

Diagnostic Nutrient Testing for Commercial Citrus in Florida¹

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The IFAS Extension Soil Testing Laboratory (ESTL) <http://soilslab.ifas.ufl.edu> offers several types of diagnostic tests for nutrient status and management in commercial citrus groves in Florida. This fact sheet presents the details of each test and sample submission procedures along with certain specific information. The sample submission form is provided in the PDF version of this fact sheet, which can be found by clicking on the PDF icon in the top right corner of this page. The form should be used when submitting commercial citrus soil and/or plant tissue samples to the ESTL. All the information and instructions on the form should be completely provided and followed when submitting a sample for analysis. The submission form can also be found at http://soilslab.ifas.ufl.edu/ESTL_files/ProducerCitrus.pdf.

Nitrogen Testing

Nitrogen recommendations are made based on the research data on crop nitrogen uptake and requirement for optimum production. There is no reliable soil test for N for any crop in the southeastern US due to the sandy soil types and warm and wet climatic conditions. Recommendation for N depends on the age of the trees in the grove and up to the age of seven (7) years, the N recommendations are standard as provided below.

For the first three years of grove-age, the N recommendations are:

- Year 1 = 0.15–0.30 lbs/N/tree
- Year 2 = 0.30–0.60 lbs/ N/tree
- Year 3 = 0.45–0.90 lbs/ N/tree

For grove-ages 4–7 years, the variety of tree also must be specified by choosing from one among the following:

grapefruit, orange, tangelo, or tangerine

The requirements for the 4–7 grove-age are also standard but are also based on the variety of tree:

- For grapefruit: 120–160lbs/N/Acre/Year
- For orange, tangelo, or tangerine: 120–200 lbs/N/Acre/Year

If the trees are eight years and older, along with the age and the variety (Grapefruit, Orange, Tangelo or Tangerine), the expected yield of the trees in either **boxes per acre** or **pounds of solids per acre** must also be provided.

Then, the recommended N rate will be computed using one of the following equations:

$$1. \text{Recommended N Rate} = 140 + [(\text{boxes/acre expected yield} - 200)/100] \times 14$$

1. This document is SL 279, one of a series of the Department of Soil and Water Sciences, UF/IFAS Extension. Original publication date December 2008. Reviewed July 2017. Visit the EDIS website at <http://edis.ifas.ufl.edu>.

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2. Recommended N Rate = $140 + [(\text{lbs solids/acre expected yield} - 1300)] \times 2.5$

Based on the above expected yield computation and the variety, the N recommendations will be one of the following:

- Oranges: 140–250 lbs/N/Acre/Year
- Grapefruit: 120–160 lbs/N/Acre/Year
- Tangerine/Tangelo: 120–300 lbs/N/Acre/Year

Phosphorus Testing

In order to determine the type of analysis needed, any diagnostic testing for phosphorus requirement of citrus trees requires specific information on the age of the trees. For trees that are 1–3 years of age, a standard soil test alone using Mehlich-1 extractant is sufficient, where the soil test levels of phosphorus will be interpreted and the application needs determined as detailed in Table 1.

For trees that are four years and older, along with the standard soil test, a leaf tissue test has to be performed. Table 2 provides the interpretation of the soil and tissue test results and how the phosphorus recommendations are made.

Potassium

Potassium recommendations also vary based on the age of citrus trees. During the first 3 years of age, K_2O should be applied at the same rate as N (lbs K_2O /tree). For grove-ages of 4 years and above, K_2O should be applied at the same rate as N in lbs K_2O /acre.

Magnesium

For determination of magnesium needs for commercial citrus groves, the standard Mehlich-1 soil test must be performed. Table 3 below provides details on how the soil test results are interpreted and how recommendations for magnesium application are made.

Copper Toxicity

In order to determine copper toxicity, a soil test must be performed. If the soil test Cu is determined to be equal to or greater than 25 mg/kg, then a soil pH determination will be made. If the pH is found to be <5.5, then the standard Adams-Evans buffer pH test will be run and a lime recommendation will be made to raise the pH to 6.5.

If, however, the soil test Cu is <25 mg/kg, then no remedial action needs to be taken as Cu toxicity is not expected below that level.

Soil pH

A soil sample should be submitted for soil pH determination. If the soil pH is found to be <5.5, the standard Adams-Evans buffer pH test is run and a lime recommendation will be made to raise the pH to 6.5. Soil pH management is essential to prevent any trace element toxicity, particularly copper.

Citrus Nutrient Management Footnotes

In addition to the above nutrient recommendations, additional information on management is also included on the test reports. Following are the footnotes, providing the general and specific management tips, which form an integral part of the recommendations. This information should be carefully read and followed to obtain an optimum benefit from the diagnostic nutrient testing process.

General—Split fertilizer applications minimize salt damage potential, reduce leaching, and help maintain a continuous nutrient supply.

Nitrogen—Nitrogen has more influence on citrus growth, yield, and fruit quality than any other element.

For bearing trees, two-thirds of the annual N fertilizer rate should be applied between January and mid-June. The remaining one-third should be applied between early September and mid-October.

Phosphorus—If a citrus grove receives a recommendation to apply P fertilizer, the entire recommended dosage can be applied in a single annual application.

Potassium—Florida soils planted to citrus have naturally low nutrient-holding capacity in the root zone, so potassium leaches almost as readily as nitrogen.

Higher than normal rates of potassium fertilizer (up to 125% of the nitrogen rate) may be needed if the grove soil is calcareous.

Soil pH below 5.5 can solubilize soil copper to where it can become toxic. For soils high in copper, maintain soil pH close to neutral to reduce the potential for copper toxicity.

Foliar fertilizer application can reduce or eliminate soil micronutrient fertilizer applications and is the fastest method of short term micronutrient uptake if there is a deficiency. It should not be relied upon for long term tree nutrition unless the soil is calcareous.

Reference

Obreza, T. A., and K. T. Morgan. (ed.) 2008. Nutrition of Florida Citrus Trees, 2nd Edition. SL 253. UF/IFAS Department of Soil and Water Sciences.

Table 1. Soil test interpretation and phosphorus recommendations for commercial citrus groves, 1–3 years of age.

Soil Test Phosphorus, ppm	0–10	10–15	16–30	31–60	>60
Interpretive Classes	Very Low	Low	Medium	High	Very High
Recommendation (lbs/tree)	Apply P_2O_5 at 100% of the N rate	Apply P_2O_5 at 75% of the N rate	Apply P_2O_5 at 50% of the N rate	0	0

Table 2. Test interpretations and phosphorus recommendations for commercial citrus groves, ages 4 and above.

Leaf Tissue P level	Soil Test P level	P recommendation
High or Very High	Soil Test P not applicable	0 lbs of P_2O_5 for 12 months until re-evaluation
Optimum	Sufficient	0 lbs of P_2O_5 for 12 months until re-evaluation
Optimum	Less than Sufficient	8 lbs P_2O_5 /acre for every 100 boxes/acre of fruit produced during one year
Low	Less than Sufficient	Apply 12 lbs P_2O_5 /acre for every 100 boxes/acre of fruit produced during one year
Deficient	Less than Sufficient	Apply 16 lbs P_2O_5 /acre for every 100 boxes/acre of fruit produced during one year

Table 3. Test interpretations and magnesium recommendations for commercial citrus groves.

Soil Test Magnesium, ppm	<15	15–30	>30
Interpretive Classes	Low Very Low	Medium	Very High/High
Recommendation	Apply Mg fertilizer at 20% of the N rate	Apply Mg fertilizer at 20% of the N rate	No Mg recommended