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Streptocarpus: Lower Leaf Purplish-Black Discoloration

The first report of low substrate pH induced micro-nutrient toxicity is discussed on streptocarpus (Streptocarpus xhybridus).

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During a grower visit, came across a crop of streptocarpus (*Streptocarpus xhybridus*) plants with lower leaf purpling (Figures 1 and 2). The cultivar was 'Scarlet'. The initial reaction was the lower leaf purpling was the result of a phosphorus (P) deficiency. On the opposite side of the bench was a blue cultivar. The leaf discoloration was slightly different with more of a purplish-black appearance (Figure 3). The purplish-black coloration appeared on both the top and bottom (Figure 4) of the leaf. Leaf spots such as this are more typical when the substrate pH is too low.

Figure 1. Purple leaf discoloration on the lower foliage of streptocarpus due low substrate pH induced iron/manganese toxicity. This symptom may be mistaken for phosphorus deficiency.

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Figure 2. Close up of purple leaf discoloration on the lower foliage of streptocarpus. This photograph was from a second grower's location.

To determine the cause, a pH and EC test was conducted using the PourThru method. The PourThru EC was at 1.26 mS/cm and when converted saturated media extraction (SME) values it would be 1.89 mS/cm. Uhl (2012) recommended a SME EC between 0.8 to 1.0 mS/cm. So the EC was higher than desired.

The substrate pH provided a key to the problem, because it was 4.5. The recommended pH range varies. Dole and Wilkins (2005) recommended 5.5 to 6.0, Uhl (2012) suggests keeping the pH at 6.0, while Oglevee stated a wide range of 5.5 to 7.0 would work and 5.6 was optimal.

To provide more concrete proof to confirm this was a low pH induced problem, a tissue sample was taken from the affected plant and analyzed for nutrient levels (Table 1). The sample was collected from the lower foliage (LL) that exhibited the black spotting. Analysis of the LL sample detected an iron (Fe) concentration that was four times higher when compared to the recommended

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range reported by Dole and Wilkins (2005). Manganese (Mn) was also higher than the recommended range. It is also interesting to note that the P levels reported with this sample exceeded the recommended range, which indicates that P was not low.

Elevated Fe and Mn levels can result in lower leaf black spotting in many other species such as gerbera, dahlia, fuchsia, and zinnia.

Additional Streptocarpus Production Information

Dole, J. and H. Wilkins. 2005. Streptocarpus, p. 874-877. In: Floriculture Principles and Species, 2nd Ed., Prentice-Hall, Upper Saddle River, NJ

Oglevee (anonymous). 1994. Growers Notebook: Streptocarpus. Greenhouse Manager, 13(5):8. July 1994.

Uhl, R. 2012. Crop culture reports: Streptocarpus Ladyslippers series. http://www.gpnmag.com/crop-culture-report-streptocarpus-ladyslippers-series

Table 1. Leaf tissue nutrient analysis results for streptocarpus.

Element	Most Recently Matured Leaves (MRML)[1]	Lower Leaves (LL) with Black Spotting Symptoms
Nitrogen (%)	2.0-3.5	2.15
Phosphorus (%)	0.1-0.7	1.11
Potassium (%)	4.8-5.5	4.53
Calcium (%)	1.2-1.9	1.13
Magnesium (%)	0.3-0.5	0.41
Sulfur (%)	not reported	0.15
Sodium (%)	not reported	0.11
Iron (ppm)	90-260	**1030**
Manganese (ppm)	130-300	351
Zinc (ppm)	85-130	96.8
Copper (ppm)	15-20	19.7
Boron (ppm)	55-65	33.9

[1] *Source: Dole and Wilkins, pg 118.*

Figure 3. Purplish-black coloration of streptocarpus. This is a typical symptom of low substrate pH induced iron/manganese toxicity.

These results, (elevated tissue Fe and low substrate pH) helped confirm that the black spotting was related to low pH induced micronutrient toxicity. This is the first report that confirms streptocarpus is susceptible to low pH induced iron/manganese toxicity. As mentioned earlier, the substrate pH for this plant was 4.5.

The lowest recommended level is 5.5. Somewhere between those values is where injury occurred, so until more refined pH ranges are researched, it is recommended to avoid pH levels below 5.4.

With streptocarpus, the substrate pH should be monitored during production to avoid low levels.

Corrective procedures for low pH include the application of hydrated lime, flowable lime, or potassium bicarbonate. Application details are provided in e-GRO Alert 3.05.

Figure 4. Purplish-black coloration of streptocarpus on the top and bottom of the leaf.