



Applications of lime which amount to less than 50 lbs. per 1000 sq.ft. will disappear from the homeowner's view after one or two rains.

# LIME: SIMPLE AND CHEAP, BUT SO EFFECTIVE

Nitrogen fertilization should be countered occasionally by lime, which safely and effectively reduces soil acidity.

by Stephen J. Donohue, VPI-SU

In order to establish and maintain a high quality turf, additions of fertilizer and lime by the lawn care/landscape supervisor are sometimes needed.

While close attention is often paid to fertilization programs, the same is not normally true for lime. However, lime is a very simple material to apply, it is inexpensive compared to other materials and it is extremely effective in promoting good quality turf.

## Determining needs

It is quite simple to determine if lime need be applied to turf by testing the soil. Most soils in Virginia are natu-

rally acid and require limestone to neutralize this acidity. Also, as most nitrogen fertilizers used on turf make soil more acid, this should be countered by periodic lime additions. Since too much lime can be as harmful as too little, it is essential that the soil be tested beforehand.

In Virginia (and most other states), information on how to have soil tested may be obtained directly through the local cooperative extension office. These offices provide information on how to collect a sample as well as soil sample boxes and lawn information questionnaires. Most land grant universities have soil testing and plant analysis laboratories that offer testing services and information on amounts and types of fertilizer and lime to use.

## The application

Limestone is simple to apply, either with a drop spreader or a spinner (centrifugal) spreader. Uniform coverage

of the lawn is important. Overlaps and skipped areas should be avoided. For best results, one-half of the lime should be applied in one direction, and the remainder applied in a perpendicular (crisscross pattern) direction.

If using ground lime, it is simple to determine if coverage is uniform because of the visible white color of the material. More care should be taken if pelletized lime is used.

Lime can be applied at any time. It is recommended that lime be applied in the fall to enable the material to break down over the winter for the next season's growth. But if the soil is tested in the spring and lime is needed, it should be applied at that time. Lime will begin to react immediately upon application and will reduce acidity and improve turf growth through the summer and fall.

Lime is safe to use. The common

This text is adapted from a speech given at the Virginia Turfgrass Conference by Dr. Stephen J. Donohue, professor of agronomy and extension specialist in the Department of Crop and Soil Environmental Sciences at Virginia Polytech Institute and State University.



forms of lime applied to turf—ag lime, calcitic lime and dolomitic lime—are non-toxic to humans and grass, and will not cause pollution problems.

If the proper amount of lime is applied to bring the soil pH to 6.5, the application should last four to six

years for it to react adequately with the soil.

When compared with other materials applied to turf, lime is very inexpensive. Lime costs are but  $\frac{1}{3}$  to  $\frac{1}{10}$  the cost of fertilizer. Lime is a real bargain at those prices.

turf growth.

Limestone also increases the plant availability of nitrogen, phosphorus and potassium in an acid soil. All three nutrients undergo reactions in the soil when lime is applied to increase their availability to the plant. It should be noted that, when fertilizer is applied to a very acid soil, an appreciable portion will undergo chemical reactions that reduce its availability. By liming a soil, the efficiency of fertilizer use is increased.



Lime is a critical factor in keeping soil pH around 6.5 for good turf growing conditions on most athletic fields.

years.

If applying lime to established turf and the recommendation calls for more than 50 lbs. per 1000 sq.ft., the lime application should be split with no more than 50 lbs. per 1000 sq.ft. being applied at any one time. Additional applications, when needed, should be applied three to six months after the first application. The reason for split application in these situations is aesthetic. Lime is white and while applications of less than 50 lbs. per 1000 sq.ft. will disappear from the surface after one or two rains, larger amounts will remain visible for a longer period of time, which is undesirable from a homeowner's point of view.

Lime is even simple to produce. The lime material used on turf is nothing more than crushed lime bedrock.

### Collecting lime

At a lime quarry, topsoil is removed with a bulldozer, exposing the limestone bedrock. The bedrock is loosened using dynamite charges and the broken-up material is then transferred, usually by conveyor, to a crusher or pulverizer where it is ground to the proper fineness. It is necessary to grind limestone to a very small particle size since it is very insoluble and the surface area of the material must be increased

### Lime's effects

Lime is effective in so many ways. Its main benefit is neutralizing soil acidity.

There are two forms of acidity in soil, active and reserve. Active acidity refers to the actual concentration of hydrogen ions in the soil solution.

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### Uniform coverage of the lawn is important.

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This is the acidity that is measured in a soil pH test. This form of acidity amounts to only a small portion of the total acidity in the soil; it could be neutralized by applying merely a couple of teaspoons of lime per 1000 sq.ft.

Most of the acidity in soil is in the reserve form. It consists of aluminum and hydrogen held loosely on the edges of clay particles.

### Other benefits

In addition to neutralizing acidity, limestone supplies calcium and sometimes magnesium for plant growth. Common aglime supplies abundant amounts of calcium. The same is true for calcitic lime. Dolomitic lime, on the other hand, supplies both calcium and magnesium. These two essential plant nutrients are required for good

### Boosting pH levels

In addition to increasing availability of major plant nutrients, limestone reduces the availability of aluminum and manganese, the two elements primarily responsible for poor growth at low soil pH levels. Application of lime with resultant rise in pH causes aluminum and manganese to undergo reactions which render them unavailable. These elements exist in very unavailable forms at neutral soil pH levels.

Another benefit of lime is that it improves soil structure. This is due to the "bridging" effect of calcium (as well as magnesium) between clay particles and also because of an increase in microbial activity. Soil microorganisms help break down organic material in soil, and the resultant "glue" that is produced helps bind soil particles together.

While not present to any great extent in Virginia, soils that are high in sodium (which causes dispersion and breakdown in soil structure) are aided by limestone in that the calcium displaces sodium which is then leached out of the soil.

### Counteracting acidity

Another beneficial effect of lime, particularly important in turf production, is that it counteracts acidity caused by certain nitrogen fertilizers.

Ammonium nitrate and urea, two commonly-used nitrogen fertilizers, break down in the soil to produce nitric acid. Approximately  $1\frac{3}{4}$  lbs. of pure lime is needed to neutralize the acidity caused by 1 lb. of nitrogen from each of these fertilizers. In a yearly fertilization program where a total of 4 lbs. of nitrogen is applied per 1000 sq.ft., approximately  $7\frac{1}{4}$  lbs. of pure lime is needed to neutralize the acidity the nitrogen fertilizer produces.

These then are the benefits of using limestone on turf. Limestone is a simple material; simple to determine if needed, simple to apply, simple from the standpoint of its longevity and infrequent application need—yet a real bargain in terms of cost and benefit to the turf. **LM**