e-GRO Alert




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Pansy: Lower Leaf Purplish-Black Spotting

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Low substrate pH-induced micronutrient (iron/ manganese) toxicity of pansies is typically observed as lower leaf purplish-black spotting.

Pansies (*Viola* × *wittrockiana*) are a major spring and fall bedding plant crop with millions of plants grown for the North American market. On a recent visit to a greenhouse, purplish-black spotting on the lower leaves was observed (Fig. 1). In severe cases, the entire leaf exhibited dense darker regions (Fig. 2) and pale yellow discoloration (Fig. 3). The flowering pansy crop had been transplanted in the fall grown cool, and were past the optimal stage of production.

A PourThru was conducted on a few plants. The electrical conductivity (EC) values were low at 0.43 mS/cm. The EC was on the lower end of the optimal range of 1.3 to 2.0 mS/cm, but adequate for plants being held. Substrate pH of 5.1 was determined. This is on the low side with the optimal substrate pH ranging between 5.5 to 5.8. For more information about pansy nutritional monitoring, refer to factsheet: Nutritional Monitoring of Pansy. Based on testing other pansy crops over the years, it has been observed when the substrate pH drops below the 5.0 to 5.2 range, purplish-black spotting can occur. It is also usually linked with another stress event with the crop, which slows or stalls plant growth. In this case, the plants were being toned with cooler growing conditions and low fertility. Rarely do actively growing pansy plants within the normal 5 to 8 week production cycle stall and experience low pH problems.

Figure 1. Lower leaves of pansy plants exhibiting purplish-black spotting due to low substrate pH. Symptoms typically appear when the substrate pH is 5.0 or below. Photo by: Brian Whipker.

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A tissue sample was submitted for nutrient analysis. The recommended range for pansies is 30-300 ppm iron (Fe) and 25-300 ppm manganese (Mn). Elevated levels of Fe (3640 ppm, >12X higher than the upper limit of the recommended range) and Mn (3050 ppm, >10X higher than the upper limit of the recommended range) were determined in the leaf tissue of the symptomatic pansies.

Figure 2. Lower leaves of pansy plants turning purplish-black due to low substrate pH. Plants were grown for a longer period of time and held over the winter. Photo by: Brian Whipker.

Both the PourThru pH values and tissue analysis confirm that the symptoms were a result of low substrate pH-induced Fe/Mn toxicity.

Figure 3. Another example of pansies with lower leaf purplish-black discoloration due to low substrate pH. Plants were held for a prolonged period of time. Photo by: Brian Whipker.

Management

Monitor pansy crops to ensure that the substrate pH is within the recommended range of 5.5 to 5.8. Stress from cool growing or finishing/toning temperatures can sometimes lead to problems. One possible reason is that almost all fertilizers are acidic when mixed. The acidic effect of the fertilizer can have a greater influence on lowering the substrate pH than the acidic/basic reaction that occurs with nutrient uptake by the plant. If plant growth stalls, the acidic impact of the fertilizers will then drive down the substrate pH. If this trend continues, the substrate can quickly drop below the desired pH range.

Corrective Procedures
Corrective procedures for low pH are provided below and in Table 1:

Management Through Fertility
Switching to a basic fertilizer when the substrate pH is nearing the lower limit (pH 5.5) will help stabilize the pH. If the pH is below the recommended range, then corrective action will need to be implemented.

Management Through Liming
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. A maximum of two quarts can be used through the injector. Additional applications can be made if needed. Hydrated lime applications are a tried and true method of increasing the pH. 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. Note, rinse the foliage of the plants immediately after applying the potassium bicarbonate solution. 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.

Table 1. Low substrate pH correction options.

Corrective Measure	**Application Rates**	**Logistics**
Liming	Use 1 – 2 quarts per 100 gallons of water	Rinse Foliage Can Use Split Applications
Hydrated Lime	1 lb. in 3 – 5 gal. warm water	Mix twice then let settle and decant. Apply the decanted solution at a 1:15 through injector. Caution very caustic and will burn. Rinse the foliage
Potassium Bicarbonate	2 lbs. per 100 gallons of water	Rinse foliage if splash occurs. Provides high amount of potassium (K), leach heavily 24 hrs. after application

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