

Growers needed for nutrition trials

By Tripti Vashisth

It has been 10 years since huanglongbing (HLB) or citrus greening disease was first discovered in Florida in 2005. In the past 11 years, the Florida all-orange production changed from 242 million boxes in the pre-hurricane, pre-HLB 2003–2004 season to 96.8 million boxes in 2014–2015. This dramatic 60 percent reduction in yield is attributable to multiple causes, including loss of citrus acreage in the state, citrus canker and other diseases, but HLB is now recognized as the primary reason for declining citrus yields.

Growers are urgently looking for strategies to maintain fruit production in their groves. Undoubtedly, psyllid control is one of the most effective strategies to mitigate the spread of HLB, but trees that are already infected remain infected and eventually become unproductive. Hence, in addition to eliminating psyllids, there is a desperate need for cost-effective strategies to keep trees productive and healthy.

Mineral nutrition is an integral part of tree health. For many decades, it has been classified as an essential factor for maintaining tree productivity. Mineral nutrients are classified into major and micro nutrients, and both are critical for growth and function of a tree. Most of the mineral nutrients are involved in more than one physiological process, including plant hormone biosynthesis and signaling, plant defense response and systemic acquired resistance.

In the past five to seven years, several anecdotal accounts suggest promising results from intensive mineral nutrition care. These accounts suggest that trees under constant and balanced mineral nutrition seem to perform well and look healthier than the trees that don't receive good nutritional care. None of the reports claim that the enhanced/improved mineral nutrition program can cure or sustain the HLB-affected trees. Although, intensive mineral nutrition programs can correct for any deficiency in the tree and help in maintaining productivity. Currently, most growers are using some form of enhanced mineral nutrition for citrus trees to keep them productive.

NUTRITION CONCEPTS TO CONSIDER

A few basic concepts to consider whenever choosing or modifying a mineral nutritional program for citrus groves are:

1. **All.** A fertilizer program should have all of the 13 mineral nutrients. Every nutrient is critical.
2. **Balance.** All nutrients should be balanced. Increasing the dose of a single nutrient can only help to a certain limit because those nutrients which are not increased then can become the limiting factor.
3. **Constant.** The supply of nutrients must be constant. Field research has demonstrated that HLB-affected

trees have a reduced root system and therefore are likely to uptake only smaller fractions of applied nutrients at a time. The rest of the fertilizer may leach out of the rooting zone. A constant supply coupled with smaller nutrient doses should help to improve nutrient uptake efficiency by the root system.

Unfortunately, there are not many scientific reports that can be used to support the anecdotal evidence regarding the effect of mineral nutrition on HLB-affected trees or to help formulate recommendations for fertilizer programs for HLB-affected citrus groves. Nevertheless, many fertilizer or nutritional products are being advertised that claim to be beneficial. These products are gaining popularity and are being applied in Florida citrus groves without close scrutiny and valid comparisons with untreated controls.

According to production cost analysis by Ariel Singerman, Extension economist, fertilizers and foliar nutritional products constitute approximately 20 percent to 25 percent of total citrus production costs. Citrus growers are confronted with a variety of fertilizers and/or nutritional programs without adequate decision-making information to make the most informed choice.

PROMISING PRODUCTS

In order to assist growers in the decision-making process, University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS) will be conducting field trials in collaboration with growers to evaluate promising nutritional products. The goal of these trials is to scrutinize the effectiveness of a few promising products (Harrell's controlled-release fertilizer, Tiger® micronutrient mix and foliar nutritional sprays) and to quantify improvements to citrus tree health and productivity. The information obtained from these trials will be compiled into a database and updated on a website to assist growers in decision-making for their nutritional program.

Assistant professor Tripti Vashisth will supervise these trials with a team of UF/IFAS faculty including professors Arnold Schumann and Kelly Morgan, and multi-county Extension agents Cami McAvoy, Chris Oswalt, Gary England, Laurie Hurner, Mongi Zekri, Parker Platts and Steve Futch. The trials are a collaborative effort between UF/IFAS and growers. The UF/IFAS team will be responsible for data collection and analysis, and the growers will be responsible for obtaining and applying the product.

We are encouraging extensive grower participation in the trials. Growers can sign up for any or all the different trials enumerated below. To be considered, the experimental trial sites must include blocks of Valencia or Hamlin on Swingle

rootstock and 10- to 15-year-old trees. There is no fixed block size or specific experimental layout being considered. Instead, each trial site will be surveyed and custom-designed to accommodate valid treatment comparisons. For each trial, the grower standard fertilization program will be considered as the control for comparison. The three product or program evaluations being considered during 2015–2016 include:

1. **Harrell's controlled-release fertilizer (CRF).** CRF can provide a slow and constant supply of nutrients to the tree root system. In the slow-release form, the opportunity for fertilizer leaching outside of the citrus root zone can be minimized, and uptake efficiency is enhanced. Preliminary results from field trials evaluating Harrell's controlled-release fertilizer have shown improvement in health and productivity of sweet orange trees. Harrell's CRF primary and secondary micronutrients (N-P₂O₅-K₂O-Ca-Mg: 12-4-14-5-2.5) will be compared to grower standard fertilizer programs (control). Micronutrients will be applied in foliar forms at the same concentration to both the CRF treatment and the grower standard.
2. **Tiger® micronutrient mix.** The availability of micronutrients are essential for growth and development in a tree. Micronutrients are only required in minute quantities, and their uptake is highly dependent on soil pH. Preliminary studies have shown that Tiger® micronutrient mixes have been effective in improving nutrient uptake by adjusting the soil pH to the favorable pH range. Within each individual fertilizer prill of

Tiger® micronutrient, a mix of evenly distributed minor elements are embedded into the sulfur bentonite matrix surrounding the prill, giving the advantage of soil pH modification as well as a supply of available micronutrients altogether to support optimal fruit production. The controlled release of the micronutrients optimizes nutrient uptake and minimizes losses to the environment. For these trials, the micronutrient mix will consist of a blend of four minor elements: manganese, zinc, iron and boron (Mn-Zn-Fe-B: 6-6-3-1). The Tiger® micronutrient mix will be compared to the grower-standard foliar micronutrient application (control), while the grower-standard macronutrient program will be applied to both of the treatments.

3. **Foliar micronutrients: sulfate vs. nitrate vs. glucoheptonate (chelate) form.** Application of foliar micronutrient sprays has become a common practice in Florida citrus production, with the numbers of sprays ranging from four to eight applications per year. Previous field research in various crops has demonstrated that certain chemical forms of micronutrients are more bioavailable to trees in foliar sprays than others. The current trial is targeting a comparison among different chemical forms of micronutrients to determine differences in uptake efficiency and growth enhancement, both factors being deemed helpful for the growers in decision-making among the different forms. For these trials, the concentration of all the nutrient active ingredients will be kept constant to

FIELD TRIAL SIGN-UP FORM

CONTACT INFORMATION

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Phone Number: _____

SITE CHARACTERISTICS

Scion and Rootstock: _____ Tree Age: _____

Circle trials you would like to participate in. Each trial will be evaluated against the existing grower standard program.

Controlled-Release Fertilizer (Harrell's)

Tiger® Micronutrient Mix

Foliar Micronutrients (Sulfate, Glucoheptonate and Nitrate)

On a scale of 1 (poor health) to 10 (healthy), rate the general health of the above mentioned grove.

1 2 3 4 5 6 7 8 9 10

Grove Location (County): _____ Property Size (acres): _____

Completed forms may be returned by mail to:
UF/IFAS Citrus REC, Attn: Tripti Vashisth, 700 Experiment Station Rd., Lake Alfred, FL 33850 OR by fax: 863-956-4631

establish a fair comparison among different formulations of the micronutrients.

PERFORMANCE PARAMETERS

All the Citrus Mineral Nutrition Trials will be conducted at grower field sites for at least two years. To evaluate the effectiveness of these different products and nutrition programs, a variety of plant nutrient and growth parameters will be collected on a six-month basis for the duration of the trial. The field trial evaluation protocol is approved by the Citrus Research and Development Foundation (CRDF), and the same protocol will be used for all trials to allow for direct comparison between field sites. The parameters in which sample data will be collected include: visual disease index, photographs, leaf and soil nutrient analysis, trunk diameter, canopy volume (derived from height and diameter), canopy density, fruit drop, and fruit yield and quality. In addition to grower-collaborator trials, all three trials will be conducted at Citrus Research and Education Center (CREC) groves in Lake Alfred and Lake Placid to replicate the trials in an experimental grove setting.

Basic and experimental data from all CREC and grower trials will be updated regularly on the citrus nutrition website (www.crec.ifas.ufl.edu/extension/horticulture/citrus_nutrition/) for grower viewing. From this data, growers will be able to compare the performance of any of the different products or programs on either ridge, flatwoods or CREC groves. Given accessibility to the data, it is hoped that growers will use the information to assist them in decision-making.

Yearly progress of the trials will be presented at an annual Grower's Day where the results will be given as percent increase or decrease in yield by comparing the yields of two previous years, as well as the change in tree health associated with changes in canopy volume and tree density during the course of the trials. It

is anticipated that these trials will expedite the development of UF/IFAS recommendations and effective strategies to enhance citrus nutrition and productivity across geographic regions in the face of citrus greening.

HOW TO PARTICIPATE

Growers are encouraged to participate in the trials. To participate, complete the Field Trial Sign-Up

Form included with this article and mail or fax it to: Tripti Vashisth, 700 Experiment Station Road, Lake Alfred, FL 33850; 863-956-4631 (fax). For more information, contact Vashisth at tvashisth@ufl.edu or 863-956-8846. 🍊

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