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Don’t Let Winter Weather Bring Your Pansies Down


Patrick Veazie

Luke Finn

Brian E. Whipker
bwhipker@ncsu.edu

Winter weather conditions can potentially result in an accumulation of fertilizer salts in the substrate and subsequently the substrate pH falling below optimal levels. Monitoring substrate pH and EC during production is critical to preventing potential toxicities.

Spring Pansies are one of the most popular cool-season crops for greenhouse and outdoor bedding plant production. Weather changes often bring significant changes in plant needs and, therefore, production practices. Cold temperatures and low light conditions can reduce water uptake rates, resulting in reduced nutrient demand, potentially resulting in saturated root zones and increasing electrical conductivity (EC) if production practices are not adjusted.


Figure 1. Low substrate pH exhibits lower leaf bronzing and blackening due to increased iron and manganese availability. (© Patrick Veazie)

Recently, a group of pansies was observed exhibiting stunted growth and lower leaf blackening (Fig. 1-3). After further inspection, the substrate pH was 3.9 with an EC of 4.82. The lower leaf blackening is the result of an iron (Fe) and manganese (Mn) toxicity due to an increased availability due to low substrate pH. The recommended substrate pH and PourThru EC values for pansies are 5.5 to 5.8 and 1.3 to 2.0 mS/cm, respectively.

While this was a later pansy crop compared to other fall pansies, the growing practices had not been adjusted to match the current crop's demands. Pansies grown earlier in the fall in warmer conditions will reach marketable size sooner and will require a greater fertility rate and watering frequency. It is important to match both the fertilizer type, rate, and irrigation frequency to prevent the substrate from decreasing below optimal values.

Fertilizers can be broadly classified as acidic, neutral, or basic depending on their effect on substrate pH. This reaction is largely determined by the proportion of nitrogen supplied as nitrate (NO_3^-) versus ammoniacal nitrogen (NH_4^+). Acidic fertilizers contain a greater concentration of NH_4^+, which acidifies the substrate as plants take up NH_4^+ and release hydrogen ions. Neutral fertilizers provide a balanced mix of nitrate and ammonium, resulting in minimal net pH change when plant uptake matches the fertilizer supply. In contrast, basic fertilizers are dominated by NO_3^-, which tends to raise substrate pH because plants release hydroxyl or bicarbonate ions during nitrate uptake. Additionally, pansies are reported to exhibit ammonium toxicity, which is generally observed in colder weather conditions. During winter months, changing to a greater nitrate concentration is recommended to promote optimal plant growth and maintain substrate pH within the recommended range. The fertilizer type relies on the biological reaction to influence the substrate pH; however, the fertilizer rate is also an important factor in managing substrate pH.

When the fertilizer rate matches plant uptake, substrate pH tends to remain stable. However, when fertilizer rates exceed uptake, substrate EC begins to rise. As EC increases, substrate pH declines, creating an inverse relationship between the two. This drop in pH occurs because fertilizer solutions are inherently acidic, and only through biological uptake can pH be moderated. In winter, reduced uptake magnifies this imbalance, making pansies particularly vulnerable to low pH and subsequent micronutrient toxicities. Selecting the correct fertilizer rate requires consideration of crop stage and seasonal conditions. Young plugs or transplants require different concentrations than actively growing, established plants.

Figure 2. Progression of lower leaf bronzing and blackening due to increased iron and manganese availability. (© Patrick Veazie)

Figure 3. Stunted growth is another common low pH symptom observed (right) when substrate pH fell below the optimal range, compared to plants within the optimal substrate pH range of 5.5 to 5.8 (left). (© Patrick Veazie)

Routine monitoring of substrate pH and EC is therefore essential. Keeping EC within recommended ranges helps prevent pH drift, reduces the risk of iron and manganese toxicity, and ensures consistent crop quality throughout the winter production cycle.

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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

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. 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
Extension Plant Pathologist
University of Wyoming
jwilwood@uwyo.edu

Cooperating Universities

Cornell CALS College of Agriculture and Life Sciences

Cornell Cooperative Extension Suffolk County

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