e-GRO Alert



Brian E. Whipker[1] Josh Henry[1] W. Garrett Owen[2]

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Lower Leaf Interveinal Chlorosis:

A Pictorial Guide When Magnesium is Limited

Magnesium (Mg) is sometimes a forgotten element. In many areas of North America, adequate Mg is available in the groundwater used for irrigation. Concentrations of 25 to 50 ppm Mg are sometimes available and provide adequate levels for plants growth. In addition, supplemental Mg is also supplied via the dolomitic limestone used to adjust the substrate pH. But not all growing locations are blessed with a supply of Mg.

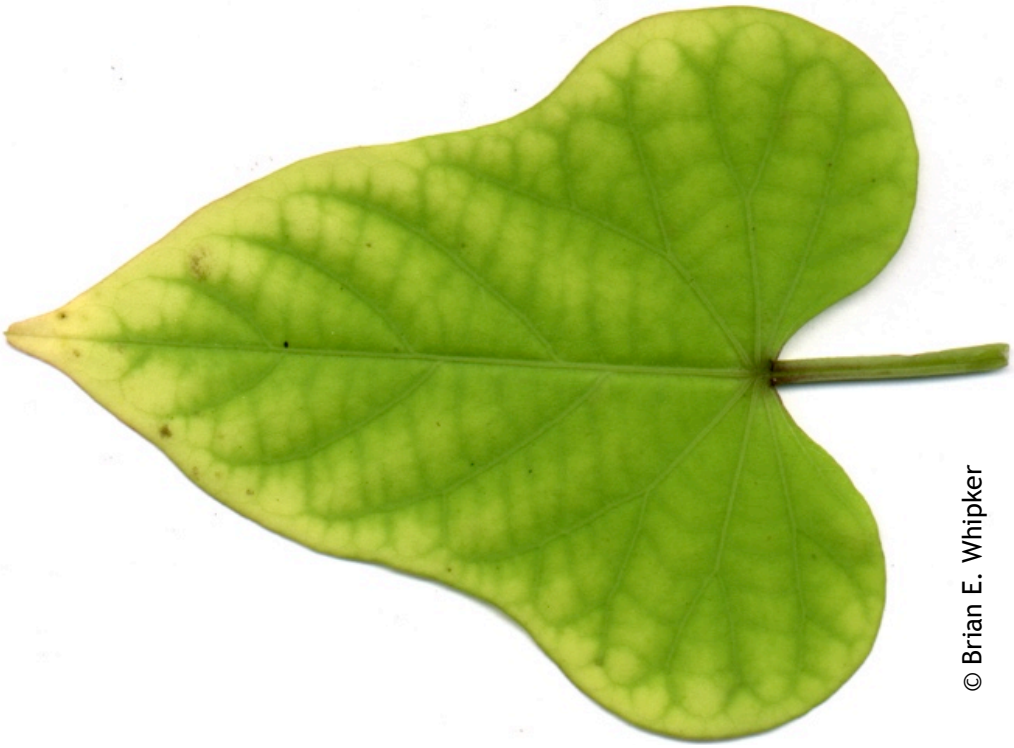

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Figure 1. Typical symptomology of a magnesium deficiency is interveinal chlorosis (yellowing) of the lower leaves.

[1]NC State University
bwhipker@ncsu.edu
[2]Michigan State University
wgowen@msu.edu

Deficiencies can occur due to a number of factors. In areas without Mg in the irrigation water, of course the free source is lacking. We have observed in these locations that the level of Mg supplied by the dolomitic limestone will provide adequate levels of Mg through 50 to 75% of the season, after that time, symptomatic leaves start to be noticed (Fig. 1). This is especially true during warm springs when the plants are irrigated more frequently and the Mg is most likely leached from the substrate.

Magnesium uptake is also affected by other elements. In general the recommendation is to target a 4:2:1 ratio of potassium (K) to calcium (Ca) and Mg. This helps avoid antagonisms that limit the plant's ability to uptake adequate levels of any one of these elements. Antagonistic situations are commonly observed with crops such as tomatoes in which high levels of Ca are provided to avoid blossom end rot or with geraniums in which high levels of dolomitic limestone or flowable lime are

Figure 2. The initial symptom of a magnesium deficiency begin as faint interveinal chlorosis (yellowing) of the lower leaves (*Alocasia* 'Maharani').

Figure 3. Interveinal chlorosis (yellowing) expands between the veins of the older leaves as magnesium deficiency symptoms progress (*Alocasia* 'Maharani').

Figure 4. Brown (necrotic) spotting on the lower leaves is observed with advanced symptomology when magnesium is deficient (*Alocasia* 'Maharani').

Figure 5. On tomatoes, the dark spotting is a dark purplish-black coloration. It can be confused with low substrate pH symptoms.

Figure 6. Initial signs of a magnesium deficiency symptoms on the lower leaves of pot mums.

added to avoid pH drop of the substrate. These elevated levels of Ca limit the uptake of Mg and plants often develop deficiency symptoms.

Symptoms

Symptomology of Mg deficiency occurs on the lower, older leaves. That is because Mg is a mobile element, and if Mg is limit in the plant, it will be translocated to the new tissue if required. Typical symptomology is lower leaf interveinal chlorosis (yellowing). A few areas of the leaves develop a slight interveinal chlorosis (Fig. 2), which expands over time (Fig. 3). With advanced symptoms, necrotic (brown) spotting will develop (Fig. 4). On some species, especially tomatoes, the dark spotting will be a dark purplish black (Fig. 5). This can be confused with low pH induced iron (Fe)/manganese (Mn) toxicity (generally when the substrate is below pH 5.5). So it is important to confirm your diagnosis with a substrate and/or tissue test. In general, the sufficiency range for Mg is between 0.15 to 0.40%, but can vary with species. To help you identify Mg deficiencies, the gallery of symptomology is provided (Figs 6-12).

Corrective Procedures

The fix for a Mg deficiency is easy. Epsom salts (magnesium sulfate) can be applied at the rate of 2 pounds per 100 gallons of water (2.4 kg/1000L). Apply this as a 10% flow through leaching irrigation. This will stop the progression of symptoms, but will not reverse any necrotic spotting. For areas which lack sufficient Mg in their irrigation water and Mg is not part of the regular fertilization program (ie: 20-10-20 does NOT contain Mg), monthly applications of Epsom salts at the rate of 1 pound per 100 gallons of water (1.2 kg/1000L) is the common production practice to green up plants and avoid deficiencies.

Figure 7. Advanced symptoms of a magnesium deficiency with brown (necrotic) spotting on the lower leaves of mums.

Figure 10. Gerbera can develop interveinal chlorosis on both the lower foliage (a magnesium deficiency) and the upper leaves (a high pH induced iron deficiency), so it is important to determine where on the plant symptoms are developing.

Figure 8. Advanced symptoms of magnesium deficiency on Euphorbia.

Figure 11. Lower leaf interveinal chlorosis caused by a magnesium deficiency on poinsettia.

Figure 9. Geraniums often develop a magnesium deficiency as a result when excess calcium is being supplied to the crop to prevent a substrate pH drop.

Figure 12. Rudebeckia with advanced symptoms of a magnesium deficiency.

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CONTRIBUTORS

Dr. Nora Catlin
Floriculture Specialist
Cornell Cooperative Extension
Suffolk County
nora.catlin@cornell.edu

Dr. Chris Currey
Assistant Professor of Floriculture
Iowa State University
ccurrey@iastate.edu

Dr. Ryan Dickson
Extension Specialist for Greenhouse Management & Technologies
University of New Hampshire
ryan.dickson@unh.edu

Thomas Ford
Commercial Horticulture Educator
Penn State Extension
tgf2@psu.edu

Dan Gilrein
Entomology Specialist
Cornell Cooperative Extension
Suffolk County
dog1@cornell.edu

Dr. Joyce Latimer
Floriculture Extension & Research
Virginia Tech
jlatime@vt.edu

Heidi Lindberg
Floriculture Extension Educator
Michigan State University
wolleage@anr.msu.edu

Dr. Roberto Lopez
Floriculture Extension & Research
Michigan State University
rglopez@msu.edu

Dr. Neil Mattson
Greenhouse Research & Extension
Cornell University
neil.mattson@cornell.edu

Dr. W. Garrett Owen
Floriculture Outreach Specialist
Michigan State University
wgowen@msu.edu

Dr. Rosa E. Raudales
Greenhouse Extension Specialist
University of Connecticut
rosa.raudales@uconn.edu

Dr. Beth Scheckelhoff
Extension Educator - Greenhouse Systems
The Ohio State University
scheckelhoff.11@osu.edu

Lee Stivers
Extension Educator - Horticulture
Penn State Extension
Washington County
ljs32@psu.edu

Dr. Paul Thomas
Floriculture Extension & Research
University of Georgia
pathomas@uga.edu

Dr. Ariana Torres-Bravo
Horticulture/ Ag. Economics
Purdue University
torres2@purdue.edu

Dr. Brian Whipker
Floriculture Extension & Research
NC State University
bwhipker@ncsu.edu

Cooperating Universities

Cornell University
Cornell Cooperative Extension Suffolk County
University of New Hampshire Cooperative Extension
PennState Cooperative Extension College of Agricultural Sciences
Virginia Tech
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