

Magnesium

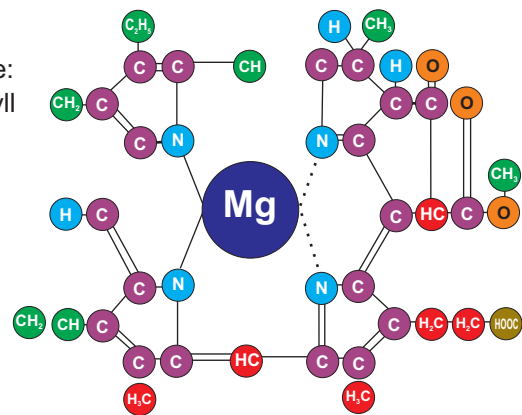
The “Fifth Major” Nutrient in Crop Nutrition

Magnesium (Mg) is one of the 17 nutrients essential for plant growth. It is essential for optimum photosynthesis and for improved effectiveness of other production inputs. Magnesium uptake requirements of high yielding crops are similar to uptake needs for sulfur (S). Soil test summary data indicates that millions of acres of farmland are marginal in available magnesium. Response to fertilizer magnesium on these acres is most likely when the soils are acidic, low in organic matter, sandy in texture and located in regions of intense rainfall. In addition, response is often crop specific and influenced by other practices such as liming and/or the use of high rates of potassium and nitrogen. Understanding the role of magnesium in plant growth is a first step to proper use of magnesium in high yield, top-profit cropping systems.

Why is magnesium important?

Some of the benefits that magnesium provides in growing plants are:

- Improved photosynthesis, Mg is the central ion in the chlorophyll molecule
- An activator and/or cofactor for many enzyme systems
- Promotes phosphate metabolism
- Improves seed formation
- Promotes the synthesis of proteins



What nutrients do crops need?

Magnesium is required by all major agricultural crops grown at high yield levels. Ammonium, calcium and potassium ions in the soil nutrient reservoir compete vigorously with magnesium for absorption by plant roots. This influence is greatest for crops growing on acidic, low CEC soils that test medium to low in magnesium. Reduced tillage develops a cold, moist environment that inhibits magnesium and phosphorus absorption, that can retard seed germination and that slows seedling development.

Nutrient uptake by major crops

Crop	# N	# P ₂ O ₅	# K ₂ O	# S	# Mg
Corn (180 bu/a)	240	100	240	28	41
Soybeans (60bu/a)	325*	65	140	25	26
Bermudagrass (8t/a)	370	96	400	44	26
Wheat (55bu/a)	120	45	85	13	15
Rice (7500#/a)	120	60	170	12	15
Cotton (1500#/a)	180	65	155	40	32
Alfalfa (8t/a)	410*	95	400	40	40

* Legumes get most of their N from the air.

When do high yielding crops need magnesium?

A 180 bushel corn crop must absorb over 40 pounds of magnesium during the growing season. Magnesium, like nitrogen and phosphorus, is a mobile nutrient within the plant. When in short supply, plant magnesium moves from older to newly developing plant tissue. A steady supply of available magnesium is needed to maintain photosynthesis and full season plant growth. Magnesium needs are elevated for legume crops, for seedlings growing in cool, moist soils, as well as for crops fertilized with elevated rates of potassium. Full season magnesium nutrition is key to high yield crop nutrient management.

Magnesium deficiency in high yielding crops

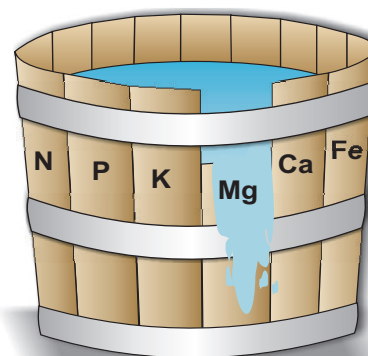
Deficiency symptoms:

- Inter-veinal chlorosis of older leaves of corn
- Slow seedling growth on cold, wet soils
- Purpling between dark green veins in older leaves of cotton
- Yellowing between green veins in older leaves of soybeans, tomatoes, potatoes and cabbage.



Importance of balanced nutrition

Nitrogen, phosphorus, potassium and sulfur are the focus of much attention when nutrient management plans are developed. Other nutrients, such as magnesium can be equally important. To minimize the risk of grass tetany (caused by a low blood serum magnesium level) in cattle, special care is needed with forage fertilization practices involving potassium, nitrogen and magnesium. For optimum seed development, plants require a balance of magnesium with both phosphorus and sulfur. Imbalance between Ca and Mg in low CEC soils may increase Mg deficiency as a result of less Mg is taken up.



A crop's yield potential is limited by the amount of the most limiting nutrient

Magnesium Nutrition Management

The two primary sources of magnesium for crop use are potassium magnesium sulfate (K-Mag[®]) and dolomitic limestone. Selecting the best source requires a close look at what each contributes to the production of a high-yield, top-profit crop. The primary objective of finely ground dolomitic lime is to neutralize soil acidity and provides magnesium over time. Dolomitic lime is not intended to meet crop needs on soils with a pH of 6.0 or higher. K-Mag is a primary provider of readily available, water soluble, sulfate form of magnesium. K-Mag also provides added value in the form of (a) a readily available sulfate source of sulfur and (b) a readily available sulfate source of potassium. K-Mag's maximum chloride content is less than 3.0 percent, minimizing the potential for "fertilizer burn" and makes it ideal for sensitive vegetable and fruit crops that require high fertilization rates, but do not tolerate high levels of chloride or soluble salts. These "added value" nutrients are also key components of most crop nutrient management plans.

