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Magnificent Magnesium

Why maintaining magnesium is important.

Magnesium (Mg) is essential for plant growth however it can often be forgotten in our fertilizer regiments. On average, plants require Mg in greater concentrations than most other elements other than nitrogen (N), potassium (K), and calcium (Ca). In many areas of the United States, there is adequate Mg available concentrations of 25-50 ppm Mg in the groundwater.

However, not all

locations have Mg concentrations adequate to sustain plant growth and must be supplied another way. Plants can be provided with Mg through a variety of methods including groundwater, dolomitic limestone included in substrates, and through fertilizers.

Magnesium uptake can be impacted by other elements as well even when supplied at adequate concentrations. A general recommendation is to target a 4:2:1 ratio of K to calcium (Ca) and Mg (ie.: 200 ppm K to 100 ppm Ca to 50 ppm Mg) to prevent antagonism that would limit the plants' ability to uptake any one of these nutrients. Antagonistic relationships are generally observed when growers supply high Ca to crops such as



Figure 1. Lower leaf interveinal chlorosis is the most commonly observed initial magnesium deficiency symptom. (An upper foliage interveinal chlorosis situation would initially point to an iron deficiency.) (Photo: Brian Whipker)

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tomatoes to prevent blossom end rot or with geraniums where flowable lime is used to prevent a decrease in substrate pH and Mg uptake can be affected.

Deficiencies can occur as a result of many factors, in areas lacking Mg in the water supply, dolomitic limestone can provide adequate Mg concentration through roughly half or more of the season, then after that symptomatic leaves can appear. When relying on dolomitic limestone to provide adequate Mg fertility in warm springs the extra irrigations can result in leaching the available Mg and resulting in deficiencies. We have observed this to be the case when growers utilize a fertilizer such as 20-10-20 (N-P₂O₅-K₂O), a fertilizer that does not supply calcium or magnesium, and also rely on the Mg from the dolomitic limestone during spring bedding plant production.

Symptoms of Mg deficiency will appear first on the lower older foliage. However, the symptoms can take a variety of forms. Magnesium is a mobile element and can be translocated from the lower leaves (source) to new developing portions of the plant (sinks) such as flowers, fruit, or new expanding foliage. Most commonly observed is interveinal chlorosis of the lower foliage (Fig. 1), which expands over time to entire leaf chlorosis (Fig. 2). In advanced stages, necrotic spotting will develop and leaf drops may occur. On some species, such as tomatoes, dark purple spotting can be observed (Fig. 3). These symptoms can mimic the traditionally reported symptoms of phosphorus (P) deficiency and low pH-induced iron (Fe) and manganese (Mn) toxicity. As a result, it is important to confirm your diagnosis with tissue and or substrate analysis. Generally, a sufficiency range of 0.15 to 0.40% Mg is reported for most species.



Figure 2. Symptom progression of interveinal chlorosis can be seen here with cineraria (A to C). (Photos: Brian Whipker)



Figure 3. While interveinal chlorosis is the most common magnesium deficiency symptom, purple discoloration as a result of Mg deficiency has been reported for some crops such as tomatoes. (Photo: Patrick Veazie)

Corrective Procedures for Mg Deficiency

Epsom salts (magnesium sulfate) can be applied at a rate of 2 pounds per 100 gallons of water applied as a 10% flow through leaching irrigation. This will halt the progression of symptoms but will not reverse any necrosis that has already occurred. For growers utilizing fertilizers that do not include Mg (such as 20-10-20) and do not have adequate Mg in their water supply, a monthly application of Epsom salts at 1 pound per 100 gallons can be used to green up plants and avoid deficiencies.

Maintaining adequate Mg is important for plant growth. Knowing how the inputs of your water supply, lime charge, and fertilizer regime will help you meet the needs of the plant and avoid deficiencies.

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