

brown-patch, while the Bellingham strain is quite badly injured. There is as yet no sufficiently long test with any of the others to determine how brown-patch affects them. Apart from this factor there can be no question as to their excellence as turf-formers.

For clubs located in Canada or the northern tier of states, there need be no hesitancy in using seed of seaside bent from any source, so long as it is genuine. Farther south, where brown-patch is troublesome, there is some risk involved, as some strains of seaside bent are likely to be susceptible to this disease. While Revere bent is strongly resistant to brown-patch, it does not follow at all that other strains are equally resistant. It is greatly to be hoped that such will prove to be the case; but until it is demonstrated, the above words of caution should be heeded.

Some Things We Have Learned About Brown-Patch

By R. A. Oakley

While we behold the brown-patch disease of turf with a much calmer attitude than we beheld it a few years ago, nevertheless it constitutes one of our most serious and perplexing putting green problems. We are more complacent with regard to it now than formerly, because it has not proved to be an overwhelming trouble, and furthermore we have made some progress toward its control.

No one who has studied brown-patch sufficiently to know it well has any doubt as to its cause. That it is due to a fungous organism has been definitely proved. Whether the large form of brown-patch and the small form are due to the same specific fungus but to different strains, or to different species of fungi, is not a settled point; but this is not a highly important matter so far as greenkeeping is concerned.

The progress that has been made in the control of brown-patch has been chiefly along three lines: (1) the use of fungicides, (2) cultural treatment not involving the use of fungicides, and (3) the selection and use of resistant strains of creeping bent for putting greens.

After brown-patch was recognized as a true disease of turf, attention at once was directed to the use of fungicides for its control. Bordeaux mixture was the first one to be tried, and experience has shown it to be the best for the purpose of those commonly employed in horticultural practice. But Bordeaux has not proved to be wholly satisfactory. If used frequently and properly it has considerable merit as a preventive and a check for the large brown-patch, but it is apparently of little value in the control of small brown-patch.

Bordeaux, to be effective against large brown-patch, must be on the leaves and stems of the grass at times when conditions are favorable for the growth of the fungus. To have it thus present, grass must be sprayed or dusted with it after rains and after watering and mowing while the critical brown-patch season is on. Without doubt vigilance and intelligence in the use of Bordeaux will go far toward controlling large brown-patch, but the treatment is expensive in the labor to apply it. Furthermore, as has been cautioned, it is easily possible to apply such a large total quantity of Bordeaux in a season that poisoning will result. This poisoning is a soil trouble which requires rather drastic measures to cure. While spraying is a more effective way to apply Bordeaux than is dusting, the latter is the easier and cheaper method. Two pounds of dry Bordeaux

is enough to dust a green of 7,000 square feet. If the dusting is done after watering or while the dew is on the grass the powder will be retained better by the leaves of the grass.

Recently attention has been directed to the use of chlorophenol mercury for the prevention and cure of brown-patch. There are two well known American preparations of chlorophenol mercury, namely Semesan and Uspulun. So far as their active ingredient (chlorophenol mercury) is concerned, they are identical, and there appears to be no difference in their efficacy for the treatment of brown-patch. Chlorophenol mercury has been available to golf clubs for two years, but tests of it have been far from adequate. Reports of results from a considerable number of courses upon which it has been tried are quite conflicting. In some cases good results are reported; in others, negative results are said to have been obtained. So far as reported, no deleterious results were had where the chlorophenol mercury was applied properly. From the evidence available it seems safe to conclude that this product is a promising fungicide for the treatment of brown-patch, particularly the small form. It appears to possess preventive properties and is valuable as a check to the disease when it is in an active condition. It also appears to be a stimulant to grass that has suffered from the attacks of brown-patch. Much experimentation is needed in the matter of its application. It will take time and careful study to work out methods that will give the maximum of protection to the turf with a minimum of cost.

The large field that is open for chlorophenol mercury to fill is that of prevention. The nature of brown-patch is such that when once it has attacked turf the great harm is done. Its subsequent spread from a particular infection or attack is, as a rule, not so serious. Consequently checking measures in the main may be said to have much the same value as locking the stable after the horse has been stolen. But the stimulation to the diseased grass that results from applications of chlorophenol mercury is important and may prove to be well worth the cost of the material and the labor necessary to apply it. To insure the greatest measure of protection against brown-patch, the evidence now indicates that chlorophenol mercury should be used as a drench before brown-patch puts in its appearance and probably occasionally afterward during the growing season—just how frequently can not now be definitely stated. It may be necessary to spray or dust the greens with chlorophenol mercury occasionally between drenches. Success will probably depend much upon the method of application; therefore, careful attention should be given this point.

As for the use of chlorophenol mercury as a stimulant for grass that has been attacked by brown-patch, it should be determined whether this product is more efficacious than the sulfate of ammonia and compost mixture, or whether the two treatments combined are more efficacious than either used singly. There is much still to be learned regarding the value of chlorophenol mercury for the treatment of brown-patch, but the evidence resulting from tests that have been made bespeaks for it a thorough trial by clubs whose greens are subject to the attacks of this disease. In making tests, the importance of leaving a part of each treated green untreated can not be overestimated. It is only in this way that the efficacy of the treatment can be determined.

The cultural treatments for brown-patch that do not involve the use of fungicides are of the nature of remedies rather than of preventives. There

is now sufficient evidence to say with some certainty that the attacks of large brown-patch may be lessened by watering in the early morning about sunrise or shortly afterward. Watering at this time seems to break up the mycelium or cobwebby growth of the fungus before it seriously damages the grass. Probably brushing in a proper way would produce much the same effect. But since greens must be watered anyway it does not entail much extra trouble or expense to water them in the early morning.

After attacks of either the large or small brown-patch, a safe and one of the most helpful things to do is to topdress with ammonium sulfate or ammonium phosphate and well-screened compost. When attacks come in the hot weather—as they frequently do—the treatment given the grass should be approximately 7½ pounds of ammonium sulfate or ammonium phosphate, mixed with 1 cubic yard of well-screened compost, and this mixture applied evenly to 5,000 square feet of green. After it has been applied it should be watered in thoroughly. No burning will result if this is done, and recovery of the diseased grass may be expected within two weeks from the time of the application, provided, of course, good care is given after the treatment.

The success of creeping bent greens established vegetatively is attested to by the very large number of excellent ones that are now in use. But it has been found that some strains of creeping bent, while making exceedingly desirable turf, are much more susceptible to the attack of brown-patch than are others that make equally fine turf. Some excellent strains of creeping bent are indeed quite resistant to both the large and the small brown-patch. Two that have proved to be outstanding in his respect at Arlington and elsewhere are the Washington and the Metropolitan strains. There are doubtless other strains that are highly resistant. Those who are engaged in selling and propagating strains of creeping bent should give attention to the brown-patch resistance of each.

We are learning quite a lot about brown-patch. We find that forms of it appear in the winter as well as in the summer and fall. We know that Bordeaux, properly used, is in a measure successful in controlling the large form of the disease. We hope that chlorophenol mercury will prove to be a preventive to the disease and also a stimulant to disease-attacked grass. We have good reason to think that early morning watering helps to lessen the seriousness of attacks of large brown-patch. We know that either ammonium sulfate or ammonium phosphate mixed with compost will prevent permanent injury resulting from attacks of either of the forms of brown-patch and will hasten recovery of the diseased turf. And we know that some excellent strains of creeping bent are highly resistant to both common forms of brown-patch and when attacked are usually so lightly affected that they soon recover under proper treatment.

In view of all this we are fairly equipped to cope with brown-patch, serious as it may be at times; and with more critical study and experimentation we should in time reduce the problem it presents in green-keeping to a minor rank.

Welcome to the Grass Turf Plots.—When you are in Washington let us show you the grass turf plots at Arlington. You will be welcome as the roses in June—and we think as interested as a kid at Christmas. No trouble to us, but a great pleasure. Come to room 7213, Building F, 7th and B Streets Northwest.