$4.00

North Carolina Flower Growers' Bulletin

Volume 50, Number 4
August 2005

N.C. Commercial Flower Growers Association

Official Publication of the North Carolina Commercial Flower Growers' Association

Avoiding Nutritional Problems with Poinsettias

Brian E. Whipker

Most growers have their tried and true fertilization practices which result in healthy looking poinsettia plants year after year. They are on top of the crop's nutritional needs and rarely see a problem. But sometimes the "recipe" fails when a parameter is changed. Change may come about with: the growing of a new cultivar; a switch of water source; trying to grow in a new substrate; use of a different fertilizer blend; or the fertilization equipment may malfunction. Over the past few years, I've observed a number of nutritional problems. As we get ready for another poinsettia season, wanted to familiarize you on how to recognize poinsettia nutritional problems and what steps to take to avoid them.

Hungry Plants: Low EC

Situation. Poinsettias are heavy feeders and growers know to provide adequate levels of fertilization. So how could stunted growth and lower leaf loss occur with a poinsettia crop? In one greenhouse, the injector malfunctioned and was not delivering enough fertilizer. By mid-season the plants were showing signs of a multitude of deficiencies (Figure 1). In the case of another grower, they switched to bargain priced substrate with higher water retention, so they did not have to irrigate as often. They held the feed at the same level, but with the less frequent fertigations, the total amount of fertilizer provided to the plant on a weekly basis was cut in half. So the plants did not grow (Figure 2).

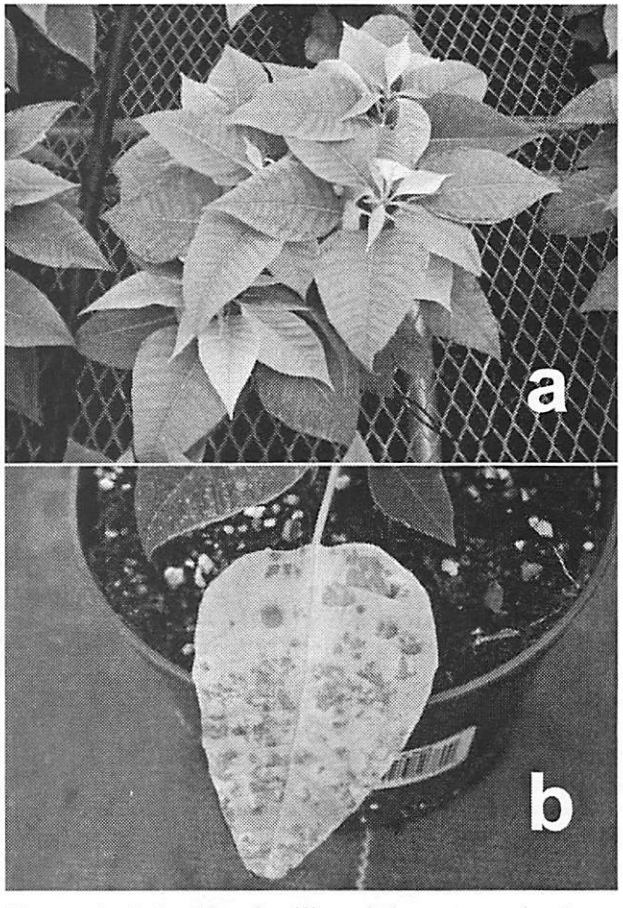

Figure 1. A broken fertilizer injector can lead to lower leaf yellowing (a) and a multitude of deficiency symptoms(b).

(Continued on page 4)

Figure 2. Low EC levels can result in stunted growth and lower leaf loss.

Management Steps. Checking the EC of the fertilizer solution coming out of the irrigation hose would of helped the first grower determine there was a problem before the deficiency symptoms became so severe. All the fertilizer manufacturers provide target EC tables to help ensure your fertility is on target. So for this grower, his target EC value would have been 1.90 mS/cm, which is a combination of the fertilizer EC of 1.34 mS/cm (value for 20-10-20 mixed at 200 ppm N) and an EC of 0.56 mS/cm of the clear irrigation water.

Of course in the case of the grower who changed substrates, checking the EC of the fertilizer solution would not of detected a problem. So the other management step to ensure your fertilization plan is working would be to conduct soil samples. Using either the PourThru, 1:2, or SME method to monitor the substrate EC would of detected the low EC readings. For both situations, the value of purchasing and learning how to use an EC meter would of saved a lot of frustration.

In either case, applying a few irrigations with a complete fertilizer such as 13-2-13 Cal-Mag at 400 ppm N would increase EC to acceptable levels (no lower than 1.5, 0.5, or 1.0 mS/cm, respectively, for the PourThru, 1:2, or SME methods).

Overfeed Plants: High EC

Situation. Even though poinsettias are heavy feeders, too much fertilizer can also be a problem. Plants can be darker green and stunted, similar to what occurs with PGR overdoses. If the plants are allowed to dry out, a marginal leaf burn can also occur (Figure 3). Spray burn also causes a leaf necrosis, but some leaves will have burn in the middle of the leaf as well as the possibility along the leaf margin (Figure 4).

Management Steps. Routine checking of the fertilizer EC and the substrate EC will let you know if the EC has increased to excessive levels. If this occurred, thoroughly leach the plants with two clear water irrigations in succession. Allow the substrate to dry down naturally and recheck the EC to determine if it has dropped to acceptable levels (no higher than 4 mS/cm for the PourThru method or 3.5 mS/cm for the SME method). Leach again with clear water if needed.

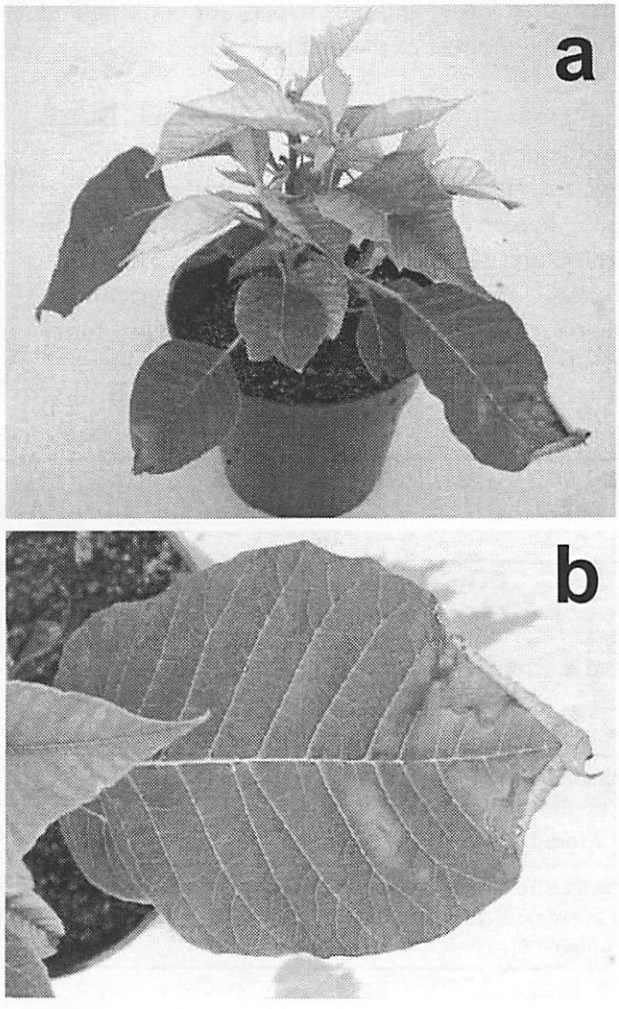

Figure 3. Drying out the plants when the EC is excessive will lead to a marginal leaf burn.

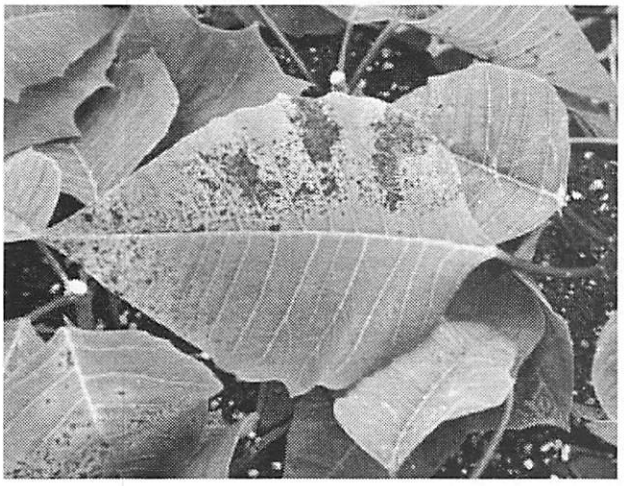

Figure 4. Phytotoxicity from spray applications can result in necrosis of both the interior and margin of the leaf, a factor which helps to distinguish it from excessive EC in which the burn begins along the margins.

Upper Leaves with Interveinal Chlorosis: High pH and Iron Deficiency

Situation. Poinsettias can be grown over a pH range of 5.8 and 6.4. The use of basic fertilizers, too much lime in the substrate, or high alkalinity levels in the irrigation water can increase the substrate pH to unacceptable levels. Poinsettias will let you know that they are not happy by developing an yellow coloration between the green veins (interveinal chlorosis) on the upper leaves (Figure 5). The high substrate pH is causing a chemical reaction making the iron unavailable to the plant.

Management Steps. Routine checking of the substrate pH will let you know if the pH is within acceptable levels. If the pH is too high, one can start using an acidic fertilizer or apply iron sulfate ($FeSO_4 \cdot 7H_2O$) as a substrate drench, using 1 to 3 pounds per 100 gallons of water. Wash off the foliage after application to avoid leaf burn. Recheck the pH to make sure it has dropped to acceptable levels.

Lower Leaves with Interveinal Chlorosis: Magnesium Deficiency

Situation. Interveinal chlorosis can also occur on the lower and mid-section levels of the plant. Magnesium deficiencies occurring early in the growing season appear on the lower leaves (Figure 6). Chlorosis can also occur in the mid-section of poinsettias if the deficiency develops closer to bract coloration. The leaf margins will gradually become necrotic if the problem persists. Deficiencies can be due to insufficient magnesium being supplied via the lime source or in the fertilizer. In North Carolina, late season magnesium deficiencies can occur during excessively hot autumns when the increased irrigation frequency leaches away the magnesium supplied by the limestone. Also keep in mind that 20-10-20 does not contain magnesium (or calcium); so supplemental applications of magnesium are required to meet the needs of the plant.

Figure 5. A high substrate pH can limit the availability of iron and lead to interveinal chlorosis of the upper leaves.

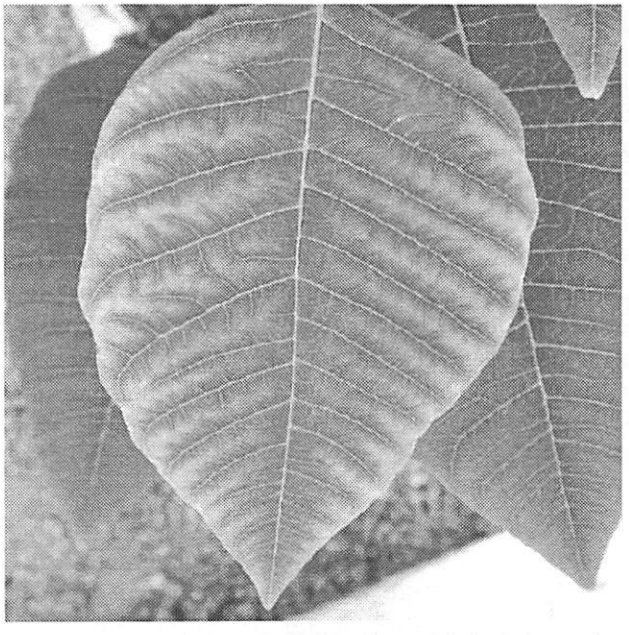

Figure 6. Magnesium deficiencies, which occur early in the season, begin as an interveinal chlorosis on the lower leaves.

Management Steps. Poinsettias are heavy feeders of magnesium. For most areas of the Midwest, the irrigation water may provide sufficient magnesium (25 to 50 ppm Mg), but that is rarely the case in the South. Know where your magnesium levels are by routinely checking the Mg levels in the substrate and tissue. I consider it to be a good, economical practice to also provide a monthly application of Epsom salts (magnesium sulfate) at the rate of 1 pound per 100 gallons of water to supply extra magnesium.

Newly Developing Leaves with Marginal Necrosis: Calcium Deficiency

Situation. The perils of edge burn caused by a deficiency of calcium in the newly developing bracts are a problem every grower is aware of. Calcium problems can also occur earlier in the season. Poinsettias are most prone when the newly pinched shoots are rapidly growing. If the weather turns cloudy for an extended period of time, then watch out for calcium deficiencies. The cause of the problem is a lack of transpiration occurring in the plant during cloudy weather. Without transpiration, water uptake decreases, and when water uptake decreases the associated uptake of calcium drops too - even if there is adequate levels of calcium in the substrate. Calcium is a building block of cells, and if rapidly growing plants can not get enough, cells die, and then you notice on the younger leaves a marginal necrosis (Figure 8) and upward roll (Figure 9). Leaf scorch caused by insufficient water flow can also result in an upward leaf roll, and is most noticeable with Freedom poinsettias in late September or early October after the shade cloth is removed. The overdose of Distanceâ insecticide can also result in distorted, thickened leaves with a marginal curl (Figure 10) and may be mistaken as calcium or molybdenum deficiency. Leaf roll induced by calcium deficiency occurs in Southeast during the hurricane season and has also been seen in a Midwest greenhouse with inadequate ventilation. Once the factors that limit transpiration are removed, the plant begins to grow normally. In most cases, the new leaves cover up the ones with marginal burn.

Management Steps. Make sure the plants are being provided with adequate levels of calcium. Sources include the irrigation water, preplant limestone application, and fertilizers (i.e. calcium nitrate, but as stated earlier, 20-10-20 does not contain calcium [or magnesium]). If the weather forecast, predicts an extended period of overcast weather, then try improving the airflow in the greenhouse (which aids in increasing transpiration from the leaves) or apply a foliar spray of calcium chloride to the leaves. An extensive guide to applying calcium sprays is also on the Paul Ecke Ranch website at: http://www.ecke.com/html/tibs/tib_foliar_feeding.html.

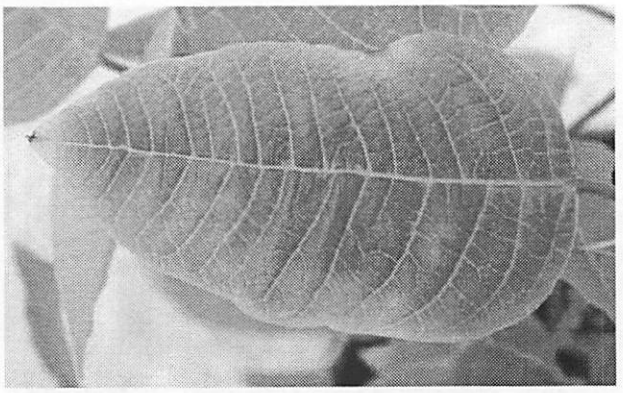

Figure 8. An marginal necrosis of the younger leaves is the initial symptom of calcium deficiency in rapidly growing poinsettias.

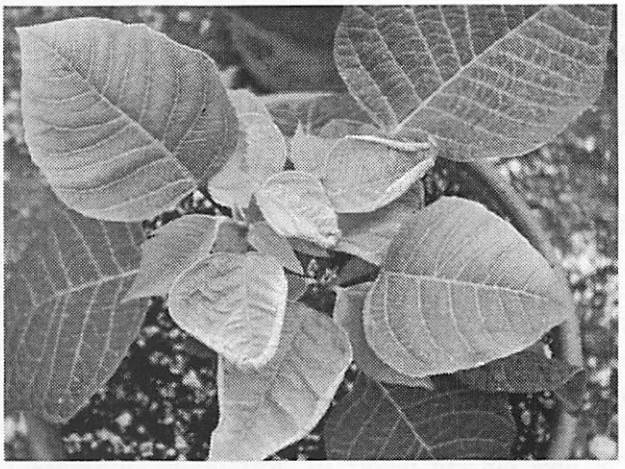

Figure 9. As the calcium deficient leaves expand, they develop an upward roll.

Lower Leaves with Interveinal Chlorosis: Molybdenum Deficiency

Situation. Symptoms appear as chlorosis (yellowing) of the recently mature leaves (middle of the plant), rolling of the leaves and leaf edge burn. The leaf chlorosis of molybdenum deficiency resembles magnesium deficiency, except that the thin, marginal band of chlorosis is expressed from the leaf tip to the leaf base. Molybdenum deficiencies can cause distorted leaves due to the failure of the interveinal

areas to expand normally.

Symptoms similar to molybdenum deficiency have also been observed with a 4X to 8X over-application of Adeptâ insecticide, which lead to the dropping of poinsettias from the label of this excellent fungus gnat control material.

Management Steps. Poinsettias are heavy feeders of molybdenum. As a precaution, provide supplemental applications of Mo on a continual basis. To mix a 0.1 ppm Mo constant feed; use 1 oz (28.4 g) ammonium molybdate [$(NH_4)_6Mo_7O_2 \cdot 4H_2O$] or sodium molybdate [$Na_2MoO_4 \cdot 2H_2O$] per 2 1/2 pints (40 fl. oz.) of water to create a stock solution. Add 1.5 fl. oz. of the stock solution per 10 gallons of water and apply through an 1:100 injector.

Upper Half of Plant Pale Yellow: Sulfur Deficiency

Situation. The upper portion of the plant develops an overall yellowish coloration (Figure 11) and is most commonly observed during the last half of the growing season. Sulfur deficiency symptoms vary from both nitrogen deficiency (or low EC) - which occurs on the lower leaves and from iron deficiency caused by high pHs - which is an interveinal chlorosis of the upper leaves.

Management Steps. The problem of sulfur deficiency is rare with poinsettias because adequate amounts of sulfur are usually supplied from Epsom salts (magnesium sulfate). If problems occur, use the rate of 1 pound per 100 gallons of water will help correct it. Knowing how much sulfur you are supplying with your fertilizer is difficult to calculate. Sulfur is often a forgotten element because the content is not listed on most fertilizer bags.

Poinsettia growing is easier than what the above photographs suggest, but they don't grow themselves! Now is the time to review your fertility program before planting the crop. Anticipate the implications of any changes you plan to make this season to your tried and true growing recipe. Then be on top of what is occurring in the root zone by continual monitoring the fertilizer solution and the substrate for pH, EC and nutrient levels. This will help assure your crops' success.

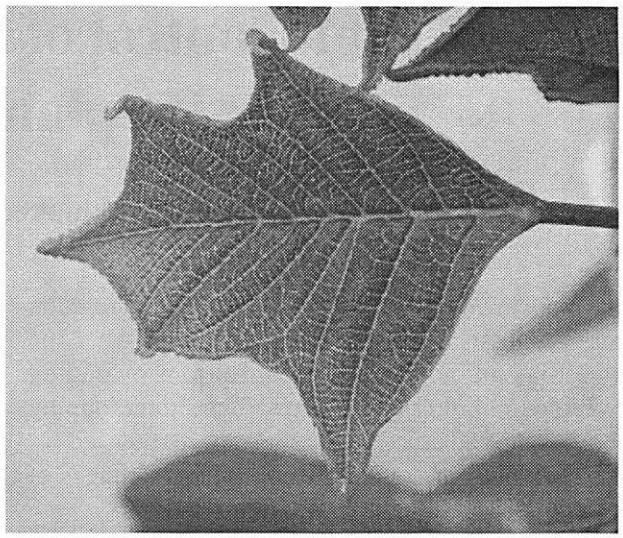

Figure 10. Misapplications of Distance insecticide can also result in distorted, thickened leaves with a marginal curl and may be mistaken as calcium or molybdenum deficiency.

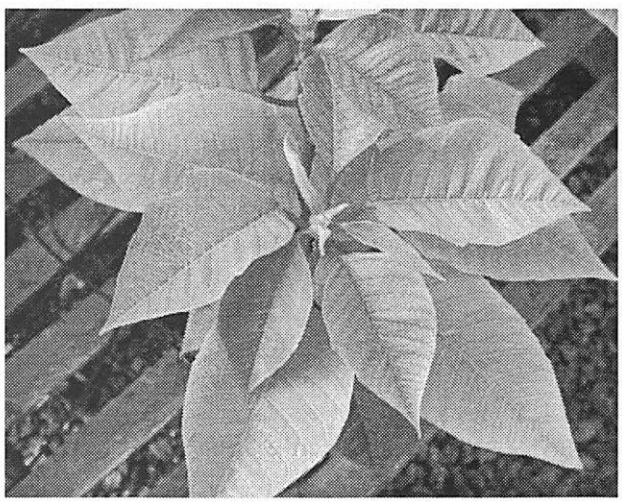

Figure 11. Sulfur deficiency results in the entire leaf turning pale yellow. This occurs at the top of the plant.

A color version of this article appeared in the September issue of GM Pro. If you want additional information about identifying poinsettia problems, a 54-page, color photograph guide to poinsettia diseases, insects, nutritional, and physiological disorders can be ordered from the North Carolina Commercial Flower Growers' Association (www.nccfga.org).