

What's new in UF-IFAS Citrus Nutrition Recommendations?

By Thomas Obreza, Kelly Morgan and Mongi Zekri

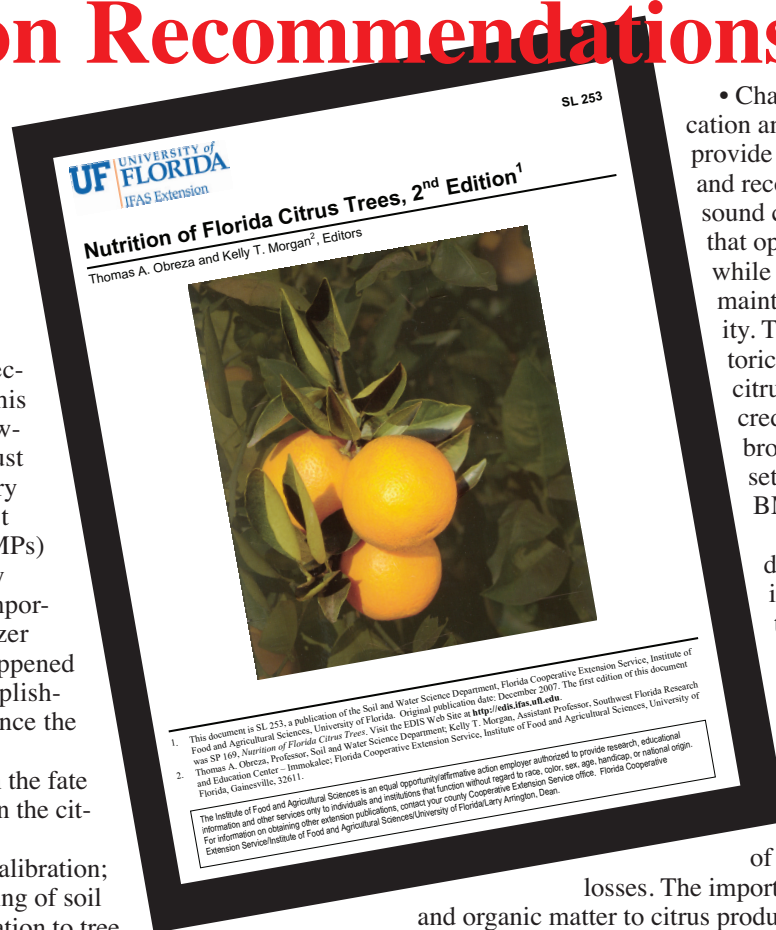
For the past 12 years, the publication "Nutrition of Florida Citrus Trees" (also known as SP 169) has been the most important source for UF-IFAS citrus fertilizer recommendations. Although this publication has served growers well, it was produced just as the Florida citrus industry was entering the era of Best Management Practices (BMPs) and thus did not adequately address several new and important issues related to fertilizer management. Much has happened in terms of research accomplishments and grower trends since the mid-1990s, including:

- Extensive research on the fate of nitrogen and potassium in the citrus production system;
- phosphorus soil test calibration;
- improved understanding of soil characteristics and their relation to tree growth;
- implementation of precision agriculture practices;
- changes in fertilizer sources used;
- increased use of foliar fertilization;
- better irrigation scheduling techniques;
- organic citrus production;
- recovery from hurricanes;
- new diseases to deal with; and
- creation of regional citrus BMP manuals in response to water quality concerns.

With all of these things rapidly occurring, a serious overhaul of SP 169 became a clear necessity. About two years ago, the authors of this article spearheaded an effort to produce an updated version of UF-IFAS nutrient management recommendations. Our new publication retains the same title, but will have a new publication code, SL 253. The scope has been expanded to include topics not previously discussed in comprehensive IFAS citrus fertilization manuals.

Additional contributing authors include Gene Albrigo, Brian Boman, Mary Collins, Jim Ferguson, Steve Futch, Ed Hanlon, Larry Parsons and Arnold Schumann. Thus, SL 253 runs about 100 pages compared with SP 169 at 61 pages. The publication includes new information and updated recommendations crystallized from more than 60 citrus research and extension publications produced by UF-IFAS faculty since 1995.

SL 253 consists of 14 chapters, seven appendices, 47 illustrations, 24 tables, and 40 color plates. Here is a brief summary of what citrus growers will see when they take a look at the new publication:



- Chapter 1 introduces the publication and states its objective: To provide background information and recommendations to develop a sound citrus nutrition program that optimizes financial returns while sustaining yields and maintaining soil and water quality. This chapter provides a historical perspective of Florida citrus tree nutrition, gives credit to the workers who have brought us to this point, and sets the stage for the new BMP era.

- Chapter 2 identifies production areas, describes typical soil types and outlines the land preparation needed to plant citrus trees. Considerable discussion is devoted to the physical and chemical characteristics of soil important to citrus nutrient management and the definition of soils vulnerable to nutrient

losses. The importance of soil pH, liming, and organic matter to citrus production are also discussed.

- Chapter 3 talks about general soil fertility and citrus tree nutrition. Essential nutrients are identified and their behavior in the soil and functions in the tree are detailed. There is a general discussion of how each nutrient is typically supplied to citrus and how much of each is needed by a citrus tree. Finally, there is a concise summary of how specific nutrients and irrigation affect fruit quality.

- Chapter 4 describes how soil and leaf tissue testing should be used as nutrient management tools. The benefits of each type of testing are described, and the steps needed to establish a successful testing program are clearly outlined. Interpretations for both soil and leaf analysis values are shown in easy-to-read tables, along with suggested actions to take if a leaf or soil test value is out of the optimum range. The chapter ends with pros and cons of traditional sampling vs. sampling for use with precision-agriculture practices.

- Chapter 5 discusses how precision agriculture practices like field electrical conductivity measurements, ultrasonic canopy measurements, citrus yield mapping, and precision nutrient application can be used to improve citrus nutrient management.

- Chapter 6 reviews the characteristics and use of a wide variety of fertilizer sources and formulations, including solid, solution, suspension, slow-release and controlled-release materials. This chapter also includes a section describing nutrient sources used for organic citrus production.

- Chapter 7 describes methods of applying dry and liquid fertilizers. There is particular emphasis on fertigation as a nutrient delivery method, including equipment needs, back-flow prevention, fertilizer salt-out, avoiding emitter plugging, fertilizer injection calculations and safety. Since the

practice of foliar fertilization has increased in Florida citrus groves during the last 10 to 15 years, tips about this application method are mentioned.

- Chapter 8 provides the latest IFAS-recommended fertilizer rates and timing. Nitrogen management guidelines are separated into non-bearing (first 3 years in grove), young bearing (years 4–7), and mature bearing (years 8+) trees. The maximum recommended N rate for a mature orange grove is now based on projected fruit yield or soluble solids yield rather than a set maximum per-acre rate of 200 lbs. (240 lbs. for an exceptionally-producing grove) as before and should make rate decisions less subjective. Chapter 8 also provides a P fertilizer recommendation based on both leaf and soil test data. Phosphorus application is not recommended unless it is justified by low soil and leaf P tests. Recommended N rates for grapefruit, and K, Ca, Mg, and micronutrient fertilizer recommendations remain essentially unchanged from SP 169. Finally, particular situations that justify foliar N, P or K applications are discussed, and specific recommendations are provided.

- Chapter 9 brings in irrigation as a factor that can improve nutrient uptake and reduce leaching if water is managed properly. Irrigation scheduling, the latest instruments available to measure soil water content, and water budgeting are discussed. An example is provided that shows how to estimate the longest time a micro-irrigation system can be run without leaching fertilizer below the tree root zone.

- Chapter 10 discusses environmental issues related to Florida citrus production, the BMP era, and characteristics of a successful BMP program.

- Chapter 11 covers special situations not previously discussed in detail. Subjects include scions, rootstocks, soils high in copper, calcareous soils, saline soils and water, using re-

claimed water for irrigation, fertilization strategies for damaged trees, nutritional deficiencies enhanced by environmental or pathological factors, and organic citrus production.

- Chapter 12 provides reference citations for the articles that provided new information and recommendations found in SL 253.

- Chapter 13 is a glossary of nutrient management terms.

- Chapter 14 includes the appendices that contain detailed information on soil physical and chemical characteristics, nutrient concentrations, salt index, and solubility of fertilizer materials, common fertilizer solutions, a fertilizer formulation example, an example of how to determine the fertilizer application rate and schedule for a typical grove, and a key to citrus nutrient deficiency symptoms. The color plates section shows nutrient deficiency symptoms on leaves, twigs, and fruit as well as examples of salt damage, biuret toxicity, and spray burn. Finally, several images of leaves with citrus greening symptoms are shown to help avoid confusion with nutrient deficiency.

The best part about the new publication is that it will be made available to citrus growers free of charge. The Florida Department of Agriculture and Consumer Services, Office of Ag Water Policy is producing 1,000 hard copies. We express our sincere appreciation to them for their contribution. Alternatively, the publication will be available through the UF-IFAS EDIS system; you will be able to find it at the EDIS Web site: <http://edis.ifas.ufl.edu>.

This article is a communication of the UF-IFAS Extension/Research Team. For more information and program updates, please contact your county Extension agent or go to <http://solutionsforyourlife.ufl.edu>

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