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Nutritional Monitoring Series: Element Edition

Magnesium (Mg)

Function: Magnesium is essential for photosynthesis and part of the chlorophyll molecule. Helps with enzyme activation needed for growth.

Deficiency: Initially developing as an interveinal chlorosis (yellowing) of older, lower leaves (Figs. 1-3). Upward curl of the



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Figure 1. Lower leaf interveinal chlorosis is the primary sign of a magnesium deficiency. Photo by: Brian Whipker.

Elemental Parameters

Mobile Element:
Deficiency symptoms appear on older growth

Function:
Photosynthesis, chlorophyll molecule and enzyme activation

Target Fertilizer Range:
50 to 75 ppm Mg
Supplied from fertilizer or irrigation water

Magnesium

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Figure 2. A magnesium deficiency can result in lower leaf chlorosis and marginal leaf necrosis. Photo by: Brian Whipker.

leaves is also possible. With advanced conditions, the leaves turn from chlorotic to necrotic (dead, brown tissue). A corrective fertilization with Mg will return the chlorotic tissue to the normal green color within 1 to 2 weeks. It is important to correct a Mg deficiency when symptoms first appear because necrotic spots cannot be reversed. Magnesium is a mobile element within the plant; therefore, deficiency symptoms will first appear on the lower, older leaves.

Excess: Can reduce uptake of potassium (K) and calcium (Ca).

Misdiagnosis With:

- a. Potassium deficiency. Conduct leaf tissue analysis to determine levels.
- b. Heavy K or Ca applications can induce magnesium deficiencies. Conduct leaf tissue analysis to determine levels.
- c. Insufficient Mg being supplied to the plant. Was calcitic limestone rather than dolomitic limestone used to adjust the pH?

d. Excessive leaching of the dolomitic limestone from the substrate can lead to Mg deficiencies over time.

e. High levels of sodium (Na) in the irrigation water can inhibit Mg uptake by the plant. Conduct leaf tissue analysis to determine levels.

Confirm your actual Mg levels by conducting a routine root substrate (medium) test and/or a plant tissue analysis.

Monitoring and Management Strategy for Magnesium

Fertilization Rate: Provide or target 50 to 75 ppm constant liquid fertilization rate.

Ratio: Potassium fertilization rates >200 ppm or Ca can have an antagonistic effect on Mg uptake by the plant. Supplying the plants with a K : Ca : Mg ratio (ppm) of 4 : 2 : 1 will limit any antagonisms.



Figure 3. Heuchera also can develop magnesium deficiency symptoms of lower leaf interveinal chlorosis when it is deficient. Photo by: Brian Whipker.

Tissue Concentration: The normal Mg range is between 0.3 to 1.0%. Magnesium levels below 0.2% are considered deficient. Magnesium concentrations greater than 1.0% can occur in greenhouse production if elevated levels of Mg are supplied through the groundwater or fertilizer program.

Options:

Preplant: Application of dolomitic limestone.

Irrigation Water: Magnesium in irrigation water (test water to determine available levels). Supplement with additional Mg in your fertilization program.

Continual Fertilization:

1. Use a fertilizer that provides Mg. Examples include 13-2-13 Cal-Mag, 15-5-15 Cal-Mag and others. Calculate the ppm of Mg provided and make monthly supplemental applications if required.

2. Monthly magnesium sulfate [Epsom salts; $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$] applications at the rate of 1 pound per 100 gallons of water. Do not mix with other fertilizers.

3. Common fertilizers like 20-10-20 and 20-20-20 do not provide Mg [or calcium (Ca)]. If using 20-10-20 or 20-20-20, alternate monthly with supplemental magnesium sulfate (Epsom salts) applications as recommended above. Also, apply supplemental Ca.

Corrective Fertilization:

1. Magnesium sulfate (Epsom salts) application at the rate of 2 pounds per 100 gallons of water. Do not mix with other fertilizers. A corrective fertilization of Mg will return the chlorotic tissue to the normal green color within 1 to 2 weeks. Do not over apply. It is important to correct Mg deficiency when symptoms first appear because necrotic spots cannot be reversed.

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