



CALCITIC OR DOLOMITIC LIMESTONE?

Concern is sometimes expressed about the balance of soil calcium and magnesium, and the need to adjust the ratio of these nutrients with either calcitic limestone or gypsum. Claims have been made that soils testing high in magnesium can be harmful to soil physical properties and antagonize crop nutrient uptake.

CALCIUM TO MAGNESIUM RATIO

The calcium to magnesium ratio is the relative proportion of the percent base saturation of exchangeable calcium and magnesium in the soil. Most soils tested in A & L Great Lakes Laboratories service area have Ca:Mg ratios from 3:1 to 10:1.

Calcium and magnesium that are available for plant uptake are primarily held as exchangeable cations on soil and organic particles. Exchangeable soil calcium normally ranges from 200 to 3000 ppm, while exchangeable soil magnesium normally ranges from 20 to 400 ppm.

LIME APPLICATION

Lime applications that are based on Ca:Mg ratios may prove to be misleading. For example, a soil deficient in magnesium may have the same Ca:Mg ratio as another soil with excessive amounts of calcium and magnesium. It is difficult to distinguish between inadequate and excessive levels of calcium and/or magnesium by using only a ratio as a measure.

The University of Wisconsin has shown that if adequate amounts of calcium and magnesium are present, ratio variations between 2:1 and 8:1 have no effect on yield. Varying base saturation of calcium from 32% to 68% and magnesium from 12% to 35% also had no influences on yield. Applying calcitic lime to increase the Ca:Mg ratio does not appear to be a wise practice if the soil pH is already in good growing range.

MAGNESIUM IN SOIL

It has been theorized that the use of dolomitic lime in low calcium/high magnesium soils may induce a potassium deficiency. Michigan State University reported that, in field research performed on alfalfa, the potassium levels in plant tissue were not changed by the use of either calcium or magnesium. If low potassium levels are observed in plant tissue in soils that test high in magnesium, it is possible that other factors often associated with high magnesium soils may be the cause (i.e. compaction and/or poor drainage).

There are varying levels of exchangeable magnesium in soils. Coarse-textured, well-drained soils will have much lower soil test magnesium levels than fine-textured, poorly drained soils. This explains why magnesium deficiencies frequently occur in sandy soils.

FACT SHEET

A & L GREAT LAKES
LABORATORIES, INC.

3505 Conestoga Drive
Fort Wayne, IN 46808

Phone: 260-483-4759
Fax: 260-483-5274
lab@algreatlakes.com
www.algreatlakes.com

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A test level of 50 ppm magnesium is generally considered adequate for high crop yields. Ohio State University suggests the application of dolomitic limestone if the magnesium base saturation falls below 10%. They indicate that this is particularly important where grass crops are being grown for forage and magnesium is needed to prevent grass tetany. If the Ca:Mg ratio is 1:1 or less (less Ca than Mg), they recommend using a calcitic limestone.

Average magnesium soil test levels are shown in the following table. Use the information from your soil test report to make a proper decision for your situation.

Average Magnesium Test Levels by Soil Type

Soil Texture	Soil Drainage		
	Well	Somewhat Poor	Poor
	Soil Test Level (ppm Mg)		
Clay and Clay Loam	250	400	500
Loam and Sandy Loam	150	225	450
Loamy Sand and Sand	35	150	175

Correcting Magnesium Deficiency

- Dolomitic limestone contains about 11% magnesium and 21% calcium.
- Calcitic limestone contains about 40% calcium and 0.2% magnesium.
- Either material can be applied to increase the soil pH if the magnesium level is 75 ppm or more.
- If the soil pH is low and the magnesium level is less than 75 ppm, it may be advisable to use dolomitic lime and/or fertilizer materials containing magnesium.
- In high pH, magnesium-deficient soils, fertilizer materials containing soluble magnesium or small amounts of finely ground dolomitic lime should be applied. Apply 50 to 100 lbs of magnesium broadcast or 10 to 25 lbs in the row.