C's ball on his second shot to No. 10. B promptly claims the hole. What is the United States Golf Association's decision?

DECISION.—The question as understood is—A and B are playing a match. A hits his tee shot down the middle and B slices to the rough. B's ball is finally found and he reaches the green in six. A reaches the green in two, but does so not with own ball but by playing a ball outside of the match. B concedes the hole and they proceed to the next tee, but before striking off are notified by the pair behind that A has not played his own ball but one of theirs, whereupon B claims the hole. B's claim is sound. By playing a ball not in the match and failing to inform B of the fact before B played his next stroke, A lost the hole. See Rule 20 (2).

1926 Experiments on Brown-Patch Control

By John Monteith, Jr.

During the past season experiments have been continued on the Arlington Turf Garden to determine the efficiency of various chemicals in controlling brown-patch. Since the small type of disease was most prevalent throughout the season on the area allotted to this work, the observations reported here apply chiefly to small brown-patch.

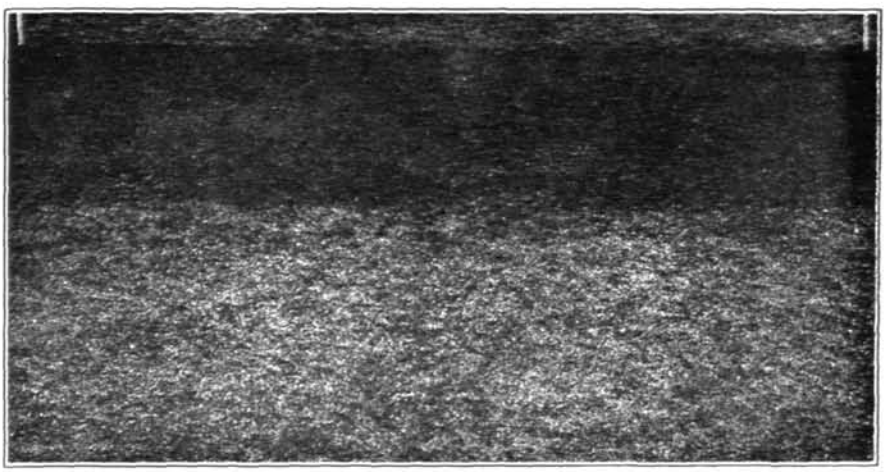
Numerous chemicals were tested, including copper sulfate, copper stearate, Bordeaux mixture, formaldehyde, sulfur, phenol, super-kalimat, sodium fluosilicate, potassium permanganate, and various compounds containing mercury. While certain of the other compounds gave some indication of checking the fungus, by far the most outstanding control was obtained with the mercuric compounds.

The tests with the organic mercury preparations used in previous work (Semesan, Uspulun, Corona 620, Corona 640, and Germisan) were repeated during the past summer. The results were essentially the same as those obtained during the preceding season, as reported in the October, 1925, number of THE BULLETIN. Each was effective in checking the disease, but the period of protection again varied considerably, apparently depending on climatic conditions. The two common commercial chemicals in this group (Uspulun and Semesan) gave practically identical results when applied in like manner and amount.

Much work was devoted to testing bichlorid of mercury, since during the previous season this chemical appeared to be as effective as the organic mercuric compounds, and considerably cheaper. In this season's more thorough comparison of bichlorid with the two chlorophenol mercury preparations (Semesan and Uspulun), it was found that ¼ to 1/5 pound of bichlorid gave practically the same control as did one pound of either of the above commercial organic preparations. These tests were repeated frequently throughout the season and gave ample evidence that the preceding season's conclusions concerning this chemical were fully justified.

A series of plots was devoted to a comparison of several inorganic mercuric salts in an attempt to determine whether any of this group, other than bichlorid, would prove effective against the disease. In these tests were used mercurous nitrate, mercurous chlorid (calomel),

mercuric chlorid (bichlorid or corrosive sublimate), mercuric sulfate, mercuric oxid, mercuric cyanide, and mercuric sulfid. Semesan and Uspulun were also included in the series to give a direct comparison with these mercuric preparations. Allowance was made for the large percentage of inert material carried in the two commercial preparations, so that when one pound of Uspulun or Semesan was used there was applied only ¼ to 1/5 pound of the other chemicals for similar areas. These tests were repeated several times throughout the summer and in general gave similar results. It was found that any of



Control of Small Brown-patch With Bichlorid Applied in Compost

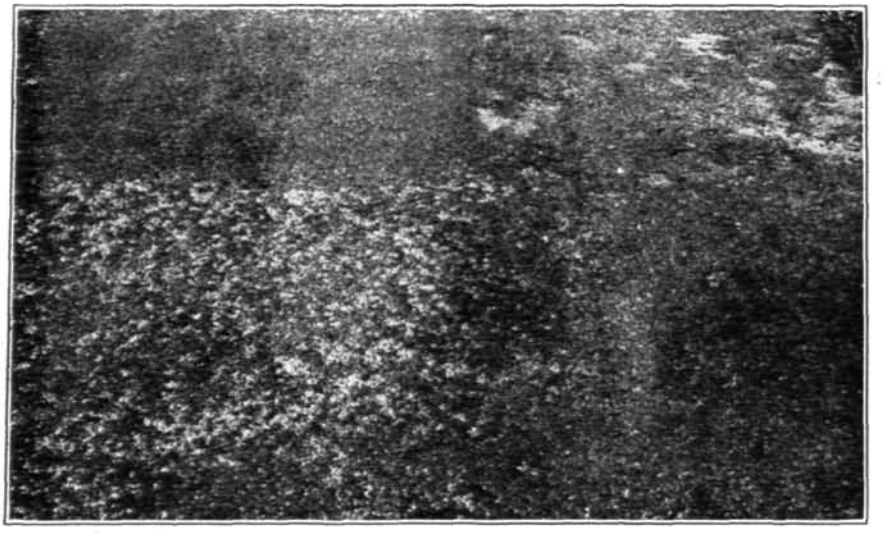
View of 8-foot experimental plot at Arlington Turf Garden previously shown on page 152 of THE BULLETIN, July, 1926. This view shows the plot six weeks after treatment, while the view previously published shows the plot two weeks after treatment. The second photograph was taken at a different angle from the first.

The dark strip of turf in the background is the two quarters of the plot which were treated with a topdressing containing bichlorid at the rate of 1 pound per 1,000 square feet. On the right of the light strip in the foreground is the quarter of the plot which received a like amount of bichlorid applied as a spray, this treatment being followed by topdressing. On the left of the light strip is the quarter which received no bichlorid but which, like the others, was topdressed. For the first four weeks or more of the experiment the disease was checked in all three squares that received bichlorid. The section treated by the spray method was the first of the three to become reinfected, and when this photograph was taken it appeared little better than the untreated square. The dark strip of healthy grass in the background illustrates the increased efficiency observed wherever the bichlorid was mixed with compost.

these compounds, with the exception of mercuric sulfid, was able to control brown-patch. It was obvious that control of the disease could be accomplished with any of a large number of mercuric compounds and that the efficiency of the compound depends primarily on the amount of mercury contained. For that reason, from the standpoint of cost, some of the inorganic compounds are from eight to ten times more effective than are the common commercial organic preparations of mercury.

It has always been recognized that any of these compounds is apt to cause severe injury to turf if applied in excess. On the other hand it is perfectly evident that with careful handling any of these chemicals can be applied throughout the season in sufficient quantities to control the disease without causing permanent injury to the turf. The extent of burning varies considerably with different compounds. Of the various mercuric compounds tested the most serious burning was caused by the cyanide. While this chemical could un-

doubtedly be used with safety, the difference between the amount necessary for control and that which produces burning is too narrow a margin for practical purposes. All the other combinations tested appear to have a sufficiently wide margin of safety to make them practical for general use on greens. It is well known that bichlorid is a dangerous chemical if carelessly used. It is more apt to burn



Control of Small Brown-patch With Calomel

The section of dark, healthy turf in the left background received an application of calomel at a rate of approximately 1/3 pound per 1,000 square feet. Note the entire freedom from disease, in contrast with the untreated section just beneath. The section in the right background received 1/3 pound of mercuric cyanide per 1,000 square feet. The light spots in this section show where the turf was burned by the application. The section in the right foreground received Uspulun at the rate of approximately 2 pounds per 1,000 square feet. When the photograph was taken the disease was again active in the Uspulun section but there was no evidence of its presence in the calomel square.

than are the organic mercuric preparations; but if due precautions are taken to insure even application and proper allowance is made for the condition of the grass when applied, it can unquestionably be used with entire success. Some of the other inorganic mercuric compounds have proved to be far less likely to burn than is bichlorid. The most promising observed at Arlington this season is calomel. It has been found that 1/5 pound of calomel is fully as effective against brown-patch as is the standard 1 pound per 1,000 square feet of the chlorophenol mercury (Uspulun or Semesan). Two chief points in favor of calomel are its more prolonged protection and its comparative safety from the standpoint of burning turf. In one experiment calomel was applied at the rate of 5 pounds per 1,000 square feet and failed to cause any noticeable injury. This application was made at a time when the grass was most likely to be injured, as was demonstrated by an application of 1/2 pound of bichlorid (much stronger than is ever recommended for this chemical) which was put on an adjacent plot and which produced severe burning. In terms of controlling the disease, this 5-pound application is equivalent to at least 25 pounds of Uspulun or Semesan per 1,000 square feet. From the work this season it appears that calomel

should completely solve the problem of burning, for a chemical which can be applied with safety in amounts 25 times greater than that required certainly should provide for all likely errors in application.

The problem of burning with the mercuric compounds is very similar to that experienced in applying sulfate of ammonia or other fertilizers. That there is a great variation in burning at different periods of the year has been observed by most greenkeepers who have used sulfate of ammonia. Early in the season (perhaps through June) sulfate of ammonia can be safely used in comparatively heavy applications. However, during July and August the amount of the chemical must be considerably reduced to avoid burning. The same precaution must be used with the mercuric preparations. At Arlington, bichlorid in excessive amounts of 1 pound per 1,000 square feet was repeatedly applied without serious damage in the early summer. During part of the later summer months, 1/5 of that amount caused severe discoloration. For that reason the use of this chemical for brown-patch control or for earthworm eradication must be modified with the season, and much more care must be used in applications during this period. The same need for increased care in application and reduction in the amount of chemical used applies also to the organic mercuric compounds.

There is apparently no way of defining the exact period in the summer when burning is most likely to occur. Most greenkeepers have learned that when grass is "soft" it is more likely to be injured by chemicals. Just what factors produce this condition have not been definitely determined. During periods of prolonged hot, wet, and cloudy weather the grass becomes somewhat yellowish in appearance and more succulent. The plants are then more likely to be injured by trampling, by large brown-patch, or by numerous other agents, and strong chemicals applied carelessly or in excess at these times cause much greater damage. Such a condition of turf is difficult to define, but nevertheless is recognized by every observant greenkeeper. During the past season we have had more of this condition at Arlington than usual and at such times have found it necessary to reduce our applications much below previous recommendations in order to avoid injuring the turf.

Throughout the summer experiments were conducted to determine the most desirable method for applying the mercuric compounds. As pointed out in the last page of THE BULLETIN for September, 1926, there are several methods which are effective, so that the final choice will depend on local circumstances. If the distribution is uniform any of the ordinary methods of application will control the disease. It is apparent that last season's recommendation for two separate treatments (fungicide followed by topdressing with a fertilizer) is not necessary. The mercuric compounds may be combined with the fertilizer treatment, whenever the latter is needed. This combination appears in no way to affect the action of either the fungicide or the fertilizer. It is possible to mix them for the liquid method of application or in compost, thus effecting considerable economy in time and labor. The method of mixing chemicals with compost has two points in its favor which should make it the preferable method on most courses. In the first place, the danger of burning is greatly reduced when the mixture is allowed to stand over night. For this purpose the soil should be fairly moist; with

very dry soil the action of the chemical is not affected even on long standing. The period of protection was materially increased when bichlorid was applied with compost, as compared with a similar quantity applied in solution. In one case this period of protection was practically doubled. An objection to this method is that it is difficult to thoroughly mix such small quantities of chemical with the large bulk of compost used in an ordinary topdressing. This objection can be largely overcome by using a small amount of compost as a carrier for the chemical. If the mercuric compound and fertilizer are thoroughly mixed with part of the finely screened compost (perhaps a pail or two for one green), an even distribution throughout the soil is easily accomplished. This may be spread over the green just previous to the heavy topdressing. The smaller amount of compost provides sufficient bulk for uniform distribution and may be used alone at times when the greens do not require a heavy topdressing. The experiments this summer showed that this small amount of compost offered practically the same advantages as mixing with the large bulk of topdressing, and the added work involved in making the separate application would no doubt be more than compensated for in the reduction of work involved in thoroughly mixing with the larger quantity of soil. Liquid applications are all effective in checking the disease and on certain courses are undoubtedly more suitable. The most serious objections to these methods result from the tendency of thoughtless greenkeepers to allow too much of the liquid to run into slight depressions, or from failure to shut off the flow when nozzles are no longer in motion. Naturally any excess liquid means excess chemical, and burns are likely to result. This objection is simply one of carelessness, against which no method is immune. Our experience has found no advantage in the dust method except perhaps that of saving time. This saving is usually more than counterbalanced by the difficulty of applying the fungicide evenly. More severe burns have resulted from dusting than from any other of the standard methods, and except in rare cases it probably has little value for applying the mercuric compounds to greens.

Experiments have been conducted to determine whether mercury would accumulate in the soil to injure the roots of grass as has been found to be the case with copper. During the past two summers neighboring plots have been repeatedly treated with excessive amounts of copper and mercury in the organic and inorganic forms. In both the copper plots the grass now shows severe injury. In neither of the mercury plots (Semesan and bichlorid) is there any evidence of accumulative injury from mercury.

To summarize, the experiments at Arlington this summer indicate that the various mercuric compounds are the most effective chemicals so far found to control small brown-patch. There are many of these compounds equally effective in checking the disease but varying widely in cost of the treatment. Calomel, from the standpoint of control, cost, and freedom from burning, appears to be the most promising of any compound tested so far. There is no evidence of injury due to accumulation of mercury in the soil comparable to that caused by the copper compounds.

In a later issue of THE BULLETIN an attempt will be made to summarize the results on various clubs in controlling brown-patch with

the various mercury compounds, in different parts of the country. Any club which has tested these chemicals is requested to report their success or failure in order to make this summary as representative as possible.

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.

1. Late fall and winter seeding.—Do you consider the latter part of October or first of November as too late to sow grass seed in this latitude? (New Jersey; Ohio.)

ANSWER.—The matter of seeding turf grasses in the late fall or winter is somewhat of a gamble. Late fall seeding all depends on weather conditions. We have seen good results follow from seeding in November, notwithstanding the chances of success are against seeding so late. If your ground is well prepared in late fall you might be justified in taking a chance and seeding even as late as November 1, as if the stand should turn out thin in early spring a little seeding then ought to give good results. Spring seeding is usually very unsatisfactory on account of the weed troubles; but if the seed can be sown before March 1 the young grass ought to get ahead of the great majority of spring weeds. Another difficulty with spring seeding is that as a rule the ground is not in condition to work so as to prepare a proper seed bed in early spring. If however you can prepare your ground for seeding in the late fall, you could reasonably hope for success by seeding on this ground in late February, even if the ground should be frozen at that time. Success has also been had with sowing grass seed directly on top of the snow in late winter. In general, the best time for seeding in your latitude is between August 15 and September 15; after October 15 there is chance of both success and failure.

2. Grasses for winter greens in the South.—We are sending you a sample of seed mixture that has been recommended for winter greens in this section of the country. We should be glad to know what this mixture consists of and its suitability for the purpose. (Florida.)

ANSWER.—The sample you send is largely perennial rye-grass, containing also some red fescue and some redtop. We would not advise you to buy this mixture, nor any other mixture for that matter. Ordinarily you will get better seeds and at a less price by buy-