

The Effects of Poisons, Insecticides and Fungicides on Soil

BY JOHN QUAILL, Secretary
The National Association of Greenkeepers of America

IN THIS day and age of particular golfers who demand the best turf possible and sometimes impossible, the greenkeeper has his hands full keeping up his course and his reputation to say nothing of his religion at times.

Just about the time he thinks he has everything in good shape and is getting all set to take a little trip over into the next county to see how that new course is coming along, up jumps the devil and upsets all his plans. It is probably a dose of brown-patch that has stopped him from his pleasure this trip. Anyway we will say it is brown-patch.

Out comes the spray outfit, sprinkling cart or proportioner or whatever he uses and the greens receive a dose of mercury or bordeaux or some other chemical which was recommended

to cure all the diseases, insects and weed troubles ever discovered. The brown-patch is probably checked and maybe cured, but what effects did it have on the organisms which are necessary to plant life?

We all know that bichloride of mercury is one of the oldest known disinfectants and germicides. Doctors and surgeons use it to sterilize their instruments and kill the bacteria. If it will kill bacteria for them why won't it kill bacteria in the soil? It is absolutely necessary that we have bacteria in the soil to grow grass, and without it we would not have any grass or weeds or any plant life and probably life of any kind would cease to exist.

There are several kinds of bacteria which are of vital interest to the greenkeeper. Some of them are the nitrifying bacteria, the nitrogen fixing bacteria, the denitrifying bacteria and the

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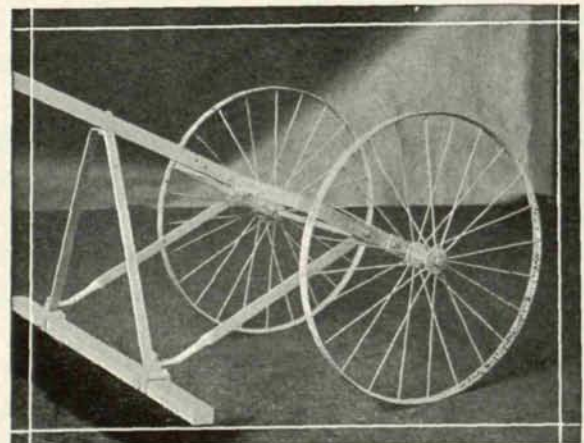
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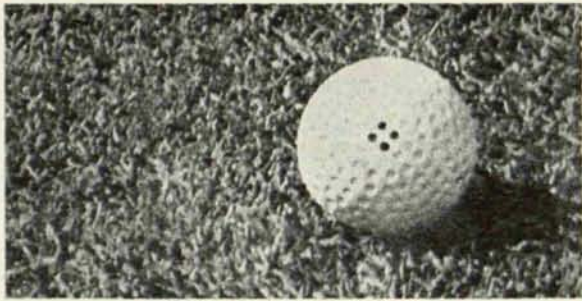
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fungi bacteria. The fungi bacteria, which causes brown-patch are the ones we are after when we use the mercury compounds. If it kills the fungi bacteria, why won't it kill the desirable bacteria also? It does and that is what makes the grass look so bad after we use it in very large doses.

Light doses do not affect the grass so much, but it does set it back some. Continued use of these fungicides will result in lowering the population of the desired bacteria so that heavier feeding of nitrogenous fertilizers will be necessary.

Now that brings us to another problem. If we use an acid reacting fertilizer such as ammonium sulphate to supply the nitrogen, we will get our soil so acid that we also reduce the desired bacteria. That means we will have to use more organic fertilizers to increase the bacteria. We will also probably have to use some lime to bring the soil back toward the neutral point to eliminate the excess acid in the soil.

Professor J. W. White of the Pennsylvania State College has experimented along these lines and has given us some very interesting

figures concerning the effect of poisons on the bacteria. These figures were given the students at the Greenkeepers' Conference at Penn State in February.

Bichloride of mercury reduced nitrification 24%.

Semesan reduced nitrification 18%.

Where lime was used on the same plots with the bichloride, nitrification was increased 6%.

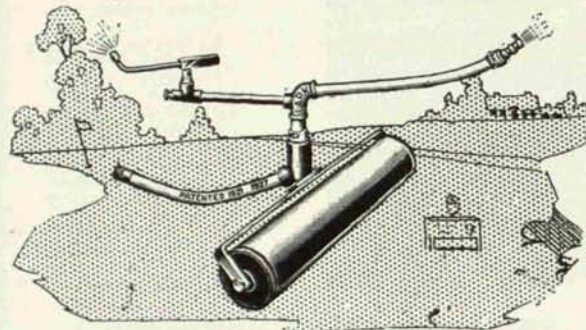
Lime on the Semesan plots increased nitrification 3%. From this we find that lime used where mercury has been used, we get a favorable result.

Prof. White also found that arsenate of lead increased nitrification about 8% and when lime was added to this plot, nitrification was further increased to about 15%.

Experiments with fungi bacteria were very interesting. He found that the fungi was more active in an acid soil than in a soil with an alkaline tendency. Following is the results of his tests.

Soil reaction expressed in pH	Bacteria per gram of earth
pH 5.1 no lime	87,000
pH 7.0 limed	16,000

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pH 6.7 limed ----- 10,000

Ammonium sulphate

pH 4.42 no lime ----- 129,000

pH 5.2 limed ----- 32,000

From this we find that the more acid the soil, the more fungi bacteria were found.

Well prepared compost and humus are necessary for the life of the nitrifying bacteria. They only work in soils where a supply of organic matter is available. A well broken-down compost that is made under the proper conditions contains innumerable bacteria. These little life giving cells are what is necessary for the production of turf. Give the little fellows a home and they will work for you as long as you don't abuse them or feed them something that does not agree with them.

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