

Ana, Calif.; Happy Hollow Club, Omaha, Nebr.; Pike County Country Club, Louisiana, Mo.; Klinger Lake Country Club, Sturgis, Mich.; Old Country Club, Flushing, L. I., N. Y.; Highlands Country Club, Grand Rapids, Mich.; Raritan Valley Country Club, Somerville, N. J.; Montecito Country Club, Santa Barbara, Calif.; Gowanie Golf and Country Club, Mt. Clemens, Mich.; Jericho Country Club, Vancouver, B. C., Canada; University Golf Club, Great Neck, L. I., N. Y.; Forest Hill Golf Club, Belleville, N. J.; Waccabuc Country Club, Lake Waccabuc, N. Y.; Cascade Hills Country Club, Grand Rapids, Mich.; Michiwaukee Golf Club, Milwaukee, Wis.; Mesaba Country Club, Hibbing, Minn.; Toppenish Golf Club, Toppenish, Wash.; Verity Park Golf Club, Middletown, Ohio; Metropolitan Country Club, White Plains, N. Y.; Colonie Country Club, West Albany, N. Y.; Fox Chapel Golf Club, Pittsburgh, Pa.; Marlborough Golf and Country Club, Montreal, P. Q., Canada; Quincy Country Club, Quincy, Ill.; Racine Country Club, Racine, Wis.; Redlands Country Club, Redlands, Calif.; Avon Field Golf and Tennis Club, Cincinnati, Ohio; Jamestown Country Club, Jamestown, N. Dak.; Washington Country Club, Washington Court House, Ohio; South Shore Country Club, Chicago, Ill.; Champaign County Country Club, Champaign, Ill.; Sioux City Country Club, Sioux City, Ia.; Madison County Country Club, Edwardsville, Ill.; San Gabriel Country Club, San Gabriel, Calif.; Country Club of Salt Lake City, Salt Lake City, Utah.

### 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. SEEDING NORTHERN PUTTING GREENS.—The following seed mixture has been recommended to us for putting greens: Chewings' fescue, 60 per cent; re-cleaned redtop, 30 per cent; bent grass, 10 per cent. We understand that the best seed obtainable for putting greens would cost about \$1.75 per pound. It is out of the question for us to pay a high price for our seed, and we shall therefore appreciate your advice with regard to seeding our greens. (Maine.)

Answer.—We would not advise you to waste any money on Chewings' fescue seed. You should aim to get bent grass greens. The best plan would be to seed with German mixed bent alone, but if the expense of this would be too great you could well use a mixture of three-fourths re-cleaned redtop and one-fourth German mixed bent, as in a few years the redtop will be entirely crowded out by the bent. This seed should be sown at the rate of 5 pounds per 1,000 square feet of putting green surface. The top two or three inches of your soil should be a loam or sandy loam with a fair amount of manure thoroughly mixed in. Do not use any peat

or lime. For the later upkeep of your greens you will get the best results by top-dressing with good compost, and occasionally stimulating when need appears, with ammonium sulfate applied at the rate of 3 to 5 pounds per 1,000 square feet and thoroughly watered in.

2. IMPRACTICABILITY OF KEEPING SOIL PERMANENTLY ACID FOR BENT GRASS; FERTILIZERS FOR BENT.—In the Rhode Island State College Extension Bulletin No. 13, of June, 1922, Kingston, R. I., they advise that on plats that are approximately ten years old, fertilizing with 250 pounds of ammonium sulfate, 250 pounds of acid phosphate, and 250 pounds of muriate of potash per acre once a year, has resulted in an acid soil that for the bent grasses was very desirable and discouraged all weeds and bluegrass. Would you advise us to follow that procedure on our creeping bent greens? (Kansas.)

Answer.—We have visited the grass plats at Kingston a great many times, and the report does not exaggerate the benefit derived from the method of fertilizing which they advocate. It needs explaining, however, that the soil at Kingston is very acid to start with. We do not get nearly as striking results here at Washington, but we do get a marked improvement in the freedom from weeds by the use of ammonium sulfate. We would not use acid phosphate, however, as it encourages white clover wherever that plant is common. The method of fertilizing we advocate, based on a number of experiments besides those conducted at Rhode Island, is to apply ammonium sulfate, not to exceed 5 pounds per 1,000 square feet of green, once or twice in the spring, and once a year to give the greens an application of bone meal at the rate of 10 pounds per 1,000 square feet, and muriate of potash applied at the rate of 3 pounds per 1,000 square feet. An application of ammonium sulfate may be repeated again in the fall if the grass appears to be in need of fertilizing.

3. RIDDING PUTTING GREENS OF CLOVER.—We have unusually large greens, clay soil, and surface well covered with bent, which has been kept fine by a daily cutting the past season. This spring a very marked increase in clover has been noted. Will you kindly advise the best action to take to eliminate the clover from the greens? It is generally considered that clover is objectionable in greens, but some have argued that a green consisting wholly of clover would be satisfactory. Will you kindly give your views on this matter? (Pennsylvania.)

Answer.—We note that you think clover is much more abundant this spring than it was last season. If you will watch your greens carefully you will see that the clover varies greatly in proportion at the different seasons and in different ways. Taken all in all, we would say that the high-grade putting greens of the east have about 25 per cent of their surface covered with white clover. This is never desirable, but of course there are limits to the expense one can go to keep it down. The best method we know of is to avoid the use of lime or other alkali fertilizers and to fertilize with ammonium sulfate, with the idea of getting the soil more and more acid, under which condition white clover and many other weeds do not thrive.

4. GRASSES FOR SOUTHERN GOLF COURSES; TREATMENT OF BERMUDA PUTTING GREENS.—Our course is on high sandy land and we are having some trouble in keeping the turf in satisfactory condition. What grasses and what treatment would you recommend for our conditions? (Georgia.)

Answer.—For your fairways ordinary Bermuda grass is best on the higher ground, and carpet grass on the lower or moister ground. In

places St. Augustine grass can be used if desired. For your putting greens the Atlanta strain of Bermuda grass is best. In growing fine Bermuda turf it is necessary to have a clay or clay loam soil. High quality Bermuda turf can not be grown on decidedly sandy soil. For treatment of sandy soils we would recommend that clay or clay loam be mixed into the top 4 inches of the soil until a clay loam consistency is secured. Then with proper fertilizing fine Bermuda turf can be grown. In the further top-dressing of such greens the soil should be of a loamy consistency.

5. SEEDING NORTHERN FAIRWAYS.—The following seed mixture has been recommended to us for our fairways: Kentucky bluegrass, 40 per cent; Chewings' fescue, 40 per cent; re-cleaned redtop, 20 per cent. Would you advise us to accept this recommendation? (Maine.)

Answer.—We would not advise you to use any Chewings' fescue under any circumstances. You can not find a single course in New England which has obtained satisfactory results with this grass either on putting greens or fairways. Beside, the seed is expensive and poor in germination. We would advise you to use 4 parts Kentucky bluegrass and 1 part redtop. The minimum rate of seeding would be 100 pounds per acre. Somewhat more seed would be desirable, but I think you could count on getting a satisfactory stand by seeding at that rate. As redtop seed is considerably cheaper than that of Kentucky bluegrass, the cost of seeding could be reduced by using Kentucky bluegrass and redtop in equal proportions and at the same time quite satisfactory results could be obtained. Under New England conditions the redtop and bluegrass will in time be replaced mainly by Rhode Island bent, which comes in naturally and makes exquisite turf; but in the meantime these grasses are the best and cheapest that you can use. The best time of seeding would be the middle of August, although in your latitude spring seeding gives fairly good results.

6. BURNING FROM THE EXCESSIVE USE OF AMMONIUM SULFATE.—We have been using ammonium sulfate on our greens at the rate of 20 pounds to a green, which is the equivalent of not to exceed 5 pounds to 1,000 square feet of surface or less. We have frequently noticed that for a few days after the applications our greens appeared to be mottled by patches of sickly, yellowish green grass, looking somewhat like grass that had been covered for a time. We have a notion that our treatment has resulted in the burning effect described on page 205 of Volume I of THE BULLETIN. Is our diagnosis correct? (Wisconsin.)

Answer.—The use of ammonium sulfate will prove harmful if carried to extremes. Do not overdo anything. Two applications a month apart in the spring of not to exceed 3 pounds per 1,000 square feet of green, and a similar application in the fall, are all that the grass usually needs. More is likely to cause a condition such as you describe.

7. WINTERHARDINESS OF CREEPING BENT; ITS USE ON SANDY SOIL.—Please advise us if creeping bent grass will winterkill in this part of the country and if it is adapted to growing on sandy soil. (Wisconsin.)

Answer.—We have never found that creeping bent winterkills in any part of the country. Of course, there is likely to be winterkilling of any grass if the soil drainage is bad. With a sandy soil it is advisable to add clay to hold the sand together. There is no first-class turf grass that will grow on shifting sand.

8. SPRING FERTILIZING OF FAIRWAYS.—What treatment would you ad-

wise for the fairways this spring? The application of ammonium sulfate was wonderfully successful last spring and made the links beautiful, but the effects seemed to wear off in a couple of months, and during the dry weather in May and June we were afraid the ammonium sulfate was going to burn the grass. (Virginia.)

Answer.—The effects of ammonium sulfate are temporary and hardly observable after two months. Bone meal or acid phosphate would probably give more lasting benefit to your fairways, and one application in the spring is advisable.

9. SPRING CUTTING OF PUTTING GREENS.—Do you advise close and frequent cuttings of putting greens in the spring? (New Jersey.)

Answer.—There is much difference of opinion on this subject. Our own opinion is that greens should be cut close early in the spring and kept cut fairly close during the season. We have found it difficult to get turf in good condition after the grass has been allowed to grow to a fairly good height for a considerable period of time. Bent greens will stand closer cutting than will fescue greens.

10. LIQUID MANURE AS A SUBSTITUTE FOR AMMONIUM SULFATE.—Could we expect to obtain the same results from the use of liquid manure alone as a fertilizer as are expected from the use of ammonium sulfate? (New York.)

Answer.—From what little we know of the action of these two substances, the results they produce are not the same. Both give excellent results when used as fertilizers, but ammonium sulfate tends to make the soil acid, a condition which discourages the growth of many weeds, yet which, on the other hand, is decidedly beneficial to the growth of the bent grasses. We know of a number of courses where excellent greens have been produced by the use of liquid manure.

11. MUSHROOM SOIL, AMMONIUM SULFATE, AND BONE MEAL AS FERTILIZERS.—We had planned to fertilize our greens this spring with bone meal applied at the rate of 100 pounds to a green. We are, however, able to purchase mushroom soil for \$1 a cubic yard, nearby. What is your opinion of the value of mushroom soil at this price? (Illinois.)

Answer.—At \$1 a cubic yard mushroom soil is very cheap, and even at \$3 a cubic yard it is by far the best and cheapest fertilizer you can buy. Bone meal is a good fertilizer, but slow in acting. If you should need to stimulate weak places in the turf quickly, use ammonium sulfate at the rate of not to exceed 3 pounds to 1,000 square feet.

12. DEPTH TO PLANT GRASS SEED; FREQUENCY OF WATERING.—I should like to know your estimate of the proper depth to plant grass seed. I have always thought it best to have the seed close to the surface, but am now advised to cover the seed with a  $\frac{3}{4}$ -inch top-dressing. Will fine grass seed come through such a cover? I am also informed by some that they never water seedlings until the grass comes up. (California.)

Answer.—Grass seed should always be sown shallow, and preferably on a firm seed bed. It should never be sown more than  $\frac{1}{4}$ -inch deep. In the use of water, forget all about rules and use water whenever necessary; that is, keep the soil moist. The amount of water and the frequency of watering depend on the weather, the character of the soil, and other conditions.