but not for putting greens. It must be propagated vegetatively as no seed is available.

Analyses of Soils

Chemical analyses of soils are practically of little if indeed of any direct value. At the present time few institutions will make such analyses without charge. While chemical analyses of soils are not without value in certain kinds of investigations, it is only in exceptional cases that an expert can determine from an analysis what fertilizers or other treatments are desirable. Inasmuch as soil analyses do not contain information of value in proportion to their cost, they can be left out of consideration by green committees.

Soils

Whenever a question is asked regarding turf growing, the character of the soil should always be indicated. Soils may conveniently be classified as clays, silts, clay loams, silt loams, loams, sandy loams, fine sands, coarse sands, in accordance with the size of the ultimate particles. It is well also to state the color: black, brown, chocolate, red, yellow, gray, or white. Any type of soil may contain more or less gravel. The dead vegetable matter, humus, may be present in abundance or scant; in mucks and peats it makes up nearly all the soil. Drainage is also an important factor in soils. The quality of a soil is also indicated by the average yields that farmers get with staple crops, such as corn, wheat, and potatoes. Such a description as the following answers all necessary requirements: Our soil is a brown sandy loam, well drained and considered by farmers to be fairly productive.

Learn to Know the Turf Grasses at Sight

All of the turf grasses can readily be recognized, especially with aid of a lens, when you once know their characters. It is easier to do when the grasses are in bloom, but all can be identified even on a putting green. Every grass "fan" ought to get familiar with all the good grasses as well as the bad ones. One of our famous visitors of last year conceived the idea that the putting-green grass we use is crab-grass. He had heard the name but did not know the plant. Each issue of the Bulletin will contain illustrations and detailed description of some grass of interest to golfers.

Gullies.

On rolling golf courses gullies not infrequently cause trouble, but once they can be filled and covered with deep-rooted grass, the trouble rarely recurs. In deep gullies boulders may be thrown in the bottom and will help considerably. Above the boulders a brush intermixed with soil will do much to prevent washing while the grass is getting established. Probably the best of all grasses in the north for sowing in gullies is orchard grass. It is very deep-rooted and the larger tufts will prevent most swiftly running surface water from eroding the soil. It is best not to cut the grass, as if left tall it will collect any soil or silt in the water and gradually build up the level of the land. The sooner gullies are attended to the better.

If a gully lies across a fairway it is best to fill to the degree desired, compacting the soil thoroughly, and then to sod the surface.