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Nutrient Supply During Cutting Propagation

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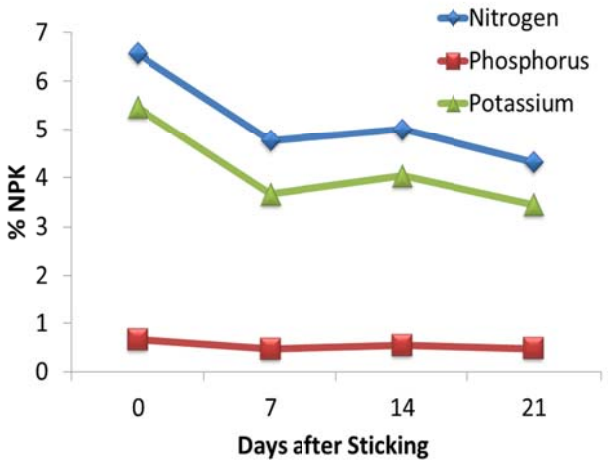
There are many ways to deliver nutrients during cutting propagation that result in a quality finished liner. For example, some growers fertilize through the mist immediately after sticking, whereas others fertilize only when plants are rooted off mist. Although growers have flexibility in their strategies for applying fertilizer and water, some approaches produce more consistent results with less environmental impact.

Unrooted cuttings must have adequate nutrition.

Unrooted cuttings should contain higher tissue nutrient concentrations than finished plant material because tissue nutrient concentrations often decrease from just after sticking until roots begin to form.

In the example given in Figure 1, the tissue nitrogen concentration decreased from a high of 6.9% at sticking to 5% at day 7 when propagated under mist with clear water. Similar decreases were measured with phosphorus and potassium.



In our opinion, the tissue nutrient concentrations of unrooted cuttings should be in the upper 33% of the recommended ranges for all nutrients. For example, if the commonly recommended range for a bedding plant species for tissue nitrogen is 3.5% – 5%, our recommendation would be to have the tissue N concentration for an unrooted cutting at 4.5%-5% N. Recommended ranges vary between species – check with your testing laboratory, or contact the authors (pfisher@ufl.edu) for survey ranges on cuttings.

If the cuttings contain a high tissue nutrient concentration, then this decrease in tissue nutrient concentrations during misting will not cause a problem because the tissue levels never reach a minimum critical level that affects growth (Figure 1). However, if the tissue nutrient concentrations in the URC are low to begin with, then this decrease during misting can result in one or more of the nutrients going below the minimum critical level, often causing the appearance of nutrient deficiencies, slow or non-uniform rooting, or greater susceptibility to diseases.

If you own or operate a facility that grows stock plants, and you consistently see or hear about deficiencies in your cuttings during propagation, check nutrient levels of the URCs using a laboratory tissue analysis, and increase stock plant fertilizer concentrations, as needed. It is also common for growers to use small plants (3-4 inch pots), or even liner trays as short-term or emergency stock plants. The cuttings from these non-traditional stock plants are likely to have low initial nutrient concentrations unless you have adequately fertilized mother plants in the tray.

Nutrients must be available when roots begin to emerge.
Once root initials emerge, a constant supply of nutrients is needed in order to avoid deficiencies. There are several ways to ensure nutrients are available at the stage when roots emerge. All three approaches can work.

1. *Include a preplant fertilizer and minimize leaching*. Preplant fertilizers are incorporated into media to uniformly add nutrients for the first week of growth. However, because the preplant fertilizers are soluble, they can easily be leached from pot or tray. Our research has shown that once a complete container volume of water is leached through a plug tray, all of the pre-plants fertilizers have been leached out.

We developed a simple collection tray method to measure leaching, which growers use to refine their mist practices (Figure 2). When we used this method in several grower locations and found that some growers leached a container volume very quickly during mist propagation, meaning that the preplant fertilizer in their media was lost, and nutrients needed to be resupplied with water-soluble fertilizer. Other growers leached much less water during mist propagation, meaning that the preplant fertilizer in their media was available for plant uptake.

2. *Apply a fertilizer drench* as soon as mist is reduced to recharge the nutrients in the soil solution. Growers typically apply 200 to 250 ppm N from a complete fertilizer as a one-time drench.

3. *Apply fertilizer in the mist* system from sticking onward. One disadvantage of this approach is increased algae growth, and it is essential to have a water treatment system (for example, copper, chlorine, chlorine dioxide, or an activated peroxygen product) if you use this approach. Mist fertigation is most effective for crops that show nutrient deficiencies early during propagation at your location, if URCs arrive

looking nutrient deficient, or you are taking tip cuttings from liners that were grown with low nutrient concentrations. Most growers only apply 50 to 100 ppm N during mist fertigation to avoid salt burn.

Do not apply fertilizer through the mist (a) where existing major algae issues are prevalent and there is no water treatment or sanitation program in place, or (b) to crops sensitive to foliar salt burn, such as silver leaf varieties (lavender and helichrysum) or foliage plants such as *Spathyphyllum*, *Anthurium*, *Guzmania*, and ferns.

As with any change in your management, trial the fertilizer method you use on a small group of plants before applying to the entire crop. Once plants are off mist, most growers apply 150 to 200 ppm N. Higher fertilizer concentrations tend to increase shoot growth and decrease root growth. Consider supplementing micronutrient levels throughout cutting propagation, because pale leaf color in iron-inefficient plants such as petunia, calibrachoa, or nemesia is often iron deficiency rather than low NPK. Controlled release fertilizer are not practical in small liner cells because it is too hard to evenly distribute the prills, and nutrient release rate is too slow for short-term annual crops.

In Conclusion

Research emphasizes that nutrient deficiency during propagation is less likely if URCs have adequate nutrient levels prior to sticking. Even with a URC high in nitrogen, phosphorus, calcium, magnesium, iron, and boron (the most common deficiencies in cuttings), it is easy to run into deficiency issues during propagation. Nutrients need to be supplied to cuttings by the time roots begin to grow, either through a preplant fertilizer, a corrective fertilizer drench, or mist fertigation. A moderate fertilizer concentration (100 to 200 ppm N) with minimal leaching will provide the best combination of root and shoot growth without excess runoff.

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