

# Lime applications for soil neutralization

By Dr. Roger C. Funk

**T**urfgrasses will not grow well in highly acid soils, and since many soils in the United States are acid by nature, well established lawns may require periodic applications of lime.

Acid conditions of soils can result from the leaching of calcium and magnesium (the alkaline constituents) from the root zone; yearly applications of nitrogenous fertilizers; the use of organic material as top dressing or as a soil conditioner; and the washing to sulphur from the air into the soil by rainfall.

Acid soils are commonly referred to as "sour," whereas alkaline soils are called "sweet." Soil reaction is measured by the concentration of hydrogen ions in the soil which is expressed by a unit (pH) between one and 14. A soil with a pH of seven is said to have a neutral reaction. Soils with a pH rating of less than seven are acid and those with a pH above seven are alkaline. The pH of most soils with an established turfgrass will vary between four and eight.

## What is lime?

Lime is a compound of calcium or magnesium and is a term used quite loosely in the plant care industry. (Note: Calcium sulfate, [gypsum] is not a liming material.)

A chart of liming materials with their relative neutralizing values is given on the opposite page.

There are three major types of lime and each has its advantages and disadvantages.

(1) Ground agricultural limestone is also known as calcic limestone and is almost pure calcium carbonate ( $\text{CaCO}_3$ ). Ninety-five percent of all lime used in the U.S. is

calcium carbonate because it is the most abundant and cheapest form. Also, it is not caustic and disagreeable to handle as is burnt or hydrated lime.

Ground agricultural limestone containing significant amounts of magnesium carbonate is called dolomitic limestone or dolemite. Most recommendations for additions of lime are for ground limestone or its equivalent.

(2) Burnt lime is also known as quick lime or caustic lime and is primarily calcium oxide ( $\text{CaO}$ ). Gloves should be worn when handling either burnt or hydrated lime. Burnt lime has twice the neutralizing effect of calcium carbonate and should be used at  $\frac{1}{2}$  the recommended rate.

(3) Hydrated or slaked lime is calcium hydroxide ( $\text{CaOH}_2$ ) and is about  $1\frac{1}{2}$  times more effective and quicker to react than ground limestone.

## Effect of lime

Most cool-season turfgrasses respond best to a fertilization program when the soil pH is about 6.5. Soils with a pH significantly above or below 6.5 are not necessarily infertile, but nutrients may become unavailable by combining to form insoluble compounds which cannot be absorbed by grass roots. In addition, acid soils promote the solubility of heavy metals such as copper and zinc which may reach toxic levels and reduce plant growth.

Lime corrects an acid soil condition, thereby assuring maximum benefits from applied fertilizers and reduces the potential for heavy metal toxicity. Lime supplies calcium which is an essential macronutrient

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## Relative Neutralizing Values of Liming Materials

Liming Material	Chemical Formula	Relative Neutralizing Value, %
Magnesium oxide	MgO	250
Calcium oxide	CaO	178
Magnesium hydroxide	Mg(OH) <sub>2</sub>	172
Calcium hydroxide	Ca(OH) <sub>2</sub>	135
Magnesium carbonate	MgCO <sub>3</sub>	119
Calcium carbonate	CaCO <sub>3</sub>	100

for plant growth and development.

Calcium ions also help aggregate clay particles, improving air circulation and water drainage.

### When and how to apply lime

Applications of lime on established lawns may be made at any time of the year. However, the most effective times are fall, winter and early spring — in that order. Alternate freezing and thawing and early spring showers help work the lime into the soil.

Lime must be spread evenly over the entire area because it does not move appreciably in a lateral direction. Lime should not be applied

when the soil is too wet since it may be difficult to obtain an even distribution and the turf may be disrupted. If heavy equipment is required to spread the lime, less damage is done to the soil and grass when the ground is frozen.\*

### How much to apply

The amount of lime required to raise the soil pH to 6.5 will vary with the degree of acidity, the soil type and the lime material. Light, sandy soils require less lime than soils high in silt or clay, but will require more frequent applications. In general, a pH test every three to five years is recommended.

Single applications of over 50 pounds of lime per 1,000 sq. ft. are not recommended. If over 50 pounds are required, divide the total amount in increments of 50 pounds and allow at least six months between applications. Heavy applications of lime can be just as damaging as lime deficiency. □

*\*Most lime is applied through a drop spreader to ensure uniform, controlled distribution and to minimize dust. However, a recently developed pelletized, or granular, lime allows the use of a cyclone spreader. Care should be taken around acid-loving plants to confine lime to lawn areas.*

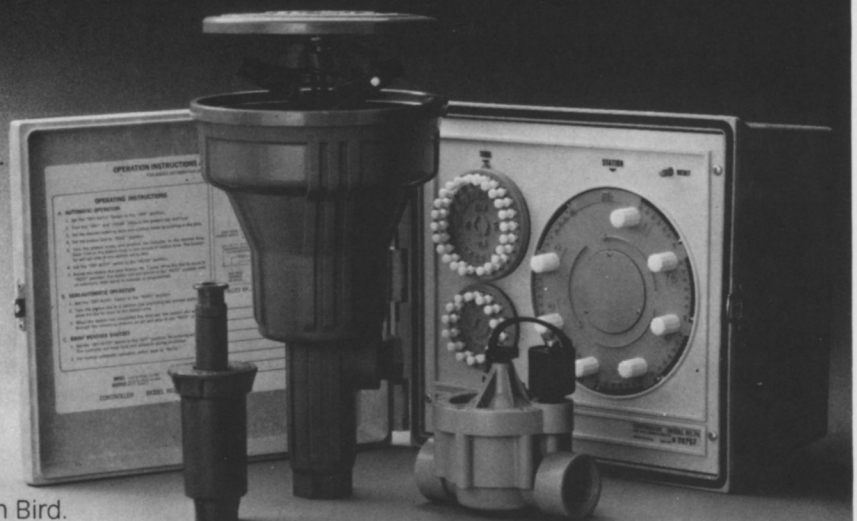
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