

FERTILIZATION OF TURFGRASSES

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THE many new materials becoming available for fertilization of turf-grasses raise numerous problems. There is a tendency and a necessity to change some of our methods in order to make use of the new materials.

Among the new materials are the urea-formaldehyde products which have recently become available in commercial quantities and the high-analysis soluble fertilizer materials which are used in liquid fertilizer preparations. Materials of both types have been known for some time and considerable experimental work has been done with them, but they are relatively little known from the standpoint of widespread use on golf courses.

There are still arguments concerning the use of fertilizers that have been used for years, particularly concerning the relative merits of organic and inorganic fertilizers. More and more products of the sewage sludge type are coming into use and most of these have the good quality of becoming available relatively slowly. On the other hand, inorganic fertilizers are considerably cheaper per unit of plant food, but inorganic fertilizer materials become available to the plant much more rapidly and they either provide a rapid flush of growth, which is sometimes undesirable, or, where rainfall is heavy, they leach out of the soil quite rapidly so that frequent use is necessary.

The basic needs of turf have not changed. Changes in fertilizer practice are due to the use of different materials and a better knowledge of fertilizer behavior rather than due to the difference in the needs of the grass. Grass takes up any of the nutrient elements in relatively small amounts and in reasonably good soil it obtains a considerable portion of its nutrients from the soil itself rather than from the fertilizer applied. The job of the superintendent is to make certain that all elements are available in sufficient quantity at all times.

The job of keeping nutrient elements available to the plant may depend upon soil conditions or upon the pH of the soil as much as it does on the actual supply of these materials in the soil. The pH of the soil ideally should range between 6.0 and 7.0. This is the range at which most elements are available to the grass plant. Conditions of good drainage and good aeration, together with reasonable moisture supplies, are necessary before the plant can make use of fertilizer materials, no matter how plentiful they may be in the soil.

Frequency of Fertilization

It has been rather common practice on golf courses to use slowly available materials, such as organic sources of nitrogen, in sufficient quantity to supply the needs of the grass for about a month at a time. Some superintendents fertilize at even less frequent intervals and use correspondingly larger amounts per application. Where inorganic fertilizers are used, the tendency is to fertilize more frequently, using less plant food per application. This prevents having a heavy flush of growth at one time and a low ebb in growth at another time.

There is a growing tendency to apply both organic and inorganic types of fertilizers more frequently in order to have an adequate supply at all times and also in order to avoid having a superabundance of nutrient elements at any time in case weather conditions should favor disease attacks. Weather which favors disease also provides conditions causing the rapid breakdown of nitrogenous materials (nitrification) and the rapid release of nitrogen. Frequent, small applications minimize the possibility of encouraging disease activity.

The soluble high-analysis fertilizers which are used in liquid form lend themselves very well to frequent applications

in which very little plant food per application is used. These fertilizers can be used in the spray tank along with fungicides or insecticides and the labor of application is thereby eliminated because the maintenance practice of spraying would be accomplished anyway. These materials will keep grass green during the summer months when applied at very light rates because a part of the fertilizer is absorbed through the leaves of the grass and a good color is provided without producing the lush growth, which is expected when larger amounts of fertilizer are applied by the conventional method.

The urea-formaldehyde products, which were developed for the purpose of giving a high nitrogen material which releases nitrogen for plant use very slowly and which lasts for a long period of time, behave very much like the organic nitrogenous materials. The release of nitrogen can be controlled more precisely and the release may spread over a much longer period of time. It may be foreseen that these materials will enjoy widespread popularity because fewer applications will be necessary and a saving of labor will be effected. It seems reasonable that one application per year of such material may be sufficient to keep the grass growing well throughout the season; therefore, only one fertilizer application must be undertaken.

These urea-formaldehyde products have not been widely tested on putting greens and their reaction under such conditions is not well known. It does seem likely that they will find a very useful place on fairways, provided the price is such that it will compare favorably with other forms of nitrogen. The smaller amount of labor required would be an advantage which would offset a considerable cost differential. In making comparisons between urea-formaldehyde products and sewage sludge materials, one should consider the small quantities of many other elements contained in sewage sludge fertilizers which are not found in a material such as a urea-formaldehyde product.

To this point our discussion has centered largely around nitrogen materials. Phosphorus and potash are the other two major plant nutrients. We know that grasses require relatively small amounts of phosphorus. Phosphorus has been considered to be a root producing element and we have been told that the plant needs to have phosphorus placed deeply in the soil in sufficient quantities to promote the development of roots. It is now considered by most plant physiologists that the most important function of phosphorus in the plant is probably its role in the respiration and transport of carbohydrates within the plant.

Relatively small amounts of phosphorus are necessary for this process and we find that the grass plant takes up relatively small quantities of phosphorus in proportion to the quantities of either nitrogen or potassium. Phosphorus levels should be checked periodically in the soil to determine whether or not they may be a limiting factor, but phosphorus levels should not be built up beyond the point necessary to maintain adequate growth. We know that from a cultural standpoint, high levels of phosphorus encourage *Poa annua* in putting greens and offset some of the inhibiting effect of arsenicals.

Potash is an element for which no specific role of essentiality has been determined, yet it is well known that potash is essential to the growth of plants. It has been demonstrated that potash levels within the plant have an effect upon the disease resistance of the plant and we know that potash has some effect upon the structure of the plant in that an over-abundance of potash will cause a stiffness in the leaves. Therefore, as in the case with nitrogen and phosphorus, potash must be supplied in adequate quantities, but it should not be supplied in such quantities that there will be what is commonly known as "luxury consumption." The plant regulates its uptake of most materials very well, but it seems to be unable to regulate its uptake of potassium and will absorb much more than is needed.

The point of this entire discussion is to emphasize that the needs of grass plants have not changed, but that many of our practices have changed. As our knowledge concerning the nutrient needs of grasses has been improved, and as research continues to disclose new materials and new methods for supplying plant nutrients, it is likely that we will continue to make small changes in our practices of fertilizer

application. It does not mean that we have been wrong in the past, but it does mean that with the development of new materials and better methods our practice will have to undergo some changes in order to keep abreast of the times. Fertilizer technology advances furnish one example of the many developments that allow the production of higher quality turf for the nation's golf courses.

Make Hay In Early Autumn

By WILLIAM H. BENGEEFIELD

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THERE is no royal road to a wholly satisfied membership." These are the words of J. Porter Henry, a man who has spent the past 16 years as Green Committee Chairman at the Algonquin Club near St. Louis.* It is difficult to keep up with the whims and the fancies of all the members and even more difficult to get your turf program and problems over to the golfing membership. Your USGA Green Section offers an idea.

This is the time, and now is the best chance, for you to do a public relations job within your club on behalf of your turf program. The publicity in mind is a planned program or meeting for club members on Home Lawn Care, to be held this month or early September, sponsored by the Green Committee, and conducted by the Green Committee Chairman and Course Superintendent. Interest in fine lawns has never been greater. There will be no problem in attracting a large number of members to such a meeting.

Early September is the most appropriate time to do something about improving turf composed of cool-season grasses. By discussing the problems of home-lawn maintenance and care you will also be

discussing many of the problems encountered in producing fine turf. Members will come away with a better understanding of grass and its management. And that, of course, is what you are after.

Will this type of program work? It already has, many times! At Henry's course, for example, a dinner meeting was arranged. The chairman gave a short talk on the grass plant, the function of its leaves and roots, soil conditions and fertilization. He then turned the meeting over to the superintendent for a question period. It was a great success.

The importance of publicity and informing the membership should not be overlooked. It pays dividends. It should be a part of your Green Committee's program. If our office can assist you in developing a home-lawn care program, please let us know. You see, you *can* make hay, even on lawns!

*From an article, "The Superintendent, the Chairman and the Locker Room," USGA Journal, August, 1954.

You can't help a little child up the hill without getting nearer the top yourself.