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Brian E. Whipker
bwhipker@ncsu.edu
Joshua Henry

Pericallis:
Diagnosing Lower Leaf Yellowing and Necrosis

Possible causes of lower leaf yellowing and necrosis on cineraria (Pericallis x hybrida) due to low substrate EC, low pH, and drought stress are discussed.

A number of growers are producing pericallis for early spring color. On a recent visit to a greenhouse, lower leaf yellowing and reddish-tan spotting were observed (Fig. 1). In severe cases, the symptoms moved inward and the leaf margin because necrotic (Fig. 2&3). The plants were just starting to bloom and only one block of plants were affected. Other blocks appeared to have normal green lower leaves.

A pourthru test was conducted. The electrical conductivity (EC) value was: 0.27 mS/cm. The EC was on the lower end of the spectrum for plants beginning to flower. Low fertility levels can certainly result in lower leaf yellowing and necrosis.

The pH value was 4.2. This was on the low side of the recommended range of 5.5 to 6.0 suggested by Suntory for the Senetti series. Based on testing other crops over the years, it has been observed when the substrate pH drops below the 5.2 to 5.4 range, lower leaf spotting can occur. These observed problem situations were also linked with another stress event with the crop, which slows or stalls plant growth. In this case, the plants were being

Figure 1. Reddish-tan spots appear on the lower foliage of pericallis when the substrate pH drops below the recommended range of 5.5 to 6.0.
Photo by Brian Whipker

toned with cooler growing conditions, low fertility, and they were being grown on the dry side. Water stress can also result in lower leaf loss and necrosis.

A tissue sample was submitted for nutrient analysis. There are no published recommended ranges for tissue analysis based on reading five major resources. While at NC State University, Dr. Jared Barnes' M.S. thesis work involved investigating nutrient deficiencies on 'Jester Pure Blue' pericallis. For the complete fertility control plants used in his study, iron levels were reported at 85.1 ppm and manganese at 116.4 ppm. The iron levels were found to be at 164 ppm and manganese at 439 ppm in the problem plants at the grower. So the tissue values with the problem plants were 2X higher for iron and around 4X higher for manganese. Both the pourthru pH values and tissue analysis support that the problem could be a low substrate pH induced iron/manganese toxicity.

The final diagnosis is still a little unclear with this sample. Three factors, low pH, low EC, and drought stress, can all result in lower leaf yellowing and necrosis. The tissue iron and manganese levels were on the higher end of what would be a recommended range for most species. Therefore, the substrate pH needs to be increased to the 5.5 to 6.0 range.

Drought stress should be avoided as a method of controlling plant growth.

Figure 2. As symptoms advance, discoloration moves inward.
Photo by Brian Whipker

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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

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

Dr. Roberto Lopez
Floriculture Extension & Research
Purdue University
rglopez@purdue.edu

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

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

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

Heidi Wollaeger
Floriculture Outreach Specialist
Michigan State University
wolleage@anr.msu.edu

Figure 3. Most of the lower leaves can become discolored with advanced symptoms.
Photo by Brian Whipker

The fertilization rate should be maintained at a higher level to make sure nutrients are adequate for this plant. Tissue N, P, and K levels were 2.96% N, 0.18% P and 3.01% K in the problem plant sample, while much higher levels of 6.96% N, 1.02% P, and 8.68% K were reported by Barnes in his study for plants provided with normal fertilization.

pH Management

Monitor pericallis to make sure that the substrate pH is within the recommended range of 5.5 to 6.0. Higher levels can lead to high pH induced iron chlorosis. The added stress of growing the plants cool can sometimes lead to problems.

One possible reason for this is that all fertilizers are acidic when mixed. The acidic affect of the fertilizer can have a greater influence on lowering the substrate pH than the acidic/basic reaction than occurs with nutrient uptake by the plant.

pH Corrective Procedures

Corrective procedures for low pH are listed below. Switching to a basic fertilizer when the substrate pH is nearing the lower limit will help stabilize the pH. If the pH is below the recommended range, then corrective procedures will need to be implemented. Flowable lime is one option. Typically a rate of 2 quarts per 100 gallons of water will increase the substrate pH by roughly 0.5 pH units. Two quarts can be used through the injector. Additional applications can be made if needed.

Potassium bicarbonate can also be applied. The rate of 2 pounds per 100 gallons of water will increase the substrate pH by roughly 0.8 pH units. This treatment will also provide excessive potassium and cause a spike in the substrate electrical conductivity (EC). So the following day a leaching irrigation with clear water is required to restore the nutrient balance (the ratio of K:Ca:Mg) and lower the EC level. As always, remember to recheck your substrate pH to determine if reapplications are needed.

Flowable Lime

Use 1 to 2 quarts per 100 gallons of water.

Rinse foliage.

Avoid damage to your injector by using rates of 2 qts per 100 gal of water, or less

Can split applications

Hydrated Lime

Mix 1# in 3 to 5 gal of WARM water. Mix twice. Let settle. Decant liquid and apply thru injector at 1:15.

Caustic (rinse foliage ASAP and avoid skin contact)

Potassium Bicarbonate ($KHCO_3$)

Use 2 # per 100 gal of water

Rinse foliage ASAP

Provides 933 ppm K

Leach heavily the following day with a complete fertilizer to reduce EC levels and restore nutrient balance.

Rates greater than 2 # per 100 gal of water can cause phytotoxicity!

Reference:

Barnes, J., B.E. Whipker, I. McCall and J. Frantz. 2011. Characterization of nutrient disorders of *Piricallis xhybrida* 'Jester Purple Blue'. Acta Hort. (ISHS) 891:67-76.