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Volume 14 Number 20 April 2025

## Monitoring Magnesium: *Late season considerations*

*Magnesium is a common nutrient deficiency that can occur later in the growing season if supplemental magnesium is not supplied.*

Deficiencies can occur as a result of many factors (Fig. 1). The propensity for Mg deficiency problems varies by geographical area. In much of North America, adequate magnesium (Mg) concentrations of 25-50 ppm Mg are 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.



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)

### Pure Water Problem

In areas lacking magnesium (Mg) in the water supply, dolomitic limestone can provide adequate Mg concentration through most of the season. 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

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be the case when growers utilize a fertilizer such as 20-10-20 (N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O), a fertilizer that does not supply calcium or magnesium, and also rely on the Mg from the dolomitic limestone during spring bedding plant production.

### A Calcium Challenge, Not a Magnesium Problem

The top nutritional problem to avoid with geraniums is pH drop. This results in lower leaf bronzing and necrosis (Fig. 2). One of the management strategies is to provide extra lime to keep the substrate pH >6.0. With loading up with all of this lime, it results in excessive calcium (Ca) being available to the plant. The cations potassium (K), calcium (Ca) and magnesium (Mg) must be kept in a 4:2:1 ration to retain balanced uptake. If one of those elements is provided in excess, it can result in limiting (antagonizing) uptake of another one. Usually Mg is the one that loses. It is common to see the lower leaves of geraniums exhibiting Mg deficiency symptoms even if it is applied at recommended rates (Fig. 3). In this case, it is a Mg deficiency induced by excessive Ca. If this occurs, consider dialing back the amount of Ca supplied to the plant, but do not go too low as to induce low pH problems. Thus, conducting PourThru pH testing will aid in determining if this strategy is working. An additional Mg dose may help too. In either way, a few Mg deficient leaves are better than a catastrophic situation of low substrate pH on geraniums.

### Deficiency Symptomology

Magnesium deficiency symptoms first appear as an interveinal chlorosis of the lower foliage (Fig. 4). As symptoms progress, entire leaf chlorosis may be observed (Fig. 5), and in severe cases,



Figure 2. Low substrate pH induced bronzing on geraniums which can resemble a magnesium deficiency. (Photo: Brian Whipker)



Figure 3. Excessive calcium applications made to avoid low pH drop can limit magnesium uptake, even if ample magnesium is supplied. (Photo: Brian Whipker).



Figure 4. Lower leaf interveinal chlorosis is the most commonly observed initial magnesium deficiency symptom.

necrosis develops. On some species, such as tomatoes, dark purple spotting can be observed (Fig. 6). 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.

### Magnesium Management

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.

### Summary

Magnesium is an essential element that must be supplied to plants. Often times the Mg available in dolomitic limestone does not provide an adequate season long supply if the irrigation water does not contain >25 ppm Mg. Therefore test your water to determine your Mg level and then devise a fertilizer plan that helps you meet the plant's Mg demand.



Figure 5. In advanced stages, symptoms may progress from chlorosis to necrosis if a magnesium deficiency is not corrected. (Photo: Patrick Veazie)



Figure 6. 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)

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