

Such an attitude towards the buying public as was exhibited by these manufacturers is much out-of-date in this period of pitiless publicity when compounders of proprietary medicines are compelled by law to state on each package offered for sale the ingredients, and in the case of certain specified chemicals the percentage composition contained in the preparation. The situation is not so serious in the case of golf preparations to call for a national law governing their sale, for if a little more discriminating judgment on the part of the buyers is exercised the trouble will be easily corrected.

## Success With Carbon Bisulphide in Controlling Grubs

ARTHUR G. HOFFMAN

*Essex County Country Club*

On page 253 of the December BULLETIN Mr. Alan D. Wilson utters a cry for help for a practical method of controlling grubs of the Southern green June-beetle over large areas and without injury to the grass. Our success with the use of carbon bisulphide here at West Orange, New Jersey, during the past season leads me to write of our experience in the hope that it may in a measure assist in solving the problem brought up by Mr. Wilson.

The grub of the Southern green June-beetle has caused wide havoc in this territory during the past fall. We have, however, been especially fortunate at Essex County, having the grub appear in only one or two places, never on the fairways, but in the rough. From Mr. Wilson's experience at Pine Valley it appears that they were successful in controlling the grub "reasonably well" on the putting greens with the use of carbon bisulphide, "but with great labor and expense"; but, that they have been unable to find any practical method of utilizing this treatment on the large fairway areas. The method of application used at Pine Valley, as described by Mr. Wilson on page 252, is squirting the bisulphide into the burrows with a long-nozzled oil-can, and then plugging the hole with clay to prevent the fumes from escaping. When the grub first appeared at Essex County it was only in one place in the rough. We thereupon immediately examined the whole course with the greatest of care, and after treatment with carbon bisulphide we are convinced that we checked the spread of the grubs at every point. The method we used was the punching of holes in the fairways with a pointed rod about one-half inch in diameter, to a depth of from four to six inches, about ten inches apart, and injecting about half a tablespoonful of carbon bisulphide into each hole, and immediately closing the top of the hole with soil. For injecting the carbon bisulphide a large oil-can with a spring-bottom is used; a funnel is also helpful so the mouth of the oil-can will not become plugged. The carbon bisulphide quickly volatilizes when ejected from the oil can through the funnel, and its fumes, being heavier than air, sink downward through the soil, killing such insects as may be present. We have found that the injection of this quantity of the material in the manner stated exterminates not only the grub of the Southern green June-beetle, but also ants; and in the November BULLETIN, on page 232, in his article on "Fighting the White Grub at Merion," Mr. Wilson reports success with the material in the extermination of the white grub. In this latter case, however, Mr. Wilson adds that

it was necessary to discontinue the use of carbon bisulphide with the white grub owing to the fact that the chemical also killed the grass. In our experiments no killing of grass whatever occurred; and we attribute this to the fact that the depth of four to six inches to which we pierce the turf before injecting the carbon bisulphide, was sufficient to carry the chemical below the grass roots. We are led to believe, therefore, that an injection of carbon bisulphide to the depth we have stated will be successful in killing the white grub, and without injury to the grass. The white grub, it should be borne in mind, is the grub of the May-beetle, and not the grub of the Southern green June-beetle; it is most often just under the sod.

As to the amount of labor involved in our method of treatment, we find that two men can easily make and treat 600 holes in an hour, one man punching the hole and the other injecting the carbon bisulphide by means of the large oil-can and the funnel, and immediately thereafter stopping the hole up. Two men work better than one man. An ideal team, however, is composed of three men working together, the first man punching the hole, the second man injecting the chemical, and the third man stopping the hole. The number of holes that can thus be handled in a given time, of course, depends a good deal on the nature of the soil; but 1,000 holes an hour would not be too much to expect; and if the area affected were of considerable extent there could be two or three teams of three men each. Isn't the experiment one that could very easily be carried out on any course? Take one fairway, and the portion of that fairway that comes mostly into play, namely, the approaches to the greens, and certainly in a day three men could cover a very large area, and then later on the turf could be raised, with a spade and the actual results learned. Also, it could be tested on a small portion of the green in the same manner. The point we would particularly emphasize, however, is that if the green-keeper and his workmen are constantly on the lookout for the appearance of the grubs, and the method of treatment we have used is adopted, infested areas will never appear to such an extent that an entire fairway is affected.

The only other methods of exterminating this grub that have been tried, judging from articles previously appearing in *THE BULLETIN*, are the use of kerosene emulsion and the mechanical killing of the grubs with a steel wire thrust into the hole. These two methods are described on page 62 of the April number of *THE BULLETIN*, but the caution is added that the use of kerosene emulsion may cause injury to the grass if it is very tender, and in the December *BULLETIN* Mr. Wilson writes that they have tried this method at Pine Valley but without success.

Some remarks on the habits of the grub of the Southern green June-beetle in turf, as far as our observations have gone, may be pertinent in this connection. The grub is apparently invariably absent from putting-greens except around the edges of the green. It is probable that the frequent waterings which the interior areas of a putting-green receive, subject the eggs and young grubs to frequent floodings, which perhaps kill them. The burrows are definitely known to be vertical or nearly so. Further, we have found the grub only in dark, loamy soil, and apparently preferring a soil rich in humus. Further information on the habits of the insect should throw much light on the proper methods of control.

(Where putting-greens are built on soil in which a large amount of manure is intermixed, the grub of the Southern green June-beetle is occasionally very abundant. In two such greens under observation at Washington, D. C., the mounds of these grubs literally covered the greens.—*Editors.*)