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Petunia:
Lower Leaf Interveinal Chlorosis & Necrosis

Magnesium (Mg) deficiency is the most common cause of lower leaf chlorosis and necrosis, but substrate and tissue nutrient analysis results found ample levels. The less common mimic is a deficiency of potassium (K), which was low in both tests. This Alert discusses how to diagnosis this disorder.

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A group of 'Pink Star Charm' petunia plants were observed with lower leaf interveinal chlorosis, slight purpling, and necrosis (Figs. 1-4). The roots were inspected and the entire root ball was filled with nice white roots, so root rot was not the issue. Other petunia cultivars grown in the same greenhouse were not developing symptoms. A combined leaf tissue sample from 15 'Pink Star Charm' plants and a combined substrate sample were submitted for nutritional analysis.

Figure 1. Lower leaf interveinal chlorosis and necrosis developing on petunia.
Photo by Brian Whipker

In areas without a natural source of Mg in the groundwater, the most common reason for these symptoms would be a Mg deficiency. Typically symptoms are observed late in the season when the Mg contribution from the limestone charge used to adjust the substrate pH is leached out or consumed. The use of a Cal-Mag type of fertilizer helps maintain Mg levels to avoid problems. In this situation, a neutral reacting 17-4-17 Cal-Mag fertilizer was being applied

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at the rate of 150 ppm N. So Mg levels should of been adequate.

The substrate analysis found Mg to be at 84.9 ppm, which is on the upper end of the adequate spectrum. The tissue analysis determined Mg was at 1.26%, which was high to excessive. These two pieces of data indicate that Mg is adequate and not the cause of the problem.

A second possible mimic would be an excessively high electrical conductivity (EC) level. The substrate test found the EC to be at 1.41 mS/cm (SME test). The EC level was within the normal range and would not be considered to be excessive. This dropped high EC as being a possible cause.

A low substrate pH is another possible mimic. The pH reading from the SME test was 6.13. This value is in the upper half of the acceptable pH range for petunias. A pH of 6.13 would not be considered problematic.

So the data for the three most common causes of lower leaf interveinal chlorosis, slight purpling, and necrosis did

Figure 2. Symptoms develop on the lower leaves.
Photo by Brian Whipker

not support the problem being caused by low Mg levels, low substrate pH, or excessively high EC levels.

What could be the cause then?

The information provided by both the substrate and leaf tissue analysis reports actually provided valuable clues.

Even though the 17-4-17 Cal-Mag fertilizer was being supplied at the rate of 150 ppm N, the potassium (K) levels in the substrate were at 8.32 ppm and in the tissue the levels were low at 2.47%. This suggests that the leaf symptomology was the result of inadequate K levels.

Figure 3. Close up of the lower leaf discoloration developing on petunia. Photo by Brian Whipker

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One may wonder why this occurred, when K deficiencies are not common? Based on observation, I have seen plants with an extensive system of stems to be heavy users of K. Even when K was supplied at 123 ppm, the substrate levels could be in the 5 to 20 ppm range. These plants just need a larger amount of K.

In addition, not all of the essential elements play well together. In this case, Ca (tissue high at 2.90%; substrate moderate to high at 81.1 ppm), Mg (tissue very high at 1.26%; substrate high at 84.9 ppm), and Na (tissue at 0.02%; substrate high at 110 ppm) were all at the upper end of the acceptable range. These levels can hinder K uptake and further aggravate a deficient condition.

Corrective Steps

Supplying the plants with a heavy application of fertilizer will help restore the K levels. Potassium nitrate at 300 ppm N would be an excellent choice. Periodic substrate testing will also help in monitoring the K levels over time. This particular cultivar of petunia must need more than 150 ppm N. Supplying a slightly higher rate may also help avoid this situation.

Figure 4. Close up of the lower leaf discoloration developing on petunia.
Photo by Brian Whipker