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. Comparative viability of South German bent seed and red fescue seed.—Can you give me any information as to the relative viability of South German bent seed as compared with red fescue seed?—(Indiana.)

Red fescue seed after it reaches this country seems to have lost considerable of its viability en route and averages near 75 per cent. immediately on arrival, whereas the South German bent seed is much higher. After the red fescue seed has remained in stock in this country for a year its germination generally goes down to 25 to 40 per cent, whereas South German bent seed will retain its viability very satisfactorily for as long as four or five years.

2. Steamed vs. raw bone-meals.—I recently got quotations on steamed bone-meal at $32.00 per ton and raw bone-meal at $45.00 per ton. The sellers claim that the steamed bone-meal is the more quickly acting. Which would you advise us to purchase?—(Pennsylvania.)

Steamed bone-meal is usually quoted at about three-fourths the price of raw bone-meal. The former differs from the latter in that the fat has been extracted from the steamed bone-meal either by steaming or by the use of a solvent. Where steam is used, considerable of the nitrogenous matter is also removed, the net result being that the steamed bone meal is poorer in nitrogen and relatively richer in phosphorus and the phosphorus is in a more available form. However, for grass purposes it is the nitrogen which is of most value. The difference in price seems to be based on the chemical analyses of the two as regards the content of potash, phosphorus, and nitrogen; but it may be based, in part, on the experience of truck growers and the large users of bone-meal. We can find no data whatever in the way of actual fertilizer trials comparing the relative value of steamed bone-meal and raw bone-meal for grass or for field crops. but we are inclined to think that at about the differential in prices quoted to you the values of the two about balance. On the whole we should be inclined, however, to purchase the steamed bone-meal. It would be interesting if you could test the two on a putting-green, fertilizing one-half of the green with steamed bone-meal and the other half with raw bone-meal, and watching the results. Yet we have serious doubts that any difference in results would be perceptible.

3. Weeds in sand-pits; sodium arsenite.—Can you give us any information relative to a remedy for weeds in sand-pits? Hoeing weeds by hand labor is an expensive proposition with us, and we would like to inquire if there is not some weed-killer or a preparation of some kind that we can use to kill out the weeds. Is it customary with most courses to use a preparation, or do they weed by hand?—(Wisconsin.)

So far as we know, this work is done on most courses by hoeing or raking. It would seem, however, that chemical weed-killers could be used at perhaps less expense than the hand-labor; and furthermore, the contin-

uous use of the weed-killers would finally get the soil in such condition that the weeds would not grow, and without interfering with the use of the sand-pit otherwise. The best chemical week-killer is sodium arsenite in a 2 per cent solution, which would mean 1 pound of sodium arsenite to 6 gallons of water. This should be used rather liberally, say, at the rate of 10 gallons to 1,000 square feet, and used whenever the weeds are troublesome. In one of our experimental areas we used this solution twice a year for two years, and in the five years that have since elapsed the area has been practically free from weeds, which were mostly deep-rooted perennials, namely, quack-grass and horsetail. This was, however, on clayey soil, and you will readily appreciate that in sandy soil the seepage, and consequently the loss of the preparation, is more rapid. For further information on the use of chemical weed-killers your attention is called to the articles in THE BULLETIN of July, 1921, pages 126 to 131.

4. Rock phosphate as a fertilizer.—I am sending you herewith a letter from the ——— Phosphate Mining Company, advocating the use of rock phosphate as a golf turf fertilizer and as a substitute for sand at tees. Will you be good enough to advise something of the advantages of this treatment, if any, in your opinion?—(Ohio.)

We do not recommend the use of rock phosphate for golf grasses. You will note from the article on *Commercial Fertilizers* in the October, 1921, number of THE BULLETIN that we do not recommend the heavy use of phosphate of any description, as it promotes the growth of clover and weeds. What phosphate is used should be of a more readily available sort than is rock phosphate so that the benefit will be appreciable soon after the phosphate is applied. The trouble with rock phosphate is that it is ver slow in becoming available as plant food.

We have never heard of ground rock phosphate being used at tees as a substitute for sand. It would probably answer the purpose, but we fear its cost would be several times that of sand.

5. Farming unused golf land in the North.—This club has purchased land adjoining our present nine-hole course with a view to adding another nine-hole course, possibly in about three years' time. This land contains considerable quack-grass, some thistles, and numerous weeds of all kinds, the property having been allowed to run down by the owner for some four or five years. During the next three years we would like to prepare this ground so that it will be in proper shape for fairways, and information is desired as to how we shall proceed and what crops should be planted to insure within three years proper soil conditions for fairways.—(Wisconsin.)

If this is farm land, which we presume is the case, it would probably be wisest for your club to farm the land until you are ready to construct the nine holes. In the fall the land could be plowed and sown to rye, and the rye plowed under the following spring and the land planted to corn or soy beans in rows. In either case the crop should be cultivated as thoroughly as possible so as to reduce the amount of weeds. If planted to soy beans, the crop could either be plowed under as green manure, or harvested. If the land is relatively poor this same general system could be followed until you are ready to build the nine holes. If, however, the land is of good quality it might be well simply to grow commercial crops on it for the next three years, having as a summer crop one that can be thoroughly cultivated so as to subdue the weeds. Your choice of summer crop could be corn, soy beans, potatoes, or such others as your local conditions would justify.

6. **Undulating greens; deficient drainage.**—I am anxious to know your views in regard to the maintenance of undulating greens as compared with flat greens. While we have not experienced any bad results up to the present time, I know of similar greens that are playing out in the low places.—(Illinois.)

There is no greater difficulty in the maintaining of undulating greens than of flat greens, provided the undulations are gentle and not violent. It seems that in the vast majority of cases, however, the undulations are made too violent. Of course, care must be taken that there are no undrained basins in an undulating green. The greens you speak of that are playing out in low places are probably suffering from lack of drainage, which is very often the cause of turf deteriorating in putting-greens.

7. **Hydrated lime for getting rid of earthworms.**—Can you inform me whether the use of hydrated lime for the removal of earthworms has been successful, and if so what methods are the best to follow?—(Pennsylvania.)

From our experiments it appears that any substances that will irritate the worms will cause them to come to the surface; this is true of lime-water as well as of weak acids. But after all, the efficiency of an eradicator depends on the number of worms which you bring up per unit of area, and its desirability largely on the cost of application. From the results of all of our work thus far we still favor corrosive sublimate as the best eradicator. Mowrah meal is good, but costs about eight times as much as corrosive sublimate and does not get as many worms.

8. **Seashore sand for golf courses; grasses for northern putting-greens, tees, and fairways.**—The question has been raised as to the desirability of using white seashore sand for "teeing up" on our tees. Some claim that the salt in it hurts the grass and others that it does not. Will you kindly give us the benefit of your experience in this matter? Will you also be kind enough to let me know what you consider the best mixtures of seed for putting-greens and tees?—(New Jersey.)

There is no danger whatsoever in using sea-shore sand for teeing purposes, nor indeed for top-dressing putting-greens. The amount of salt which it contains is really very small, not sufficient to injure fine turf unless used in perfectly enormous quantities. In regard to seeds to use on the golf course, we would say that in our judgment the best seed to use on your putting-greens is South German mixed bent; second choice, Rhode Island bent; third choice, Chewings fescue. For your fairways, if you want to use additional seed, we would recommend the ordinary mixture of 4 pounds of Kentucky bluegrass to 1 pound of redtop. This latter mixture is also as good as anything else for the tees.

9. **Effect on soil of constant use of corrosive ublimate in earthworm extermination.**—On a clay soil, such as ours and a great many inland courses, we require earthworm treatments a half-dozen times a year, and such continued use of corrosive sublimate for this purpose appears to be detrimental to the grass. Is it likely that permanent injury to the turf can result from the continued application of corrosive sublimate?—(Pennsylvania.)

We know of no case of permanent injury to turf from corrosive sublimate, nor of accumulative injury. This chemical is, of course, a very violent plant as well as animal poison. All of those who have experimented with the substance for the purpose of destroying vegetation, such as weeds, have not been able to notice any permanent injury to the soil. The corrosive sublimate would be absorbed in the soil, combined with soil material, plant refuse, etc., particularly material of a protein character,

and thus form insoluble mercuric compounds which should not subsequently be effective in injuring plant growth. This probably explains why vegetation will always again occupy land that has been treated with corrosive sublimate. It may be, of course, that the continued use of this reagent on a limited area of ground would ultimately result in leaving some of the chemical uncombined in the soil, but this seems to us to be hardly likely.

10. **Caterpillar and turf.**—We have noticed a brown, fubzy caterpillar on some of our greens this fall, and we have heard the opinion expressed by other golf clubs that these caterpillars or their moths affected the turf. We can not say that the caterpillars have done any harm on our greens, but we have never noticed them before this year. Do you consider that they have a harmful effect and should be fought earlier in the season before they appear?—(Illinois.)

We have never heard of caterpillars or their moths doing damage to putting-greens. They usually appear in late summer or fall, crawling around in search of a place in which they can spend the winter. We feel sure that they are perfectly harmless as far as grass growing is concerned.

11. **Red fescue; its use on the golf course.**—Under what conditions do you recommend red fescue for golf courses?—(Illinois.)

When "creeping bent" or rather South German mixed bent seed cannot be obtained, red fescue is the next choice for the region across the continent north of the latitude of the Potomac and Ohio rivers and for the higher altitudes south of this line, and also in the Pacific Coast states. There is no warrant for using red fescue in the south even for purely winter greens. This grass is admirably adapted to poor coarse soils such as fine gravels, sands, and sandy loams, on which soils it will maintain itself against most other plants. On clays and clay loams other grasses tend to crowd out the fescue. For these reasons red fescue will hold its own on the coarser soils even in mixtures, but on the finer soils it gradually gives way especially to the bents. Northward of the line from New York to Chicago, red fescue is very satisfactory for fairways, especially on the coarser soils. On the finer soils it does well, but we think the bents preferable. Southward of the New York-Chicago line red fescue, if used at all, should be sown alone, not in mixtures. We can maintain pure red fescue turf at Washington even on clay soils; but if sown in mixtures, the bents and other grasses will soon exterminate the fescue.

In brief, red fescue is adapted to the conditions in the northern tier of states especially, and is increasingly less satisfactory toward the south. The grass thrives best in the coarser soils. Incidentally it is a most excellent grass for shady places.

12. **Forking greens vs. top-dressing with sand.**—Is it advisable to fork a green in order to get sand into the soil, or remove the surface and get the subsoil in perfect condition and then re-surface again?—(Illinois.)

The data we have thus far on forking are not at all consistent. In our own experiments we got very bad results from any type of forking when done in midsummer when the grasses are weakest. It by no means follows that this would be the case with similar treatments in spring and fall. Some of the green-keepers report excellent results from forking. but in most cases they have not left any check-plots with which to make

comparisons. We know that very excellent results have been gotten, where the greens have been made on a clay soil which is too stiff, simply by continued top-dressings with sand or sandy loam. We are not prepared to say whether additional benefit will be obtained by forking or spiking in any form. We should be very much interested if, in connection with some of your greens, you would try one treatment on half of the green or three-quarters of it for a test. At any rate, leave part of the area untreated so that you can judge of the effects that you do get from the forking.

13. **Reseeding greens; inadvisability of mixing bent seed with fescue seed.**—We are offered some German creeping bent seed, but inasmuch as we seeded rather heavily in the fall with redtop and fescue, and as both fescue and bent seeds grow rather in patches and are of a different color, would it be better to continue using fescue, or would you advise incorporating bent seed?—(Indiana.)

We do not recommend mixing bent with red fescue. The two differ not only in color, but in texture also. If from your previous experience you believe red fescue will persist it would probably be best not to put in bent, but if there is likelihood that the red fescue will die out in a year or two, the sooner the bent is started, the better. Of course, there will be a transition stage when the greens will not be as satisfactory as when consisting of either one of the two grasses in pure culture.

14. **Northern putting-greens and fairways, spring seeding; redtop, bent, bluegrass, English (perennial) rye-grass.**—If we sow our greens with extra fancy recleaned redtop, would you use a little bent grass seed or would you defer all bent grass seeding until very early in the fall. I take it that in re-seeding with the bents I would not have to tear up these greens seeded to redtop, but could sow on top, use a Velvet hand-disk, and top-dress with mushroom soil and screened soil. Many greens experts suggest the first week in April for seeding, but it would be to my advantage to sow earlier, if safe. On our new fairways, would fancy recleaned redtop exclusively be all right, or would you suggest that something be added. I want the quickest-growing grass possible, so we can use the fairways. say, about July 1, by playing winter-rules. Would we get quicker results by using English rye-grass with the redtop, or have you anything else to suggest. It is necessary that we be as economical as possible, but I realize that we cannot skimp at the risk of botching the job.—(Pennsylvania.)

We would suggest that you seed your greens to a mixture of recleaned redtop and South German mixed bent, using as large a proportion of the latter as you think you can stand. Supplies of this seed are now available from a number of seedsmen, including the following * * *. The use of redtop will lower the expense of seeding the greens considerably; and the redtop practically all disappears from a green within two years, so that where a mixture of redtop and bents are seeded the final result is a bent green. If you should seed a mixture of half and half it would not be necessary to use any additional seed of the bents in the fall. If there is a fairly good stand of grass by next fall, good treatment will be all that is necessary, as additional seed has little chance of becoming established in knitted sod. As to the fairways, redtop will last some time longer on fairways than on putting-greens. but we certainly would advise you to seed a mixture of redtop and bluegrass. preferably in the proportion of 4 pounds of bluegrass to 1 of redtop, the redtop being the smaller seed. The bluegrass will become the permanent grass on your fairways, but the redtop will come quickly and is very helpful. There is no particular objection to using English rye-

grass on the fairway, as it grows quickly. Seed just as soon as the frost is out of the ground. In your latitude this ought to be about the middle of March, possibly not until the first of April. It is expecting a good deal to have good turf by the first of July, but we would expect it to be plenty good enough so that no serious harm would result if you use winter rules. Until the sod has become well knitted, divots are very destructive.

15. **Spring-seeding of putting-greens; use of redtop and bent in putting-greens.**—We built our first nine holes last spring, starting in March, and we had them in playable condition so that we opened the course August 6 and used it incessantly thereafter. We purchased a standard putting-green seed mixture from the * * * Seed Company, but much of the grass was burned out during the drought of midsummer, as we had no water supply for the greens. We now have our second nine holes shaped and ready for seeding. We have rich ground, but it is high and inclined to bake in hot weather. I am inclined to think we would obtain good results with sowing these greens exclusively with recleaned redtop instead of using the much higher-priced bents and fescues. What is your opinion?—(Pennsylvania.)

Fall seeding is much to be preferred to spring seeding. If you must seed this spring, be sure and seed as early as possible, say, just as soon as the frost is out of the ground. Redtop makes greens of mediocre quality, but you have this advantage in using redtop, that whenever you want to change to bent you can do so, as redtop is a short-lived grass under putting-green conditions and the bents will soon replace it entirely. The bents make much better greens than the redtop. If the additional cost of the bent seed is not a serious matter with you, we would suggest that you use it, or do this as an alternate; plant redtop this spring, as this is not the best time to plant bent and the seed of redtop is cheap, and then reseed the greens about the middle of September with the bent, top-dressing after scattering the seed.

16. **Creeping-bent nursery: spring planting from center of previous nursery and from new runners.**—Last September when removing runners from our garden to plant our new putting-greens, I left what I call the core of each row intact, so that they now look like rows of sod in the places where the original runners were planted. I have had the intervening spaces between the rows manured and cultivated in the hope that next spring new runners will be sent out across the intervening spaces. Would you mind apprising me whether this is likely to occur, since my purpose is to make additional greens from the new runners?—(New Jersey.)

In regard to leaving the center part of a row of creeping bent after you remove the runners, we have tried this method, and, in comparison, the planting of new runners. Thus far our results have consistently been in favor of planting the new runners each year, as we get a much broader growth from them than we do from the core left in their rows. Inasmuch as it is very easy to plant rows when you have runners 3 feet long, we would think the best thing to do is to plant new rows. In some cases very good results have been obtained by planting runners in the spring; the rows do not become as wide, but do become 3 or 4 feet wide in the course of the season. Fall planting is to be preferred, but spring planting is by no means unsatisfactory.

17. **Brown-patch on winter greens in the south. Italian rye-grass, redtop, and bluegrass for southern greens.**—We are making some changes on our golf course here. In these changes we are building some new greens, and as we have

not been getting complete satisfaction with Italian rye-grass in the winter, I am wondering if you know of any grasses that would be better adapted for our purpose.—(Florida.)

Heretofore the grasses used for seeding winter greens in Florida have been Italian rye-grass and redtop, and the redtop, from the standpoint of turf alone, and cost, is preferable. Recently a new development has taken place in connection with the matter of winter greens in the south all the way from New Orleans throughout Florida, namely, a disease apparently identical with the northern brown-patch, which does much damage to the seedlings, injuring redtop rather more than it does Italian rye, but very severe on both. At two places in Florida we are now testing out about twenty kinds of grass, hoping that we may find some one or more grasses which are immune to this fungous disease. Until the results of these experiments are known it is out of the question to give definite advice. However, in the north bluegrass is practically immune to brown-patch, and it is believed that bluegrass is going to solve the problem in Florida. In the meantime, perhaps the best thing to do would be to use a mixture, say, of Italian rye-grass, redtop, and bluegrass, and trust to one of them giving satisfaction.

18. **Quack-grass for fairways.**—Our green-keeper comes from the White Mountains and has charge of a golf course there during the summer season. He has been telling us about a grass which he says is very common in that portion of New England and which he calls witch-grass, and he claims it will grow in any part of the country and in any kind of soil, even the most barren, and he claims that it is a great grass for fairways. Would it not be possible for you to obtain a pound of seed of this grass so that we may try it out here?—(Florida.)

Witch-grass is more commonly called quack-grass or couch-grass. It is a perennial with long, creeping rootstocks, and a very bad weed in the North. However, it has something to its credit, inasmuch as this grass is abundant in meadows and makes up about half of the hay crop of New England. It was introduced into the United States over a hundred years ago and has spread westward across the continent and southward as far as Washington, D. C., but does not occurr in the South at all and apparently meets an invisible barrier in about the latitude of Washington. The chances are that it will not succeed at all under Florida conditions. Seed of this grass is not on the market, but if you wish to try it out we can obtain roots in the spring and ship them to you. The invisible barrier which keeps it from getting southward is either length of day or heat; there is doubt as to which; but it seems just as effective as the barrier which keeps Bermuda grass from getting any farther northward than about the latitude of Washington. Your green-keeper is perfectly correct in what he says so far as it refers to New England, but we feel sure that it will not apply in any degree to Florida. Where quack-grass is kept rather closely clipped, as on a fairway, it makes pretty good turf. There is really some very satisfactory quack-grass turf on the fairways of some northern courses on very sandy soil.

19. **Use of a filler with ammonium sulphate to prevent burning.**—In the October, 1921, Bulletin, the following formula is recommended for putting-greens: ammonium sulfate, 250 pounds; bone-meal, 500 pounds; muriate of potash, 100 pounds; the mixture applied at not to exceed 20 pounds per 1,000

square feet. In the March, 1921, Bulletin, a mixture of 5 pounds of ammonium sulfate with 50 pounds of sand is advised, and applied at 5 pounds per 1,000 square feet. Will it be necessary to use sand with the former mixture?—(Indiana.)

No; but it would do no harm, in case you wish to apply sand to your greens, to add it to the fertilizer mixture, thus applying the two at the same operation. The bone-meal in the former formula is sufficient as a filler, so that an addition of sand is not necessary. The purpose of a filler is to prevent burning from the ammonium sulfate. The danger of burning with ammonium sulfate is not serious if the chemical is in fine condition and evenly distributed, but where there are large lumps, say the size of a hickory nut, there will be a burned spot where the lump may lodge.

20. **Moles.**—A prominent green-keeper insists that he can catch more moles in a day by hand, or rather by foot, than is possible with any number of traps. He says the moles work at intervals of three hours, say at nine, twelve, and three o'clock, and that if the time of any working is noted they are sure to be found busy again in three hours. His plan is to watch very quietly near the mole-run and to stamp a heel into Mr. Mole as soon as his location is evident from his movements. The claim is that by noting the time of working a man can give attention to the moles and do other work between times. Do you know whether there is any merit to this claim?—(Ohio.)

The method described is a well-known one and would perhaps be better suited for use by the caretakers of golf courses than under usual field conditions. However, the method has the disadvantage of requiring more time for satisfactory results than does the use of traps. Careful use of the best traps, in accordance with good methods, is far more practical and economical for general use where moles are at all abundant than the method you describe.

Straight rows of trees, except along avenues, should be avoided. Irregularly scattered groups of trees are wonderfully effective in beautifying the landscape.

A putting-green is greatly beautified by a half-circling frame, such as trees or bunkers.