QUESTIONS AND ANSWERS

All questions sent to the Green Section 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. 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 Section.

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.

Discoloration of turf by cold weather.—Within the last few weeks preceding this date, May 11, our putting greens have taken on a dull brown color, and although we have given them two applications of sulphate of ammonia at the rate of 10 pounds to the green they do not show improvement. We are of the opinion that the brown color is due to the cold nights, as there has been a slight frost at nights. Have you any suggestions as to how we might take care of this condition? (Illinois.)

ANSWER.—You do not state what kind of grass you have on your greens. Some strains of bent are apt to turn a dark color during cold weather. This is particularly apt to occur with the Washington strain, which often turns a dark color without frost, mere cold winds being sufficient to bring this about. Discoloration is often more likely to occur if the cold comes soon after an application of sulphate of ammonia or other quick-acting fertilizers. If it is cold that is affecting your greens you will find that the entire surface is turned off color, rather than patches, such as occur when diseases affect turf. There is no treatment which will help greens so discolored. As soon as warm weather returns you will find that the grass will again take on its healthy green color.

Bulbous bluegrass for winter greens in the South.—Would bulbous bluegrass be worth sowing on Bermuda greens in this locality for use as a winter putting turf? We understand it is very satisfactory for this purpose in Arizona, beginning to grow in the fall when the Bermuda grass becomes dormant. It is rather expensive, costing about 65 cents a pound. (Tennessee.)

ANSWER.—We have no information as to what success might be expected from bulbous bluegrass (*Poa bulbosa*) when sown on Bermuda greens in your locality. Its value varies for this purpose with climate. At Washington, D. C., it is not entirely satisfactory, as it does not become green soon enough in the fall after frost attacks the Bermuda grass. In Florida also it is not entirely satisfactory, as the dormant bulbs of the bluegrass seem to be injured to some extent by the summer heat, since the bluegrass does not revive in the winter sufficiently to make a satisfactory turf. We understand, however, that south of Richmond, through the piedmont section, satisfactory results are obtained, the bulbous bluegrass returning when the Bermuda grass goes out with the frost, and disappearing as the Bermuda resumes growth in the spring. The use of bulbous bluegrass in your locality would therefore be an experiment, but might be worth trying on a small scale.

Use of highly concentrated fertilizers; roles of nitrogen, phosphoric acid, and potash in plant nutrition.—We are interested in using highly concentrated fertilizers, and in particular a certain commercial fertilizer which is claimed to contain 17 per cent nitrogen, 33 per cent phosphoric acid, and 17 per cent potash. These figures make a total of 67 per cent combined nitrogen, phosphoric acid, and potash, which is greater than the 46 per cent nitrogen alone contained in urea, 35 per cent nitrogen alone in nitrate of ammonia, 20 per cent nitrogen alone in sulphate of ammonia, 58 per cent combined nitrogen and potash in nitrate of potash, and 59 per cent combined nitrogen and phosphoric acid in phosphate of ammonia, as listed on page 112 of the Bulletin for June, 1928. We appreciate that for certain conditions nitrogen is more desirable than phosphoric acid or potash but do not quite understand the roles of the three fertilizing elements nitrogen, phosphoric acid, and potash, in plant nutrition nor what value or superiority each may have as applied to golf course turf. Our greens are all of creeping bent and are dressed frequently with compost containing a fixed percentage of sulphate of ammonia. Our fairways are largely Kentucky bluegrass and clover, with a small percentage of bent and fescue. These likewise are being dressed with compost containing a fixed percentage of sulphate of ammonia. May any additional benefits be expected from the use of a highly concentrated complete fertilizer? If you would recommend the use of the commercial fertilizer to which we have referred, at what rate should it be applied to an acre? (Kentucky.)

ANSWER.—It is generally accepted that nitrogen is conducive to succulent, leafy growth, and if it is used excessively with some plants nothing but stalks and leaves will be produced, to the detriment of the fruit. Phosphoric acid is considered to be used by the plant in root development and in the stiffening and hardening of the plant, as in the stiff stalks, veins, and seed coats. Potash is useful in the formation of the stiffer structures of the plant, the coloring in the plant, and the structure of the fruit and seed. It will therefore be seen that in turf work, where we are not aiming to produce an abundance of hard stalks and fruit but rather an abundance of leaves, the nitrogenous fertilizers possess higher value. When, however, seedings are first made it is well to use some fertilizer containing phosphoric acid, since a good root development is required in order to establish a good stand of grass. Once the roots are developed, turf grasses are better able to obtain sufficient phosphorus from the soil. At certain times the plant requires some phosphorus and potash, and unless these are present in the soil in sufficient quantities the plant will suffer. Usually the soil on the fairways contains sufficient phosphorus and potash, and the supply is not depleted, due to the clippings being left on the ground and thereby returning these fertilizing elements to the soil. On putting greens, however, where clippings are removed, the situation is different. A good top-dressing of compost usually contains sufficient phosphorus and potash to take care of the loss. However, it is wise to apply occasionally a complete fertilizer, containing nitrogen, phosphoric acid, and potash, to putting greens.

If sulphate of ammonia is applied to fairways at the rate of 200 pounds to the acre, as indicated in the Bulletin for June, 1928, it would take 235 pounds of the commercial fertilizer to which you

refer, containing 17 per cent nitrogen, to supply an equal amount of nitrogen. Usually muriate of potash is employed to supply the potash in mixed fertilizers, and a certain allowance in the rate of application is made for the potash contained so as to forestall possible injury to the grass from burning that might result from the muriate of potash, and we would accordingly recommend a rate of 150 to 190 pounds to the acre for the fertilizer in question. The advisability of using the commercial fertilizer you refer to depends somewhat on its price. We think the chief value of fertilizers for golf courses is in their nitrogen content, and recommend that fertilizers be bought for the most part on a nitrogen-content basis. The particular fertilizer you are considering contains more phosphoric acid and potash, in comparison with nitrogen, than is required on golf courses, and hence we would not recommend it for steady use. It could, however, be applied occasionally either to putting greens or fairways with very good results. Sulphate of ammonia and compost supply putting greens with abundant nitrogen and usually with sufficient phosphorus and potash also, and are therefore recommended for continued use.

Winter greens in the South.—What appears to be the customary method of providing winter putting turf in this section? (North Carolina.)

ANSWER.—Bermuda grass is the chief grass for both fairways and greens from southern Virginia southward, although Kentucky bluegrass does appear in the fall on the heavier soils of North Carolina and will form fair winter turf if fertilized in the fall. In the summer Bermuda grass and crab grass are the predominant turf grasses. The crab grass will displace the Bermuda if the latter is not occasionally fertilized. The Bermuda turf on putting greens is used from April or May until the latter part of October. On the first of October the custom is to skin the Bermuda grass off half or all of each green by means of sharp hoes. The area thus prepared usually is then sown with Italian or domestic-grown rye grass. The rate of seeding is fairly heavy, usually amounting to as much as 30 pounds to 1,000 square feet. Rye grass quickly establishes itself and gives a fair winter putting surface. The growing of rye grass in the winter however usually injures the Bermuda grass, which becomes weaker each year. For that reason on many courses only half of the green is used in the winter. Those clubs that use the whole green reseed with Bermuda grass in early spring.

Controlling snow-mold.—We should appreciate it if you would advise us what information you now have on snow-mold, or winter brown-patch. This is our principal problem in this section. (Minnesota.)

ANSWER.—In regions where this disease is serious it is well to treat greens with at least 3 ounces of corrosive sublimate to each 1,000 square feet of turf. Powdered calomel can be used for the same purpose. This treatment should be made as late in the fall as it is possible to work on the greens. This will avoid washing of the chemical from the soil by late fall or early winter rains. The chemical can be applied safely at this rate, or even in much larger quantities, at that time of the year. It may be applied in liquid form or mixed thoroughly with a light application of compost. In some of

the tests last year it was found that treatments in late winter or early spring checked the damage to some extent. The control was, however, by no means as effective as was the fall application. Since it is difficult to use spraying equipment on greens when snow is melting it is wise to store some dry compost or sand with which to mix powdered corrosive sublimate if it should prove necessary to give a further treatment in late winter. A mixture with sand or compost can be easily and safely applied whenever the snow-mold is found to be active. The nature and control of the disease is discussed in detail in the October, 1928, number of the Bulletin.

Borax as an ant killer.—To what extent and over how long a period of time would borax used as an ant killer injure the turf or soil? We have been using it with sugar made into a syrup, three parts of sugar to two parts of borax. We punch a hole in the nest and with an oil can inject a few drops. It seems to be far more effective than the carbon bisulphide which we have been using in connection with it. However the grass seems to yellow worse than with the bisulphide. We find it particularly useful in the colonies of ants one often finds in the areas around the green where injury to the turf is a minor matter. It seems to kill most of the ants and prevents them from working in the green. Would the injurious effect of the borax be gone the next season? (Massachusetts.)

ANSWER.—There is very little information available as to the lasting harmful effect of borax on turf. We have experimented with this chemical and have observed the very noticeable yellowing of turf which develops a few days after the material is applied. Ordinarily we have found that in a comparatively short time the turf recovers its normal green color. There seems to be no lasting accumulative effect but there has not been sufficient experimental work to justify any general recommendation or condemnation of this chemical for turf work. In the absence of any conclusive information we advise you to use the chemical as sparingly as possible on your best turf.

Controlling goose grass, small crab grass, and yellow foxtail on putting greens.—We are sending you specimens of three grasses which cause us a great deal of trouble on the 18 watered greens of our course. Kindly give us the common and botanical names of these grasses, with suggestions for their control. (Missouri.)

ANSWER.—The grasses which you send us are goose grass (*Eleusine indica*), small crab grass (*Syntherisma ischaemum*), and yellow foxtail (*Chaetochloa lutescens*). Once any of these grasses are established in a putting green the best remedy is hand-weeding. The thickening of the turf on putting greens in the spring also has a great deal to do with the control of all foreign grasses and weeds. Steps should also be taken to prevent their getting into the greens. Such foreign grasses are most commonly introduced on greens in top-dressing material. It is well therefore to test top-dressing material for the presence of weed seeds before applying it to a green. The test can be made by setting out small flats of the material, in a greenhouse or other warm place during cool weather, to see if weed seeds germinate. Weed seeds in top-dressings can be destroyed by thoroughly composting the material and frequently turning the piles or by preparing soil beds which are kept fallowed throughout the summer by frequent cultivation.

Avoid especially the class of literature which has a knowing tone: it is the most poisonous of all. Every good book, or piece of book, is full of admiration and awe. It may contain firm assertion or stern satire, but it never sneers coldly nor asserts haughtily; and it always leads you to reverence or love something with your whole heart.

John Ruskin.