e-GRO Alert


Brian E. Whipker[1] Patrick Veazie[1]

Volume 13 Number 38 July 2024

Zinnia: Missing Magnesium

Lower leaf interveinal chlorosis on zinnias was observed. This was due to limited magnesium (Mg) in the water supply and the leaching of Mg from the lime charge over time due to frequent summer irrigations.

Figure 1. The typical symptomology of a magnesium deficiency is an interveinal chlorosis (yellowing) of the lower leaves. (Photo: Brian Whipker)

Summer production of plants can lead to unique symptomology that is not typical during other times of the year. Because magnesium (Mg) is a mobile element, and if Mg is limited in the plant, it will be translocated from the older leaves to the new tissue if required. Zinnia plants then can develop lower leaf interveinal chlorosis (yellowing) (Figs. 1-2). With advanced symptoms, necrotic (reddish-brown) spotting can also appear (Fig. 3). This can be confused with low pH induced iron (Fe)/manganese (Mn) toxicity (Fig. 4) which occurs 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.

[1]NC State University, Dept. of Hort. Science
bwhipker@ncsu.edu

Magnesium 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 plant growth. In addition, supplemental Mg is also supplied via the dolomitic limestone used to adjust the substrate pH. However not all growing locations are blessed with a supply of Mg.

Figure 2. As symptoms progress, larger areas develop interveinal chlorosis and necrotic spotting occurs. (Photo: Brian Whipker)

Deficiencies can occur due to several 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. This is especially true when plants are grown during warm springs or summers when the plants are irrigated more frequently and the Mg is most likely leached from the substrate.

Figure 3. With advanced symptoms, necrotic (reddish-brown) spotting can also develop when magnesium is deficient. Photo: Brian Whipker)

Magnesium uptake is also affected by other elements. In general, the

Figure 4. Symptomology of a magnesium deficiency can be confused with low pH (<5.5) induced iron (Fe)/manganese (Mn) toxicity seen here. (Photo: Brian Whipker)

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

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 that 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.

Conclusion

Magnesium deficiency of zinnias can occur when Mg is limited. This is especially true if Mg is lacking in your water supply, supplemental Mg is not provided, or excessive Ca or K applications antagonize Mg uptake.

e-GRO Alert

www.e-gro.org

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
Greenhouse Horticulture and
Controlled-Environment Agriculture
University of Arkansas
ryand@uark.edu

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

Dr. Chieri Kubota
Controlled Environments Agriculture
The Ohio State University
kubota.10@osu.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
Sustainable Greenhouse & Nursery
Systems Extension & Research
The Ohio State University
owen.367@osu.edu

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

Dr. Alicia Rihn
Agricultural & Resource Economics
University of Tennessee-Knoxville
arihn@utk.edu

Dr. Debalina Saha
Horticulture Weed Science
Michigan State University
sahadeb2@msu.edu

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

Dr. Jean Williams-Woodward
Ornamental Extension Plant Pathologist
University of Georgia
jwoodwar@uga.edu

Cooperating Universities

Cornell CALS College of Agriculture and Life Sciences

Cornell Cooperative Extension Suffolk County

UTIA Institute of Agriculture The University of Tennessee

Iowa State University

College of Agricultural & Environmental Sciences University of Georgia

UConn

UofA Division of Agriculture Research & Extension University of Arkansas System

Michigan State University

NC State University

Purdue University

The Ohio State University

In cooperation with our local and state greenhouse organizations

Maumee Valley Growers — Choose the Very Best.

Metropolitan Detroit Flower Growers Association — Metro Detroit Flower Growers Association

NC Flower Power

Western Michigan Greenhouse Association

Connecticut Greenhouse Growers Association

Indiana Flower Growers Association

LIFGA

Cincinnati Flower Growers Association

Michigan Greenhouse Growers Council

NYSFI New York State Flower Industries, Inc.