e-GRO Alert


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

Volume 13 Number 43 August 2024

Maintaining Manganese: Pronounced Veination of Young Geranium Leaves

Summer hold-over plants offer the opportunity to view unique symptomology that rarely appears when plants are continually fertilized. Extensive veination of the young leaves is an unique characteristic of manganese deficiency in geraniums.

Figure 1. Pronounced "netted" veination occurs when manganese is limited. (Photo: Brian Whipker)

Over the past few years, we have induced nutritional disorders on several species. These controlled experiments have allowed us to view unique symptomology on plants. In greenhouse production, observing common problems on geraniums is fairly routine, such as low pH, high pH, nitrogen deficiency, and magnesium deficiency. Rarer to appear are some of the micronutrient deficiencies.

On a recent extension trip, we inspected some geranium plants with unique leaf symptomology. The young leaves had pronounced veination (Figs. 1-3). The small veins popped out. The more typical high pH-induced iron deficiency symptoms result in wider

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

bands of chlorotic tissue between the green veins (Fig. 4). Because of our prior research work, we had a pretty good idea that we were observing a manganese (Mn) deficiency.

Confirmation of Diagnosis

Confirming a Mn deficiency diagnosis with leaf tissue analysis is required for this rare event. We ran a leaf tissue analysis at the NCDA&CS lab and found Mn to be 30.5 ppm. This concentration is low according to the standards published in the Plant Analysis Handbook (normal range is 40 to 325 ppm).

Corrective Procedures

Given that these white cultivar plants were being held and were destined for the compost in a week or so, it was not a major production problem. Most likely the fertilizer charge had run out and that was why deficiency symptoms appeared.

The easy fix would be to provide normal fertilization with micros to help increase the supply. In addition, making sure that the substrate pH was not too high would help.

If it was a major problem, manganese chelate would be an option to use. Please note: if the substrate pH was low (<5.5), a Mn application would most likely result in excess Mn uptake and iron/manganese toxicity symptoms developing on the lower leaves.

Conclusion

Given enough time and the right conditions, even less common micronutrient deficiencies can appear on a crop. When symptoms appear, be sure to check the roots, and substrate pH, and submit a leaf tissue sample to help diagnose the situation and then plot correction steps.

Figure 2. Multiple leaves with manganese deficiency symptoms. (Photo: Brian Whipker)

Figure 3. Symptoms only occurred on a single white cultivar. (Photo: Brian Whipker)

Figure 4. In comparison, when high substrate induced iron (Fe) deficiency symptoms develop the main veins remain green while the interior tissue develops an overall chlorosis. (Photo: Brian Whipker)

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

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.

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.