Poinsettia Fertilization: Calcium Deficiency

When a calcium deficiency develops early, it appears as a marginal chlorosis and leaf roll on the younger leaves. Late season deficiencies develop into bract edge burn.
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Calcium is the primary element used for building cell walls. When calcium is low, marginal leaf or bract necrosis can occur. This can occur because calcium is taken up by the plant along with the water supply, mainly through evapotranspiration. So any environmental condition which limits water uptake and water loss through the leaf can create deficiencies.

Symptoms
Calcium deficiency problems can appear on both the leaves and bracts. In the case of leaves, one

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Figure 1. Environmentally induced calcium deficiencies appear on the young leaves completing the final 50% of expansion. Symptoms appear as a marginal necrosis and leaf curling.
later in the season, bract edge burn due to limited calcium can also occur on some poinsettia cultivars (Fig. 3). It is good to know that poinsettia breeding companies are actively screening for bract edge burn and susceptible cultivars are dropped. So problems with bract edge burn occur less frequently than 20 years ago. Symptoms of bract edge burn first appear along the leaf margin as necrotic spots. Under severe conditions, the entire leaf margin can turn brown.

In contrast, another problem that occurs with poinsettias is Botrytis bract edge burn. This disease problem is still frequently observed and can be confused with a bract edge burn. Symptoms of Botrytis bract edge burn appear as a discoloration along the leaf margins and rapidly move inward (Fig. 4).

Management
To prevent bract edge burn
Figure 2. Necrotic leaf margins caused by a calcium deficiency.

Figure 3. Late season bract edge burn caused by a deficiency of calcium.
apply calcium chloride foliar sprays. Be sure to use top quality technical grade calcium chloride. Apply calcium chloride foliar sprays at the rate of 200 to 400 ppm Ca. Lower grades of calcium chloride or calcium nitrate can contain impurities that will burn the foliage and bracts.

So what can be done to prevent problems? If deficiencies occur, make sure you are supplying sufficient levels of calcium. Use either a dark weather feed or calcium nitrate. If problems occur, consider foliar applications of calcium chloride.

One should remember that 20-10-20 does not contain sufficient levels of Ca to support poinsettia growth. One also needs to determine the amount of calcium supplied via the irrigation water, and if that level is low, then utilize a fertilizer that contains sufficient levels of calcium. In addition, try to maintain environmental conditions within the greenhouse that encourage good water uptake by the plant.

If conducting substrate test, the target SME values for calcium should be between 100 and 200 ppm. Also be aware that the ratio of Potassium to Calcium to Magnesium should be maintained at 4:2:1. If the level of one of those elements is too great, it can have an antagonistic effect on the other two elements. To avoid problems, fertilizing poinsettias with a 4:2:1 such as 200 ppm potassium, 100 ppm calcium and 50 ppm magnesium to help avoid problems.

Summary
Calcium is the main building block of plant cells. Target Ca fertilization rates of around at 100 ppm and substrate levels between 100 and 200 ppm for an adequate supply. Also encourage good air circulation during periods of cloudy weather and use calcium chloride sprays if needed.
Table 1. Corrective procedures for overcoming calcium deficiency of poinsettias.

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<th>Correction Steps – take these steps when problems occur</th>
<th>Notes</th>
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<td>a. Determine if the problem is a lack of Ca being supplied or a problem with the root system.</td>
<td>MISDIAGNOSED OR CONFUSED WITH:</td>
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<td>b. Determine via substrate, fertilizer solution and tissue analysis if there is a problem of insufficient Ca being supplied. Confirm boron is adequately supplied.</td>
<td>a. Pesticide phytotoxicity. (Review cultural records.)</td>
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<td>c. Provide 1 to 3 corrective application(s) of water soluble fertilizer containing 200 ppm Ca, such as calcium nitrate.</td>
<td>b. Boron deficiency. (Conduct leaf tissue analysis to determine levels.)</td>
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<td>d. After making the corrective application(s), retest the substrate to determine if the plant is now receiving sufficient Ca levels.</td>
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Figure 4. Bract edge burn caused by *Botrytis* has leaf spots which expand quickly towards the interior of the leaf.