

PART IX

Lime

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Liming materials

The **quality** of agricultural lime is determined by its purity and fineness of grind, or mesh size. Purity affects the amount of aglime required per acre in adjusting soil pH to a given level. Mesh size affects the rate of reaction of lime in neutralizing soil acidity. For example, pulverized lime more coarse than 20 mesh has little value as an aglime material because of its very slow rate of reaction in the soil.

The **calcium carbonate equivalent** (CCE) of agricultural lime is directly related to its purity. Pure calcite, which is 100 percent calcium carbonate (CaCO_3), has a CCE value of 100; whereas pure dolomite ($\text{CaCO}_3 \cdot \text{MgCO}_3$) has a CCE of 108. The CCE and chemical composition of several common liming materials are shown in the following table. Equivalent amounts of different liming materials can be determined by using the neutralizing value (NV). For example, if 2 tons of calcitic lime with a CCE of 100 are recommended, and marl with a CCE of 75 is to be used, the CCE of calcitic lime (100) divided by the CCE of marl (75) times the recommended rate per acre of calcitic lime equals 2.66 tons. This is the amount of marl that would need to be applied to equal the acid neutralizing potential of two tons of calcitic lime. The lime recommendations of soil testing laboratories are generally based on liming materials which have a CCE of 100 and an assumed plowing depth of 6 inches. Any changes in the CCE of liming material and/or plowing depth will necessitate a recalculation of lime requirement.

Chemical Composition and Calcium Carbonate Equivalent of Certain Liming Materials

Lime material	Calcium carbonate equivalent
Calcitic lime CaCO_3 (pure)	100
Dolomitic lime $\text{CaCO}_3 \cdot \text{MgCO}_3$ (pure)	108
Burned lime CaO	150-175
Hydrated lime CaOH_2	110-135
Marl CaCO_3	70-90
Slags CaSiO_3	60-90

Liming materials marketed in Virginia

Companies marketing agricultural liming materials in Virginia **must be registered** with the Virginia Department of Agriculture and Consumer Services, PO Box 1163, Richmond, VA 23209 (804-786-3511). Further, the liming materials sold must pass the specifications stipulated in the Virginia Agricultural Liming Materials Law.

The **two types of agricultural limestone**, differing in mesh screen analysis, sold in Virginia are described in the following table. Mesh size is a measure of the number of openings in one square inch of screen. A 20-mesh screen contains 400 openings per square inch, whereas a 100-mesh screen contains 10,000 openings. Crushed limestone material passing a 100-mesh screen is finer and therefore reacts with soil acidity more rapidly than 20-mesh material. Pulverized limestone is, therefore, more reactive than ground limestone. However, reactivity rate does not increase greatly for particle sizes smaller than 100 mesh.

Mesh Screen Analysis of Agricultural Limestone Marketed in Virginia¹

	Mesh screen size	Percent guaranteed to pass (5% Tolerance)
1. Ground limestone	20	90
	60	50
	100	30
2. Pulverized limestone	20	95
	100	70

¹Minimum calcium carbonate equivalent of not less than 85%.

In addition to lime types based on mesh screen fractions, there are lime types based on kind of limestone, i.e., calcitic and dolomitic. In Virginia, agricultural limestone that contains 85% or more of the total neutralizing value in the calcium carbonate form is classified as calcitic, whereas limestone that contains 15% or more of the total carbonate content as magnesium carbonate is classified as dolomitic. Both are excellent liming materials; however, dolomitic lime should be used on soils testing low in magnesium.

When buying lime, one must be aware of the cost per unit of calcium carbonate equivalency. Neutralization potential increases with the increase in calcium carbonate equivalency value. In reality, aglime users are buying acid neutralizing potential that is associated with both calcium carbonate equivalence and fineness of grind.