

Foreign Grubs, a Menace of the Future

By B. R. LEACH

Associate Entomologist, U. S. Department of Agriculture and Consulting Entomologist
U. S. G. A. Green Section

In last month's article, Professor Leach discussed the habits of grubs in turf, emphasizing the fact that they feed on grass-roots close to the surface of the soil, and that in their feeding, they constantly take quantities of soil into their bodies along with the grass-roots. It is upon these two traits that the lead-arsenate method of grub-proofing is based.

PART 5

GRUBS which are beginning to feel the effects of the arsenic have a characteristic appearance as compared with a normal, healthy grub. The latter is always curled up tightly with the head and tail close together and the flesh is firm to the touch. Grubs beginning to feel the effects of the arsenic, on the other hand, are soft and flabby to the touch and are not tightly curled. They eat very little after the arsenic begins to take effect and it is only a relatively short time before they succumb to the poison. In view of these facts the significance of the word or expression "grubproof" is apparent when used in connection with arsenate of lead and fine turf.

Under these circumstances, we are concerned with the consideration of the best and easiest method of impregnating the upper soil layer of fine turf with arsenate of lead so that any grubs finding their way into a turf so poisoned will react as described above. It will be necessary to divide the discussion into two parts: (1) Grubproofing greens and tees while in process of construction and before seeding. (2) Grubproofing established greens and tees.

Grubproofing Greens During Construction

Build the green or tee and prepare it for seed or stolons just as you would if you had no intention of grubproofing it. All plow-

ing, manuring, discing, smoothing and contouring should be done in the usual way. The area of the green should then be calculated accurately.

Most greens are roughly circular in outline. Compute its area by the following reasonably exact method. Let us suppose the green is shaped as shown in Figure I. Look the green over and place a small wooden peg at the point you consider to be the center of the green. (Represented by letter C in Figure I.) Now take a tape measure, look the green over some more, and measure in a straight line the distance from A through C to B which you have decided is the longest distance across the green. In the same way, measure the distance from D through C to E which you will notice is the shortest distance across the green. Let us suppose you find the longest distance across the green to be 72 feet and the shortest distance 48 feet. Add

these two distances together, making a total of 120 feet and divide by 4 which equals 30 feet. Multiply 30 by itself which equals 900. Multiply 900 by 3.14 and this gives the approximate area of the green in square feet or 2,826 square feet. Now add 10 per cent to this result, making the area of the green in round numbers 3,100 square feet. It is always wise to add this 10 per cent to the calculated result, first because most greens have an irregular

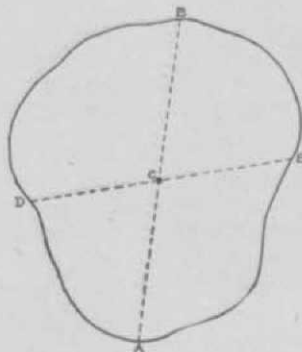


Figure I.

outline, and secondly it never pays to be too tight with the arsenate of lead. A little bit extra will take care of the probable human error in calculation and will make the grass grow greener.

Applying the Mixture

Presuming that the green or tee is all contoured and ready for the seed or stolons we are now ready to apply the arsenate of lead. The green as measured above contains 3,100 square feet of surface. It will therefore require $15\frac{1}{2}$ pounds of arsenate of lead, 5 pounds for each 1,000 square feet of soil surface treated. Inasmuch as arsenate of lead is a white, fluffy, insoluble powder and is blown about by the slightest puff of wind, it is not advisable to try to spread or dust it over the surface of the soil because there will be a large loss due to the powder blowing away beyond the confines of the green or tee under treatment. Furthermore, it is a very difficult matter for the novice to dust 5 pounds of arsenate of lead evenly over 1,000 square feet of soil surface.

Under the circumstances it is advisable to mix the amount of arsenate of lead required for the green or tee with a quantity of *slightly* moist soil or sand. The use of heavy loam or clay is not advisable in this respect, as it has too great a tendency to lump. Apply the mixture of arsenate and soil to the green or tee before seeding. By following this method loss of the chemical by blowing is largely prevented and the increased bulk of the mixture enables the operator to cover the green more evenly and with less probability of error. The amount of soil or sand to be used as a filler for 5 pounds of arsenate of lead depends entirely upon the ability of the

operator to spread it evenly over 1,000 square feet of soil surface. Some men, particularly those with many years of practical farming experience, can mix 5 pounds of arsenate of lead with a half-bushel of soil or sand, and *sow* the mixture over the allotted area just as they would sow oats or rye and with an exactness and evenness that is truly amazing. With the average workman of today, however, it will be advisable to use more soil or sand in the mixture and let him spread it with a topdressing spreader. If this is not available, spread it by the handful out of a pail, allowing each handful to sift out from the fingers onto the surface of the soil.

Don't Spare the Mixture

A word of advice will not be amiss at this point. During the spreading of the poison mixture on the green, and especially during the novice's first attempt at this job, he will wake up when about two-thirds finished and find that he is running short of the arsenate soil mixture. He immediately begins to suffer from a mild palpitation of the heart, and provided the boss is out of sight, the little bit of arsenate remaining is made to finish the green. As a result, this portion of the green gets too small a portion of the lead arsenate it should properly receive, it does not grubproof the green, and, from that time on, "Professor" B. R. Leach is a bum as far as that particular club is concerned.

Don't resort to such childish tactics. If you find yourself running short of arsenate of lead before you have finished applying it all over the green, mix up some more and finish the job properly. Incidentally this will save me the necessity of answering a



Spreading the arsenate and sand mixture on a green prior to scratching it into the top half inch of the soil.

lot of fool questions when the club elects a new green chairman the following year.

I made the statement in last month's article that arsenate of lead could be applied by the silliest jackass a golf club ever had the misfortune to have in its employ. I meant by that statement that it is practically impossible to overdose with this compound. I have grown good grass in soil treated with 100 pounds of arsenate of lead to the thousand square feet of soil surface or 20 times the dose recommended.

When the arsenate of lead has been applied to the surface of the green or tee as described above, take a rake, preferably a short-toothed one, and scratch the chemical into the soil to a depth of one-half inch, no deeper. This 5-pound dosage is based on a mixture with the top half-inch of surface soil. If it is scratched-in deeper, more arsenate of lead will have to be used at the rate of 5 pounds for each additional half-inch of soil depth. Hence, be careful with the rake and don't become imbued with the idea that you are digging potatoes.

Here again let me emphasize the importance of having all contouring completed before applying and scratching-in the arsenate. This is fairly obvious, when one considers that the finished job calls for the upper half-inch soil layer *all over the green* to be impregnated with the poison. If the contouring is done after the application of the arsenate, it means that this layer will be removed in places, leaving places devoid of poison.

Turf Grows Slower

Having scratched-in the chemical as above, the seeding or planting of stolons can now be carried out in the usual way. If stolons are used, they should be covered with the usual *light* covering of unpoisoned soil.

Grass seed and stolons sprout somewhat more slowly in arsenated soil than is the case in untreated soil. The grass shoots are usually from 4 days to a week longer in making their appearance. Furthermore, they grow more slowly during the first two or three weeks. But after that period, the grass catches up rapidly in growth and in 60 days outstrips the grass in unpoisoned soil, not only in growth but in color and vigor.

The slowness of sprouting and growth in arsenated soil during the first few weeks is due to certain chemical changes which

arsenate of lead undergoes in the soil. These changes, which are too technical to be discussed in a practical article of this sort, account for the slowing up in growth. Consequently there is nothing to be alarmed about. As the grass becomes a little older and tougher, it reacts to the arsenate of lead in exactly the opposite fashion. Instead of slowing up the grass growth, the arsenate stimulates it. In fact, it would seem that less fertilizer is necessary for grass growing in arsenated soil. Part or all of this stimulation may be attributed to the action of arsenate of lead in discouraging certain soil bacteria and fungi which are detrimental to the growth of fine turf grasses.

As the grass of the newly planted green, grubproofed as above, continues to grow, the time comes when it is ready for the first topdressing. In order to maintain the grub-proof nature of the turf, all topdressing applied must contain arsenate of lead in the proper proportion so that as the surface of the green is built up a sixteenth of an inch at a time by each topdressing. If this is not done, the original half-inch of poisoned soil will ultimately be buried under a constantly thickening layer of unpoisoned soil and in the course of time, this unpoisoned soil will become sufficiently thick so that grubs can feed in it without ever getting down to the original half-inch of poisoned soil. The green will no longer be grub-proof. The system of grubproofing topdressing will be discussed in next month's article, along with a discussion of methods to be followed in grubproofing established greens and tees.

Tell Us What You've Done with Bent Fairways

BENT is beginning to get a good inning for fairways. We know of several clubs that have recently planted or contemplated planting bent fairways. There is a lively interest in the subject and GOLFDOM would like to learn the experience of greenkeepers and green-chairmen with bent fairways, either stolon or seed, so we could pass along some good advice from fellows who "have been there."

Philadelphia, Pa. — Philadelphia will stage its "National Golf and Country Club Exposition" at the Penn Athletic club, April 16-21. Jesse C. Long is promoter of the event which is planned for annual appearance.