

Corrosive Sublimate as a Control for Brown-Patch

By John Monteith, Jr.

In the experimental work at the Arlington Turf Garden, near Washington, D. C., last summer, it was found that all the mercury compounds tested were effective in checking brown-patch. This work was summarized in the October number of THE BULLETIN, where it was pointed out that mercuric chlorid (corrosive sublimate or bichlorid of mercury) gave equally promising results when compared with the various organic mercury preparations. Before giving details as to its use, it was felt desirable to test this chemical more thoroughly another season.

At Arlington the large brown-patch has so far this year been negligible; but unusually severe and repeated attacks of small brown-patch during the latter part of May and throughout June, have given us abundant opportunity to further test the efficacy of mercuric chlorid in checking this more persistent type of disease. The results so far this year have substantiated those obtained last season, and have been repeated frequently enough to warrant the conclusion that mercuric chlorid, under conditions such as we have at Arlington, is as effective against this disease as are the organic mercury preparations—and considerably cheaper.

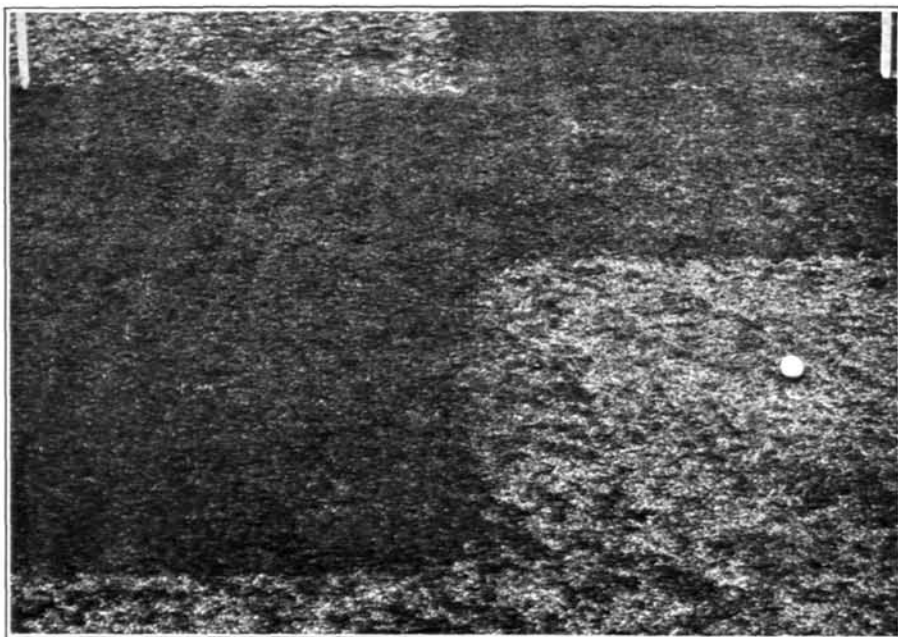
It is the purpose of this article to summarize the experiences with bichlorid and to indicate methods of application found to be most effective, in the hope that clubs may try it and help us determine its limitations or adaptability under a variety of climatic and soil conditions.

In the August, 1921, BULLETIN, on page 151, there is a brief note, stating that Mr. J. A. Roseman had used corrosive sublimate effectively against brown-patch on the greens of the Westmoreland Country Club, Glenview, Illinois. His method apparently did not become popular; and corrosive sublimate, although widely used for earthworm eradication, has been generally overlooked as a means for checking brown-patch.

In the experimental work at the Arlington Turf Garden, mercuric chlorid has been compared with a number of organic compounds of mercury. The work there has all indicated that when properly applied it gives results very similar to those obtained by the organic preparations. It is by no means a permanent cure, for it has the same limitations as do the organic forms in that the period of protection varies considerably, depending on climatic conditions. At times we find the protection afforded by any of the mercury compounds lasts less than a week; but at other times, when the organic preparations prevented brown-patch for several weeks, we found that bichlorid gave equally prolonged protection.

One of the chief objections against the use of bichlorid is that it is likely to burn the turf or cause serious discoloration. We have found that if used in comparable concentrations the "burning" by bichlorid is of no more consequence than that produced by the commercial organic preparation. In using the various organic compounds it has been found that an application strong enough to satisfactorily control brown-patch usually causes some discoloration of the grass. At times there may be no evidence of burning, whereas

under other conditions the same application may produce a distinct injury. As a rule, however, if proper care is used in application and in subsequent treatment the discoloration produced is insignificant and but temporary. Mercuric chlorid behaves in a similar manner. In using corrosive sublimate against worms most greenkeepers have learned that it is a dangerous chemical in careless hands. The same objection applies also to ammonium sulfate and some of



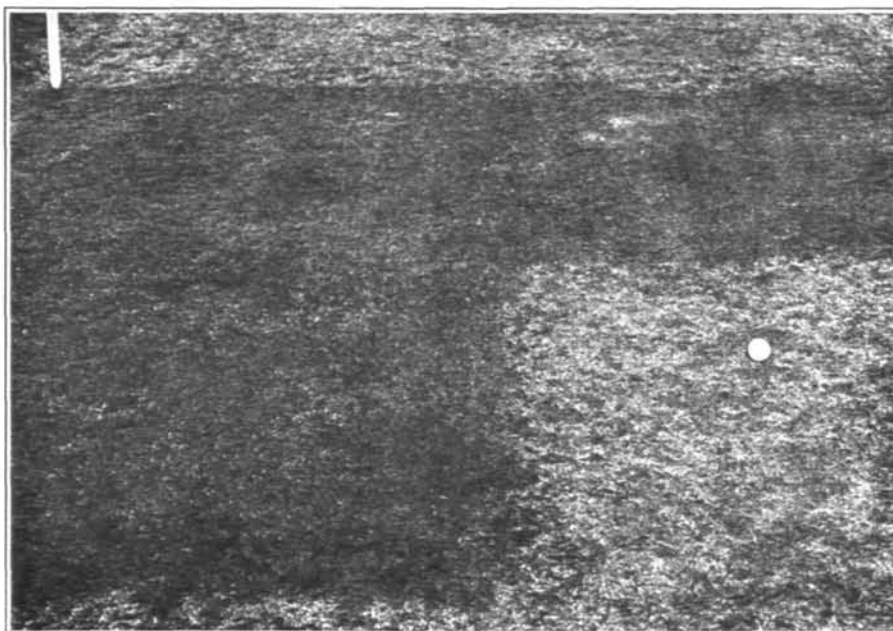
Control of small brown-patch with bichlorid applied at the rate of 1 pound per 1,000 square feet

This 8-foot plot of badly diseased turf was divided into four equal squares and treated as follows: The lower right corner (where the golf ball is lying) is the "check," which received compost without any addition of chemicals. The square just above it received a spray treatment of bichlorid at the rate of 1 pound per 1,000 square feet, after which it received the same application of topdressing as the check. The two squares at the left received the same amount of topdressing as did the check, with the addition of powdered bichlorid at the rate of 1 pound per 1,000 square feet. For the square in the foreground this mixture was prepared the day previous to application, whereas the one just above was treated as soon as the bichlorid was mixed with the compost. All were then watered thoroughly with a rotary sprinkler. Note that the disease was not lessened by the topdressing alone in the check, but the addition of bichlorid controlled the disease in all three squares. The photograph was taken two weeks after the application was made, when the discoloration in the upper left square had disappeared entirely.

the other chemicals used on greens. Any greenkeeper with experience in applying chemicals to turf, either fungicides or fertilizers, has learned that the degree of burning varies with the conditions of the turf, and the climatic conditions prevailing at the time of application. Also he has learned that strong chemicals must be applied evenly, must be well "watered in" immediately, and the green must be kept adequately watered for several days to prevent burning. One who has learned these lessons should experience little difficulty with the bichlorid treatment for brown-patch.

In using bichlorid it should be remembered that it is usually sold in practically the pure form, whereas in the case of the most common organic mercury compounds, whose trade-names are Uspulun and

Semesan, only 30 percent of the material purchased is the active mercury compound. Allowance must, therefore, be made for the 70 percent inert material contained in these preparations. In other words, in applying the standard treatment of 1 pound per 1,000 square feet of Uspulun or Semesan, only three-tenths of a pound of the active chemical, "chlorophenol mercury," is being applied. Since corrosive sublimate is usually purchased without any "inert material," it follows that in a solution of 1 pound of bichlorid to 50



Control of small brown-patch with bichlorid applied at the rate of 1/3 pound per 1,000 square feet

The square where the golf ball lies is the check, which received no chemical. The square just above the check was treated with powdered mercuric chlorid at the rate of one-third pound per 1,000 square feet, mixed in a small amount of sand to aid in even distribution, and was then well sprinkled with water. The two squares at the left received a liquid treatment at the rate of one-third pound of bichlorid in 50 gallons of water per 1,000 square feet. The upper of these two was not watered for several hours after treatment, but the lower one, just to the left of the check, was well watered immediately after the chemical was applied. None of these methods caused noticeable injury to the grass, as is evident by the dark healthy growth in each treated square when compared with the check plot where the disease continued to be active. The photograph was made five days after the application of bichlorid, showing the quick response of turf to this chemical.

This rate of application, one-third pound per 1,000 square feet, is effective in controlling the disease and much less likely to injure the turf than is the heavier treatment.

gallons of water there is over three times as much of the mercury compound as is contained in an equivalent solution of one of these chlorophenol mercury preparations. For that reason a smaller amount of bichlorid must be used to prevent burning. No definite rule as to the best concentration or amount of solution can be given for any of these compounds, since burning is so largely dependent on the condition of the turf when treated and the subsequent attention. On the Arlington Turf Garden we have found that an application of 1 pound of Uspulun or Semesan in 50 gallons of water applied to 1,000 square feet when evenly applied with a sprayer or sprinkler caused no serious injury to the turf—provided the green was not

neglected after treatment. Using one-third pound of bichlorid in the same amount of water for the same area gave no noticeable difference in burning. We have applied the chlorophenol mercury preparations at the rate of 3 pounds, and bichlorid at the rate of 1 pound, per 1,000 square feet, without any permanent injury. These applications, however, are somewhat excessive and apt to cause bad burns, and except in rare cases should not be attempted.

The method of application which at present appears most promising is that in which the powdered bichlorid is mixed with compost and applied as the usual topdressing. This method has several distinct advantages over the liquid method of application. The usual recommendation for treatment with organic mercury includes a spraying or sprinkling application of the disinfectant followed by a light topdressing containing some plant food, such as ammonium sulfate, to stimulate new growth to cover the scars of the disease. By mixing the bichlorid with compost no additional expense of equipment or time is required. Adding the usual amount of ammonium sulfate to the compost apparently does not interfere with the desired effect of the bichlorid or sulfate. Since topdressing is one of the periodic requirements of a good putting turf, the cost of the chemical is the only item of expense involved in brown-patch control by this method. Greenkeepers, in topdressing turf with a compost containing ammonium sulfate, have learned the necessity of properly watering and caring for the green after an application, and should find that similar care will solve the problem of "burning" with bichlorid.

We have also found that by mixing the mercuric chlorid in the compost the day before it is to be applied the danger of injury to the turf is greatly reduced. In some recent tests at Arlington, bichlorid at the rate of 1 pound per 1,000 square feet was mixed with compost and allowed to stand over night. The following day an equal amount of bichlorid and compost were mixed and applied at once, after which the mixture prepared the previous day was scattered in a square plot immediately adjoining, and both were then thoroughly watered with a rotary sprinkler. For a few days the plot receiving the preparation, which was applied immediately after being mixed, showed a decided discoloration, whereas the plot receiving the mixture of a day's standing showed only a slight discoloration. This difference is probably due to a chemical change taking place in the mixture left standing over night. There was no noticeable difference in disease control; so the chemical change, which is apparently responsible for the reduction in burning, does not detract from the fungicidal value of the bichlorid. This experiment has been repeated on other plots with other strains of grass and has given similar results, so that we now feel justified in recommending its trial on golf courses in various localities.

Recognizing the possibility of different results when used under conditions other than those obtaining at the Arlington Turf Garden, it is recommended that this method be first used on only a portion of a green, leaving a part untreated for a fair comparison. This will enable the greenkeeper to decide its merits on his own course without risking any large area until he is familiar with the treatment. The Green Section will welcome any reports as to its value on various

courses, for it is only after a large number of such trials that a general conclusion can be arrived at.

We therefore suggest an application of bichlorid in an ordinary light topdressing of compost (with or without fertilizers, depending on the needs of the turf). The bichlorid should be in the finely powdered form and *thoroughly* mixed with the compost, using from 4 to 8 ounces of the chemical for 1,000 square feet. It is preferable to prepare this mixture the day before it is to be used. Immediately after this topdressing is applied it should be well watered, and the turf should be sprinkled frequently the next few days to avoid any serious drying at the surface. If an attack of the disease develops when it would be undesirable to apply topdressing, the bichlorid may be applied with the usual spray or sprinkler method, using about 5 ounces per 50 gallons for each 1,000 square feet. The green should be given a light watering soon after the solution is applied, and kept moist for several days.

Contributions to Greenkeeping by the Trained Investigator*

By R. A. Oakley

Greenkeeping is a very old art. Certain features of it had their beginning long before golf itself, and the advent of the game did not bring with it anything new in turf growing. Early greenkeeping had a very crude beginning. It involved neither construction, soil preparation, sowing of seed, artificial fertilizing, watering, or mowing, as we practice these features of culture today.

We have made much progress in the art since the fifteenth century, or whenever it was that golf made its first real recognized start. Modern greenkeeping owes its birth to the rotary mower, or the lawnmower as it is now called. Had it not been for this mechanical device or had something to do similar work not been invented, our conception of a putting green today would be a closely grazed bit of sward which would permit a putted ball to approach the cup with a minimum of hops, skips, and jumps. Modern greenkeeping then may be said to have its origin in the vicinity of 1870; for it was about that time that the rotary mower came on the scene.

Greenkeeping as it exists today is very largely the product of empiricism. The results of cut-and-try methods comprised most of it; but the same may truly be said of plant-culture in general. Science, however, has made contributions to it, and very important ones. Science, through the trained investigator (the term is used here in the collective sense), has contributed to greenkeeping in two general ways: (1) by exposing mysterious and fake practices and materials and doing away with honest but erroneous practices, and (2) by making discoveries in new lines. Indirectly trained investigators have been assisting greenkeeping for many years. Hundreds of them today are working on problems related to it without knowing it; but it is not so many years since the trained investigator actually enlisted in greenkeeping and commenced work specifically on its problems.

*An address delivered at the Annual Meeting of the Royal Canadian Golf Association Green Section at Toronto, February 6, 1926.

Previously published in CANADIAN GOLFER for February, 1926.