

TIMELY TURF TOPICS

Issued By The

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USE OF TEST PLOTS: There will be a steadily increasing demand for substitutes for many of the chemicals commonly used as fungicides, insecticides, and herbicides, as these materials cease to become available either because of their role in the all out war effort or because of the fact that they can no longer be imported due to shipping difficulties or to the turn of the war in island outposts. Unfortunately, with a greatly depleted technical staff it will not be possible for the Green Section to test the many possible substitutes. We shall, however, follow developments in these directions and bring the more promising possibilities to the attention of our readers from time to time, with the hope that they may try them out on test plots and report the results back to this office. In that way the Green Section might act as a clearing house for the results from around the country. In all events, before using any of these substitutes in large-scale treatments it would be acting in the interest both of economy and better turf to try them out on a small scale first. If recommendations of institutions or men who are conducting large-scale experimental programs are not available, those of the manufacturer should be followed or, if necessary, modified to suit any particular set of conditions.

Since most recommendations for use of these materials on turf are given in terms of the amount of chemical to be used on 1,000 square feet, areas of 100 square feet make good trial plots where relatively large areas of turf are involved. On lawns or smaller areas, smaller sized plots such as 5 by 5-foot plots may be preferred. Untreated plots as well as some treated with the commonly accepted treatments should be included on as uniform turf as is available. Routine maintenance practices should be followed on all the plots in any one series.

In applying fungicides, insecticides and herbicides to test plots, it is important that the exact rate be known so that it can be duplicated, if desirable, in the future. This precision should be followed when measuring and marking off plots, as well as when weighing or measuring the material to be applied. The climatic conditions prevailing at the time of the application should be noted and recorded, as well as the response of the turf to the treatment, and the degree of the control obtained.

The usual practice is to dilute the active materials with water and apply as a spray or mix with dry, sieved sand, soil or topdressing if they are to be applied dry. Unless calibrated equipment is employed, the amount of water or sand which must be used to cover 1,000 square feet adequately with your equipment should be determined before applications are begun.

A convenient procedure is to start with a known volume of water or sand (depending on which method of application is to be used) and a 100-square foot plot. Without adding any chemicals, spray the foliage on the plot until it is uniformly wet with the water, or distribute the sand evenly over the area. By measuring the amount of water or sand which is left and by subtracting this volume from the initial volume, the volume of water or sand necessary to cover 100 square feet is calculated. It is wise to make several such trials and use the average volume as the basis for your calculations. Multiply this by 10 and you have the amount of water or sand which you must use with your equipment to cover 1,000 square feet. It usually takes from 2 to 5 gallons of water or from 4 to 8 quarts of sand to cover that area.

June, 1942

TETRAMETHYL THIURAMDISULFIDE: Chemical companies have not been permitted to manufacture mercury fungicides for use on turf since March 31, 1942. The demand for effective substitutes, therefore, is increasing rapidly. For several years the Green Section has been considering a large number of organic compounds which offered possibilities for the control of turf diseases.

All told more than a hundred of these compounds have been tested. Of these, some killed the disease-producing fungus but also killed the grass. Others did not injure the grass but were equally as harmless to the fungus. Still others, when applied at concentrations sufficiently great to control the growth of the fungus, were prohibitive in cost.

As Harrington reported in the March 28, 1941, issue of Science, some of the thiuram sulfide compounds showed considerable promise. Of these, tetramethyl thiuramdisulfide has given effective control of both dollarspot and brown-patch in extensive tests on putting green turf in and around Washington when applied repeatedly throughout the season at the rate of 3 ounces to 1,000 square feet. Applications at the 1-ounce rate gave only partial control. When applied at the 2-ounce rate, control was good in some cases but only partial in others. This past winter, moreover, it was shown in various states that effective control of snowmold was obtained from single applications in the fall at the 3-ounce rate.

Tetramethyl thiuramdisulfide is one of the organic compounds manufactured and sold as a rubber accelerator by the R. T. Vanderbilt Company of New York, the Monsanto Chemical Company of St. Louis, and the E. I. du Pont de Nemours Company in Wilmington. It has been sold by these companies for some time under the trade names Tuads, Thiurad, and Du Bay 1205-U, respectively. However, as its use as a turf fungicide is covered by a patent held by the du Pont Company, the other companies are unable to sell it for that purpose.

This year, as there is so much demand for satisfactory substitutes for mercurial fungicides, the du Pont Company has placed on the market a turf fungicide known as Thiosan, which contains 50 percent tetramethyl thiuramdisulfide. This product is to be available at a price somewhere between \$1.25 and \$1.40 a pound, when purchased in 25-pound lots. It probably will be available in amounts sufficient to supply the demand. When applying this product, it should be remembered that it contains only 50 percent of the active ingredient.

It is interesting to note that the thiuram sulfides have also proved to be of interest as contact poisons on soft-bodied insects, although they have not been shown to be effective as stomach poisons. The possibility of its use as a contact poison on turf insects simultaneously with its use as a fungicide should be tested. It was shown by Guy (Delaware Agriculture Experiment Station Bulletin No. 206) that of many chemicals tried tetramethyl thiuramdisulfide was the most effective feeding inhibitor of the Japanese beetle and the Mexican bean beetle. In fact, on a unit weight basis it was more than 3 times as effective as arsenate of lead and more effective than ground derris root containing 4 percent rotenone. Although it is ineffective as a stomach poison, apparently it is the taste of the compound rather than its color or odor which is responsible for repelling the insects.

The difficulty in using the compound seems to be in getting it on in a uniform, thin film which will stick to the foliage in spite of heavy rains. The best results were obtained in Delaware on fruit trees and ornamentals by spraying with a mixture containing 80 percent tetramethyl thiuramdisulfide, 14 percent clay, 5 percent bentonite, and 1 percent lorol alcohol, at the rate of 5 pounds to 100 gallons of water. As the compound reacts with copper it should not be used either before or after an application of Bordeaux.

OTHER POSSIBLE MERCURY SUBSTITUTES: Many inquiries have been received concerning the possibility of using zinc oxide in conjunction with lime for the control of brownpatch and dollarspot. Several years ago, zinc oxide was tried by the Green Section with unsuccessful results. As it was not tried in combination with the lime we are unable to offer any first hand information as to the effectiveness of this mixture. However, at Pennsylvania State College last year, Wernham apparently was able to check brownpatch and leafspot with this mixture when used at the rate of 8 ounces of each to 1,000 square feet, and broadcast in 8 pounds of sand without watering it into the soil. Applications were made at 3-week intervals.

Spergon, another possible mercury substitute, has been tried by the Green Section with no success. Spergon, however, occurs in two forms,-- a wettable product which must be used if the material is to be applied as a spray, and a dry product. The latter is twice as concentrated as is the wettable form. The Green Section tests were made with the wettable product and the treatment watered in. There was no injury to the grass regardless of the amount used. However, even though it was applied at the 8-ounce rate 6 times from July 9 to September 10, neither dollarspot nor brownpatch was checked. In Pennsylvania, however, when the dry product was applied at the 3-ounce rate and not watered into the soil a fair control of brownpatch and leafspot was reported although dollarspot was not checked.

The active ingredient of Spergon is an organic compound known as Tetrachloro-para-benzoquinone. Its price in February was \$1.85 a pound when bought in 25-pound lots. The manufacturers of this product, the United States Rubber Company, Naugatuck Chemical Division, recommend its application at the rate of 3 ounces of the dry or 6 ounces of the wettable form to 1,000 square feet.

BROOD A OF WHITE GRUBS DUE THIS YEAR: The white grubs of most species of May and June beetles tend to appear in 3-year cycles, since it takes 3 years from the time the eggs are laid in the turf until the adult beetles again appear. The white grubs, therefore, tend to appear in large broods every third year in certain sections of the country. Brood A, the largest and most widespread brood, is due to appear this year. The areas in which this brood has appeared in the past occur largely in the Middle Atlantic and North Central states. They have been located on a map in the U. S. D. A. Farmers' Bulletin Number 1798 which has been reprinted in the April, 1939, issue of TURF CULTURE.

The adult female beetles do not usually fly far from their feeding grounds to lay their eggs in turf. Since they usually feed on the leaves of trees such as hickory, white or burr oaks, walnut, poplar, elm, willow, locust, ash, hackberry, or even pines, grub activity may be looked for in the neighborhood of such trees. It is important to watch for grub activity in the vicinity of such trees, particularly if large numbers of beetles were present there last year. Important turf in such areas should be treated with arsenate of lead as soon as grub activity becomes evident. Rates of 5 to 10 pounds to 1,000 square feet should be used, dependent on the nature of the soil and the severity of the infestation. Since arsenate of lead should be conserved for the war effort, it is recommended that it be applied only to those areas in which grub activity is evident.

The adult beetles which appear in May and June of this year will be responsible for next year's brood of white grubs. They should be looked for in the early morning hours, when the females are likely to be found flying down from the trees on which they feed at night to the turf where they burrow into the soil and deposit their eggs. In areas where they are found in large numbers, grub injury may be expected this summer and particularly next year, and all good turf should be protected with arsenate of lead.

"STANDARD" WARTIME GREENKEEPING PRACTICES ADOPTED BY CHICAGO DISTRICT CLUBS: Greenkeepers, green committee chairmen, and officials of the Chicago District Golf Association are to be commended on getting together on greenkeeping practices as well as rules which will be followed for the duration of the war. This will assure as nearly as possible standard playing conditions throughout the District, rather than making it necessary for those clubs which are adopting wartime maintenance practices to compete with those which are operating under more normal conditions.

It may be of interest to clubs in other districts which are planning to get together on such a program to know some of the decisions. Greens are to have a height of cut of 1/4-inch rather than the usual 3/16-inch and are to be cut only on Tuesday, Thursday, and Saturday, rather than an average of 5 times a week. Fairways are to be cut at 1 1/4 inches instead of 5/8 to 7/8-inch, and the rough is to be cut down to 2 1/2 inches instead of at the usual 4 to 9-inch height. Grass on the tees will be cut at fairway rather than putting green height. The traps are to be raked only once a week, and members and caddies will be expected to smooth out their footprints. Winter rules are recommended for the duration of the war and they are to be known as war rules.

FERTILIZERS AND THE WAR EFFORT: Consumers are being urged to use mixed fertilizers of which there still seems to be a good supply. High grade fertilizers (those containing at least 20 units of plant food) are recommended because the consumer will get more plant food for his money and will have less expense for time and labor of applying it; because the manufacturer will need less labor, will have less wear and tear on his machinery and will need fewer bags; and because for the Government it will mean more economical production of vital food stuffs and more freight car space available for the shipment of other products.

In an article published a few months ago, in Better Crops with Plant Foods, W. L. Mehring gave figures showing that probably a half-million tons of filler are mixed, moved, and applied unnecessarily each year in fertilizers which might readily be replaced by mixtures with higher analyses. With regard to superphosphate, for instance, the average run-of-pile product contains about 19.5 percent available P_2O_5 , and many of the products contain more than 20 percent. Yet, there is still a large demand on the part of consumers for a 16 percent product, which means the actual addition of 200 to 400 pounds of filler to the run-of-pile product per ton.

A similar story holds for potash. Most of the muriate of potash formerly imported from Europe was a 50 percent grade, and the consumers became accustomed to using this grade. Most American products now have a 60 percent or higher analysis, but still many consumers and fertilizer manufacturers order the 50 percent product.

Mr. Mehring translated the losses due to the filler used unnecessarily in mixed fertilizers, superphosphate, and muriate of potash into terms of losses in transportation, man-hours of labor, and number of burlap bags. As mixed fertilizers are moved about 100 miles on the average, he calculated that it would take some 31,000 box cars to haul the unnecessary 500,000 tons of filler used over a distance of 100 miles. He also estimated that the use of this amount of filler unnecessarily meant the waste of the full working time of 1,000 men and also the use of 5 million 200-pound bags.

The conclusion is drawn, therefore, that the elimination of the annual consumption of 500,000 tons of unnecessary filler will not only save the consumers about \$5,000,000 a year, but a lot of unnecessary labor as well. What is more important now, however, is that such a change would ease the strain on our transportation and bagging industries and strengthen our war effort.

NEW RYEGRASS DISEASE IN THE SOUTH: This spring numerous inquiries were received from the South concerning a disease which appears on the ryegrass and carries over onto the Bermuda grass. This disease has been reported in previous years but unfortunately no one has had time as yet to investigate the cause of the disease nor to produce a cure for it. The mercury fungicides have been tried repeatedly, however, without avail. It is not wise, therefore, to waste the limited available supply of mercury fungicides in an attempt to control this new disease of ryegrass and Bermuda grass, as such attempts are likely to result in failure. Until more information is obtained regarding the cause and cure of the disease, the best procedure is to reseed such infested areas with Bermuda grass as soon as possible.

NITROGEN FERTILIZERS: On last January 31, the National Fertilizer Association released a statement in which Charles J. Brand assured the country that although there is not an abundance of all fertilizers "the fertilizer industry is better prepared to meet the demand of increased crop goals than it was in 1917-1918."

Due to the enormous demands to munitions on the nitrogen industry the War Production Board started rationing nitrate of soda in January on a month-by-month basis. The requirements for agriculture are determined by a committee of 16 members, each of whom is an authority in some phase of fertilizer use or crop production, while the requirements for munitions, meat curing, agriculture, etc., are determined by other Government offices for the following month.

Sulfate of ammonia is, of course, one of the compounds which is being used to supplement the nitrate of soda supply. Consequently even though the supply of sulfate of ammonia last year was from 50 to 100 thousand tons larger than the preceding year, due to the increased production of coke, of which sulfate of ammonia is a by-product, the supply is not sufficiently large to satisfy the demand.

Oil-meals will therefore be strongly urged as substitutes for inorganic nitrogen sources. Their use in mixed fertilizers will be difficult to accomplish because of established ceiling prices, unless adjustments of maximum prices are made for mixed fertilizers containing larger quantities of the oil-meals.

In this connection it was demonstrated over a period of 15 years at the Arlington Turf Garden in a series of plots planned to demonstrate the relative value of various fertilizers on bent turf that the results with cottonseed meal and soybean meal were about the same and were approximately as good as those receiving sulfate of ammonia and compost. These meal products have an analysis of approximately 6-3-2 and can be used very satisfactorily. Wherever possible, therefore, those who are buying fertilizer for turf are urged to use these seed meals or activated sludge products if they are available, thus leaving as much as possible of the more readily available inorganic nitrogen for purely agricultural crops. Moreover, it is urged that as little nitrogen as possible be used on golf course turf, lawns, etc., for the duration of the war. In addition to contributing to the war effort, this will reduce the amount of mowing necessary, at a time when both labor and machinery are at a premium.

USE OF ROTENONE RESTRICTED: On April 13 an order became effective relative to the conservation of rotenone-bearing roots, including timbo, barbasco, cube and derris. According to this order, rotenone is to be used only for strictly agricultural purposes, and by the Army and Navy as a delousing agent. Formerly the greater part of our supply came from East Africa, British Malaya, French Indo China, the Dutch East Indies, and the Philippines. Therefore even with annual imports from Peru increased to 2½ million pounds, there will probably not be more than 6 million pounds imported this year, whereas the normal annual demand of 8 million pounds will be increased by Army and Navy requirements as well as by increased food production.