

Citrus Nutritional Therapies for Improving Nutrient Accumulation, Root Health, Yield, and Fruit Quality on HLB-Affected Orange and Grapefruit Groves on Flatwoods and Ridge Soils

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The bacterial disease HLB has drastically reduced citrus production in Florida. Nutrients play an important role in plant defense mechanisms and new approaches to manage the disease with balanced nutrition are emerging. Nutrients like nitrogen (N), calcium (Ca), and magnesium (Mg) could extend the productive life of affected trees, although interactions among these nutrients in HLB-affected citrus trees are still unclear. A two-year study was established in Florida to determine the response of HLB-affected trees to applications of N, Ca, and Mg. The study was conducted with ‘Valencia’ trees (*Citrus sinensis* L. Osbeck) on Swingle citrumelo (*C. paradisi* Macf. × *P. trifoliata* L. Raf.) rootstock established on

Candler sand. Applications of N at 168, 224 (recommended rate), and 280 kg N ha⁻¹ were used as the main plots. Split-plots consisted of a control treatment receiving no Ca nor Mg; Ca applied at 45 kg ha⁻¹; Mg applied at 45 kg ha⁻¹; and Ca+Mg applied at 22.5 kg ha⁻¹ for each of Ca and Mg. The following variables were measured: tree size, fruit yield, and juice quality. Although some differences in tree growth among treatments were statistically significant (e.g., greater canopy volume with Mg fertilization at 168 kg N ha⁻¹), there was no clear and consistent effect of plant nutrition on these variables. Fruit yield was higher with Ca and Mg relative to the control at the lowest N rate in 2020, and there were

no other statistically significant differences among treatments. Juice acidity was significantly higher with Mg fertilization relative to other treatments in 2019. As N rates had no significant effect in this study, unlike secondary macronutrients, N rates could potentially be reduced to 168 kg N ha⁻¹ in HLB-affected citrus trees without affecting vegetative growth, fruit yield, and juice quality. However, this will require optimizing the supply of secondary macronutrients and all other nutrients to develop a balanced nutritional program. Ultimately, the effects of N, Ca and Mg obtained in this two-year study should be confirmed with longer term studies conducted at multiple sites.

Funding



HLB Multi Agency
Coordination Group



Animal and Plant Health
Inspection Service