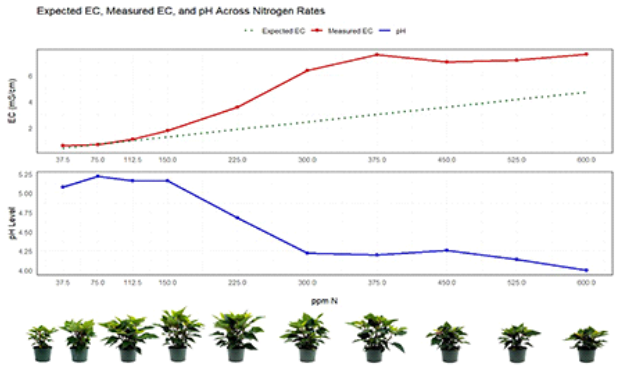
GROWERTALKS

Features

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Nutrition Evolution

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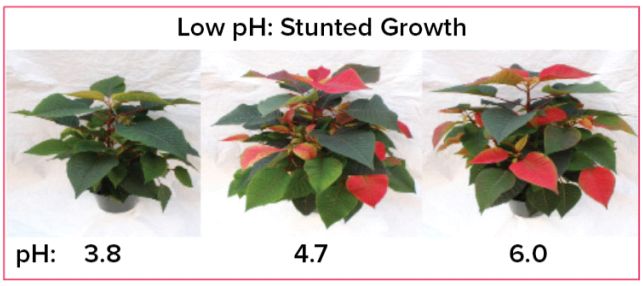


Poinsettias (*Euphorbia pulcherrima*) remain one of the top potted crops in the United States and a grower's aim is to always produce a high-quality, shelf-ready crop while minimizing inputs. Fertilization strategies vary widely, but which is the most efficient, cost-effective and environmentally responsible?

Figure 1. Expected vs measured EC comparison, pH readings and demonstrated poinsettia growth curve from low (37.5 ppm N) to high (600 ppm N) fertility. Photo: Luke Finn.

Fertility recommendations for poinsettias have evolved alongside advancements in production practices and genetics. Earlier guidelines from the 1980 "Tips on Growing Poinsettia Guide" recommend nitrogen (N) fertility concentrations of 200 to 300 ppm N with constant liquid feed, or up to 500 ppm N for intermittent applications. More recent recommendations in the "Poinsettia Nutrition Insider Guide" are concentrations of 100 to 150 ppm N during early growth stages, 150 to 250 ppm N during mid-production and 50 to 100 ppm N during finishing.

With changing growing practices, a research project supported by the American Floral Endowment (AFE) was conducted at North Carolina State University to refine current leaf tissue nutrient standards. One aspect of that project was to grow poinsettias using 10 different rates of N to determine the optimal concentration for growth (Figure 1) and obtain leaf tissue samples over the spectrum of fertilization rates. We used a neutral 17-5-17 (N – P2O5- K2O) fertilizer.



Study results

Less growth was observed at both low (<112.5 ppm N) and excessive (>450 ppm N) fertilizer rates, while optimal growth occurred within a moderate range (150 to 375 ppm N). A critical component of producing a high-quality crop is consistent monitoring and management of substrate electrical conductivity (EC) and pH, both of which can be heavily affected by fertilizer.

Figure 2. Poinsettias are not accumulators of excess concentrations of iron or manganese when the substrate pH is too low and therefore do not develop toxicity symptomology. Instead, plant growth is stunted in low pH conditions. Photo: Brian Whipker.

In Figure 1, the Expected EC Concentration (green dotted line) increased as the rate increased from 0.465 mS/cm with 37.5 ppm N to 4.74 mS/cm with 600 ppm N. The Measured EC (solid red line) in the substrate followed the Expected EC Concentration up until 225 ppm N was applied. Above 225 ppm N, the PourThru substrate EC values then spiked upward. This represents the accumulation of excessive fertility beyond what the plant can utilize. This is a key point of determining the maximum fertilizer rate that should be applied to poinsettias. Rates higher than >225 ppm N represents wasted fertilizer dollars that aren't contributing to improvements in plant growth.



Another key aspect to consider is what excessive fertility does to the substrate pH. All fertilizers—acidic (NH4-N+urea), neutral and basic (NO3-N) reacting—are acidic when mixed. Being acidic, neutral or basic reacting describes the biological reaction that occurs when the fertilizer is taken up by the plant. That reaction holds if the amount of fertilizer applied is similar to the amount of fertilizer taken up by the plant. If excessive fertilizer rates are used, then the acidic nature of the fertilizer salts overwhelms any uptake pH effects and results in decreasing the substrate pH. (This effect can be observed in Figure 1 with the blue solid PourThru Substrate pH line.) Once the fertilizer rate exceeded the uptake amount (red line), the substrate pH dropped. These trends confirm earlier work by Ka Yeon Jeong et al. at NC State University, which illustrated how higher rates of a basic fertilizer can drop the substrate pH.

Figure 3. Interveinal chlorosis of the upper foliage is a typical symptom of elevated substrate pH. Also note that over-irrigation, cold growing or root rot can also limit iron uptake and result in the development of symptoms. Photo: Brian Whipker.

Unbalanced EC and pH values can lead to nutrient imbalances, reduced uptake efficiency and visible foliar symptoms. Poinsettias are susceptible to both high and low pH problems. Low substrate pH-induced problems do not manifest as leaf symptomology of an iron/manganese toxicity, but instead result in stalled growth (Figure 2). Excessively high substrate pH will result in interveinal chlorosis of the upper leaves. Inspecting the plant is important because iron chlorosis can also occur if the plants are grown cold, with excessive irrigation or if root rot is a problem. Nutritional guidebooks for poinsettia (The Ecke Poinsettia Manual, Poinsettia Nutrition Insider and Plant Root Zone Management) are readily available and allow you to see a disorder deficiency or toxicity image.

The take-home here is to apply ample fertility to achieve your optimal level of plant growth and avoid excessive fertilizer applications that can result in a negative drop in the substrate pH. Ultimately, poinsettia nutrition is a dynamic process that requires careful monitoring and informed decision-making from growers. Successful poinsettia nutrition requires a balanced approach that ties together proper fertilizer rates, consistent monitoring of substrate EC and pH, and an understanding of nutrient mobility within the plant. Overall, growers should aim to create a plan that best suits their needs and production system.

Future research

The next step with this AFE-sponsored research project is to provide refined leaf tissue nutrient standards. Leaf tissue samples collected from this research trial will be used to develop refined nutrient standards. Previous recommendations have typically classified tissue nutrient concentrations into broad categories (critical, normal and toxic) and have used relatively small sample sizes (<25). In contrast, this research aims to utilize large sample sizes and meta-analysis to create a distribution curve divided into deficient, low, normal, high and toxic zones. Additionally, we'll work to develop grower-friendly tools that may be utilized for nutrient diagnostics. **GT**

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Additional information:

The Ecke Poinsettia Manual. 2004. p. 287. (out of print)
Jeong, K., Nelson, P., Niedziela, C., and Dickey, D. (2016). "Effect of plant species, fertilizer acidity/basicity, and fertilizer concentration on pH of soilless root substrate." HortScience. 51. 1596-1601. 10.21273/HORTSCI11237-16.
Plant Root Zone Management. 2026. p. 232. (Print-on-demand book available from lulu.com)
Poinsettia Nutrition Insider. 2025. p. 132. (Print-on-demand book available from lulu.com)
Tips on growing poinsettias, 2nd ed. 1990. Ohio Coop. Ext Service Guide. p. 110. (out of print)

New grower resources:

Researchers at North Carolina State University have created two new guides on diagnosing nutritional disorders. "The Poinsettia Nutrition Insider" is an updated version of the earlier iBook and focuses on poinsettia fertilization and diagnosing poinsettia disorders.

The "Plant Root Zone Management Guide" is a revised update of the 2001 guide produced by NC State University. It highlights overall best management practices for the root zone and has an expanded nutritional diagnostic section.

Both are print-on-demand books available from the lulu.com bookstore.