Methods of Applying Chemicals to Turf

By Arnold S. Dahl

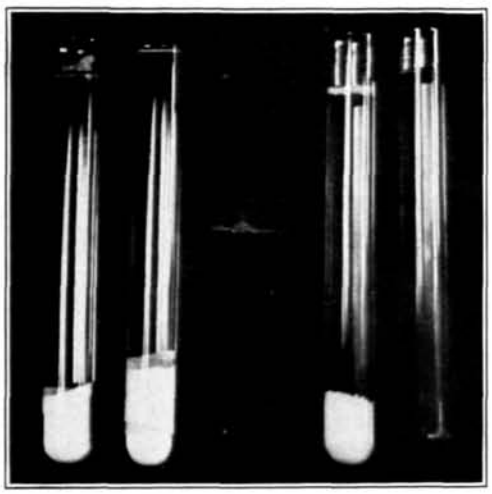
The maintenance of good turf on putting greens requires intensive cultural methods, frequently involving the use of concentrated chemicals as fertilizers, fungicides, or insecticides. The use of this type of material has introduced new problems into greenkeeping practice. Extensive damage to turf has sometimes resulted from the application of concentrated chemicals. When injury occurs as a result of their use the chemicals invariably are criticised, when, as a matter of fact, carelessness or poor judgment in making the application is the real source of the damage. One of the distinct advantages of using concentrated materials is that a small amount will cover a large area. On the other hand it is more difficult to distribute evenly small amounts of material than it is to spread bulky substances.

Concentrated chemical fertilizers and fungicides may be applied more satisfactorily if they are diluted to give much greater bulk. Only rarely should an application be made without any dilution. It is largely a matter of choice whether they are applied in water or in the dry state mixed with soil, sand, or other material. The putting greens on a course should be treated with a fungicide soon after an attack of disease is noticed, as the injury to the turf is greatly reduced by prompt attention. Applications of fertilizers to putting greens should likewise be made rapidly, so as to interfere with play as little as possible. The method to use is that which will give the most even distribution in the shortest time at the least cost. This will vary on different courses according to the individual preference of the greenkeeper.

Many golf clubs in recent years have acquired power sprayers for use in treatment of turf diseases and for applying chemical fertilizers. The cost of such equipment is considered prohibitive on some courses but others prefer to use this method and also use the sprayers for spraying trees and shrubbery on the course and therefore consider the equipment as necessary. It is felt by some greenkeepers that power sprayers reduce the cost of application and the time necessary to treat the greens. Fertilizers or fungicides that go into solution readily are well adapted to use in spray equipment. When applications of a chemical are made to coat the leaves with a film of poison, as is the case in combating many plant insect pests and diseases, a spraying outfit is most effective. This is also true when small amounts, less than ½ ounce to 1,000 square feet, of corrosive sublimate are applied at frequent intervals to check attacks of large brown-patch. The use of insoluble chemicals such as lead arsenate, hydrated lime, and calomel in particular, necessitates sufficient agitation in the tank to keep the material in suspension. In the use of calomel many greenkeepers have found it necessary to add more agitators to keep the material from settling to the bottom of the tank, for any such settling results in uneven distribution.

Some difficulty has been experienced in dissolving corrosive sublimate for spraying. Solution of many chemicals can be hastened by the addition of other chemicals. Corrosive sublimate mixed with one-fourth its weight of common salt or ammonium chloride will readily go into solution and the addition of these materials will not harm the

grass. A small amount of salt increases the solubility of corrosive sublimate many times, so that it is possible to dissolve in a gallon jug enough to treat more than one green. Less than ½ pound of the mercury compound will slowly dissolve in a gallon of water, but a mixture of 4 pounds of the chemical and 1 pound of salt will quickly dissolve in the same amount of water. The latter amount will treat approximately 22,000 square feet of turf, or four moderate-sized greens. During the hot summer weather this amount used at reduced rates will be enough for eight greens. The solution may be prepared in earthenware or glass jugs or in wooden kegs and used whenever an attack of disease occurs. Corrosive sublimate solutions should never be placed in metal containers, because of their corrosive action on metals. Not only would the container be corroded by the chemical but the solution would be weakened and it would be impossible to calculate the amount to use to get the desired control of diseases. The area of each green should be determined and the quantity of the solution to be used should be calculated so that all guessing is eliminated.

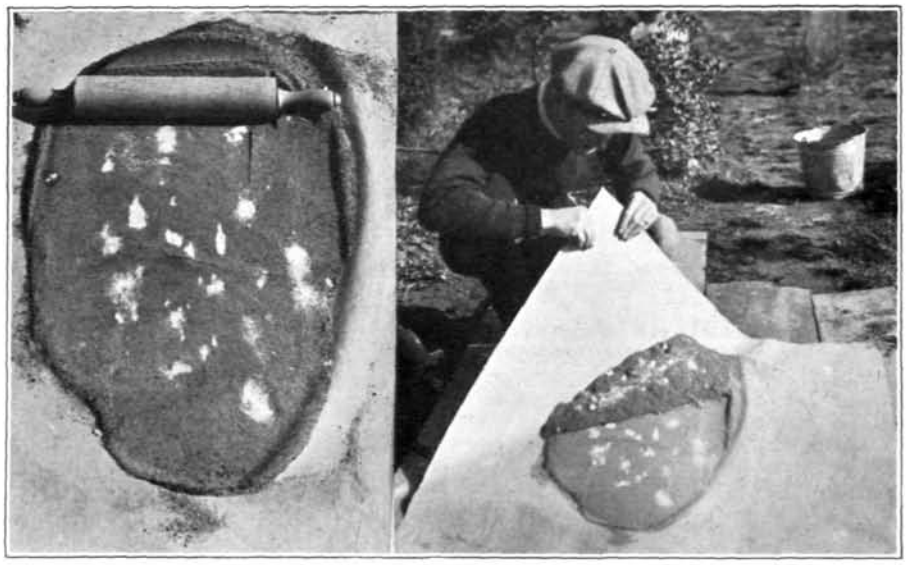


Corrosive sublimate can be dissolved rapidly by adding a little table salt to the water. Each of these four tubes contains equal quantities of corrosive sublimate and water in the proportion of four pounds of corrosive sublimate to one gallon of water. The tube on the right in each of the two pairs had common table salt added at the rate of one pound of salt to one gallon of water. The two tubes on the left were photographed immediately after the mixture was prepared; the two tubes on the right were photographed immediately after they had been shaken for three minutes. The tube to which salt had been added and which had been shaken three minutes (that on the extreme right) contains a complete solution. In each of the other three tubes the undissolved material may be seen in the bottom

Barrel sprinklers are often used on golf courses but they are much slower and more cumbersome than power sprayers. It is generally recognized that such equipment is antiquated and that more efficient methods are needed for applying concentrated chemicals. With barrel sprinklers as with power sprayers it is necessary to provide sufficient agitation to keep insoluble materials such as calomel and lead arsenate in suspension. With the use of either method the operator must watch the treatment carefully so that overlapping does not occur since this frequently causes severe burns due to doubling the rate of application.

Many greenkeepers prefer to apply chemicals in the dry state. This method has an advantage over the spray method in that it does not require a large outlay for expensive equipment nor is there heavy equipment to haul over the golf course. Some greenkeepers find that they can treat their greens more quickly by the dry method. When chemicals are applied in the dry state they should, for the best re-

sults, be mixed with comparatively dry, finely-screened topsoil, compost, or sand. An eight-quart bucketful to 1,000 square feet is a fair amount to use, but the quantity will depend on the preference and skill of the man who applies it. Some men can broadcast a small amount uniformly; others prefer a larger amount. In mixing the chemical with soil it is necessary to obtain a uniform mixture and to pulverize all the lumps of the chemical, for if lumps of a concentrated chemical are permitted to lie on turf they are likely to cause severe local burns. An excellent method of mixing chemical with soil is to first mix it with a small quantity of dry, sharp sand; preferably about twice as much sand as chemical should be used. These are then rolled together with a rolling pin, a piece of pipe, or a bottle. In rolling them together the lumps are broken by the grinding action of the sand.



Lumps of chemicals are readily broken by rolling them in a small quantity of fine sand. This is best done on heavy paper or canvas, which can be lifted at the corners to throw the rolled material back into a pile and to expose new lumps of chemicals to the rolling operation. The rolling and piling are repeated until no lumps of chemicals remain in the mixture

The rolling and mixing should be continued until a uniform mixture is obtained as indicated by the absence of streaks. The chemical and sand can also be forced through a very fine screen, but this will not result in as fine a mixture as rolling. The soil to be broadcast is spread out on a tight floor or smooth concrete so that it is in a layer not more than two or three inches deep. The chemical and sand mixture is then scattered over the soil, raked in thoroughly, and shoveled over several times so that it is uniformly mixed. A revolving barrel churn or a small revolving concrete mixer may also be used for mixing the chemical and sand with the soil. The mixture is then ready to be broadcast over the green at the rate of a bucketful to 1,000 square feet, or at any other rate that is preferred for even distribution.

Chemicals may be mixed with soil and stored until needed. Storing in this way for a short time does not affect the efficiency of chemi-

cal fertilizers. The storage of mixtures of mercury fungicides will, in part, lessen the danger of chemical burns if an excess is applied, but if such a mixture is allowed to stand from one season to the next it loses some of its effectiveness. Experiments have shown that mercury fungicides mixed with soil and stored for a period of years lose much of their value. Some, however, is retained so that a greenkeeper who has a supply already mixed, left from the previous season, may use it, but, to be effective, it should be applied at higher rates than recommended for the freshly-mixed materials. It is well not to mix more than a month's supply at a time, so that only a minimum will be lost.

A mixture of chemicals and fine sand can be given greater bulk so as to assure more even distribution on greens if it is mixed with screened soil. A pile of soil is spread out flat and the rolled mixture of sand and chemicals is spread evenly over the pile and worked in with a rake. The pile is then turned over several times to make a thorough mixture

Most chemical treatments on turf should be well watered after application so as to wash the material off the leaves. Only those treatments which are purposely left on the leaves, as mentioned earlier, are excepted. Any of the other chemicals used at the recommended rates will severely burn the grass if left on the leaves. This is true of treatments applied dry or with water in sprayers and sprinklers.

Seventeen states have laws relating to the sale of fertilizers. The percentage of plant food which a complete mixed fertilizer sold in those 17 states must contain is as follows: 16 per cent in Alabama, Louisiana, Mississippi, Montana, Ohio, Oklahoma, Wisconsin; 14 per cent in Arkansas, Delaware, Florida, Kentucky, Pennsylvania, Tennessee; 12 per cent in Georgia, North Carolina, West Virginia; 11 per cent in Virginia.