

which makes the soil less acid. This determination is quickly made and the cost should not exceed several dollars. Sands containing more than several percent of lime carbonate should be looked upon with suspicion, if clover control is desired in greens.

If samples of representative sand are sent to O. J. Noer, 304 Breeze Terrace, Madison, Wis., lime carbonate determination will be made without charge, and results will be reported in a future issue of *THE BULLETIN*.

“Most of the areas in front of a green should be level and true; but there are holes where slight ridges, little swales and swells, the latter often barely raising their heads, may be used to call forth a variety of fine shots.”—*The Links*.

Drainage adds no plant food to the soil, except the nitrogen that certain plants gather from the air, which replaces the water drained away. But the presence of air and the higher temperature induce the growth of bacteria that release certain food elements from insoluble compounds and make them available for the use of plants. In this way does drainage increase the fertility of soils. Moreover, a drained soil offers a deeper feeding ground for the plants. The roots of most cultivated crops will not go into a saturated soil, and will die if kept in water without air for more than a short time.

“To make great holes, hazards need not be numerous. A few well placed are quite sufficient to arouse any amount of lively interest and to call forth shots of which the best golfer may well be proud.”—*The Links*.

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 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 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.

Pig manure as a fertilizer.—We have difficulty here locating or procuring any other kind of fertilizer than pig manure. Can it be used at all on the golf course? (Illinois.)

ANSWER.—Inasmuch as pig manure is somewhat difficult to handle we would suggest that you compost it with top soil and use it after the mixture reaches a consistency where it can be spread easily. Pig manure is a very valuable fertilizer. The only objection to it is the difficulty of handling it.

Copper sulfate in water.—We have just completed installing 18 grass greens. We have also just built a swimming pool. The water for the 18 greens is furnished through a pressure system from the

swimming pool. The capacity of the pool is 134,000 gallons, and the water quickly becomes unsightly for swimming, due to the rapid growth of a green moss or algae. To combat this, we use 30 ounces of copper sulfate every other day. Nine greens are sprinkled per day, and approximately 67,500 gallons of water from the pool are used for the nine. Will you kindly advise us if the amount of copper sulfate used is injurious to the grass, as it would be ruinous to our approaching playing season to have anything happen to these new greens? (Arizona.)

ANSWER.—According to the figures contained in your letter, you are using 30 ounces of copper sulfate every other day in the pool, which contains 134,000 gallons of water, and that you use approximately 67,500 gallons of water every day for watering nine greens. This means that you are applying an average of $1\frac{2}{3}$ ounces of copper sulfate to each green every other day, and assuming that you water each green 150 days in the year you are applying an average of a little over $15\frac{1}{2}$ pounds to each green per year. This is too much copper. We believe that it will only be a period of a few years at the most before you will have an accumulation of copper in the soil which will be very detrimental to the turf grasses.

Sand as a winter topdressing of putting greens.—In the BULLETIN, November, 1925, page 262, answer to question 7, you advise against the use of sand on putting greens for winter covering. Several years ago the greens on our course were extremely hard, and, in my judgment, required more sand to improve the mechanical condition of the soil. We have dressed the greens in the early winter for several years with a light dressing of sharp sand. I think it has improved the condition of the soil materially. We plan to dress them again this winter unless you advise against it in our particular case. We intend to apply only about one cubic yard of sand to a green, just about enough to lessen the slippery condition of the grass when the greens are used after light frosts. We topdress our greens pretty heavily in the early spring and fall and about monthly through the playing season. Would you advise us to use a winter dressing of loam instead of sand? We prefer to avoid the use of loam so that the greens may be as playable as possible most of the winter. (Pennsylvania.)

ANSWER.—We do not see any way to avoid the use of light dressings of sand where greens are played on in winter. In our judgment, sand is the best material to use for this purpose. We have always advised, however, against heavy applications of sand, and, as we stated in the paragraph to which you refer, "when sand is used as a topdressing the tendency is to use it altogether too liberally." In many cases it has been found that the use of sand, especially on a heavy soil, results in a sort of cement forming on top of the surface. We have seen putting greens covered with a half-inch dressing of sand. If pure sand is used, a mere coating is all that is necessary, as anything like even one-eighth of an inch covering is certain to do the greens harm. If you apply a thin coating of sand to your greens in the winter, we would advise you to scratch the surface of the soil well in the spring before applying your topdressing of compost, in order to break up the coating on the surface which the sand will in all probability leave.

AS WE FIND THEM

Heard one greenkeeper say, "This modern scientific stuff is the bunk, and I'll have nothing to do with it. Didn't I take care of a good golf course years before there was any scientific greenkeeping? They can't tell me anything about running greens."

A fellow greenkeeper promptly answered, "I suppose if you were Noah returning to this world today you would say, 'This modern scientific navigation is just fairy tale stuff. Didn't I take a successful cruise years before science cluttered up ships with steam, oil, electricity, radio, and all that other trash. They can't tell me anything about running big boats.'"

Another guardian of the greens told me he didn't regard ammonium sulfate as a fertilizer, and therefore had decided to quit using it. Someone had told him the only thing worth while in ammonium sulfate was the nitrogen. Someone else told him nitrogen was a gas and that air was full of it. Promptly he put two and two together to make sixteen and concluded "a gas can't be a fertilizer; therefore ammonium sulfate is not a fertilizer."

Let's hope no one tells that fellow that nitrogen is one of the chief components of human foods (proteins). Such a theorist might decide to economize and depend on the air for his personal nitrogen supply. It surely would cut down his living expenses, for he could then give up all meats, fish, eggs, milk, beans, peas, and the like.

Still another admitted earthworms were exceptionally numerous on his greens. He knew he could get rid of them, but "Nature put them there, and they must have some purpose. I am not going to interfere with Nature." How we do admire such devoted reverence to Dame Nature. But wait till the club members get wise to that sweet sentiment. May we hope Nature never sends that greenkeeper one of her masterpiece donations—a human tapeworm.

One keeper of the greens remarked, "This fuss about different grasses and different strains of grasses is just some more of that scientific tommy-rot. They can talk about grass strains all they want to, but, after all, 'grass is grass.'"

How true that is! Likewise "A car is a car," though there be Fords and Packards, trolley cars and kiddie cars.