Monitoring and Managing Seasonal Demand for Plant Nutrients with Smartphone Apps

Arnold Schumann

Citrus Research and Education Center (CREC), University of Florida

Florida Citrus Growers’ Institute
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Making sense of leaf symptoms:

- Critical nutrient deficiencies can be identified & corrected
- What is the best fertilizer application timing?
Leaf symptoms in HLB+ groves
• Nutrient deficiencies at bloom and post-bloom are critical
• High (peak) nutrient demand at that time
• Various chlorosis patterns on leaves
• Nutrient deficiencies at bloom can reduce fruit set
• Nutrient deficiencies after bloom can impact fruit development
• N, Mg, Fe, Mn, Zn deficiency symptoms are common
• Affected fruitletts are small, chlorotic, and may drop
Optimal nutrition during and after bloom is essential.
Recognizing seasonal demand for nitrogen (% per week) in fruit-bearing citrus

Period of peak nutrient demand = bloom (= most intensive fertilization)

Period of low nutrient demand

AWS, 2021
Leaf symptom diagnosis with a smartphone web app:

1. Pick a leaf
2-3. Take a photo
4. Use photo
5. Submit photo
6. Show result

http://www.makecitrusgreatagain.com/SmartphoneApp.htm
Symptoms on HLB+ trees diagnosed with the smartphone web app:
Smartphone web apps: nutrient deficiencies
Excessive fertilization in the late summer and fall may result in incomplete color break & lower fruit quality.
• Reduced nutrition during maturation is essential
Detrimental effects of excess nutrition on fruit color break and quality: N,P,K:

“Nutrition of Florida Citrus Trees”
https://edis.ifas.ufl.edu/publication/SS478

- Fruit regreening after late application of N
- Lower brix due to excessive late N or P fertilization
- The damage occurs in the fall maturation phase if leaf nutrient levels are too high
Early color break at lower leaf N concentrations

\[ Y = -31.8x + 76.9 \]
\[ R^2 = 0.52 \]
Honey Murcott with full color break on 12/22/2020; notice pale green leaves showing low N status
6 January 2021, post-harvest grapefruit:
pale green leaves, yellow veins showing low N status
*** THIS IS COMPLETELY NORMAL ***
Correct and incorrect fertilizer timing strategies:

Cumulative nitrogen fertilizer (%)

Day of year

AWS, 2021

- Pre-bloom "priming" fertilizer
- Bloom & fruit set
- Cell division
- Cell enlargement
- Maturation

Sigmoidal demand
Linear supply
Recommendations*

- Apply most P fertilizer in pre-bloom to post-bloom period. Omit P if leaf and soil levels are high.

- Apply 50% N by post-bloom period.

- Apply 75% N by physiological fruit drop (May/June).

- Apply 100% N by mid to end of summer, depending on the maturity date of the variety.

- Leaf N, P concentrations: aim for high end of optimal in spring to early summer, and low optimal or low in late summer, fall.

* Parts adapted from “Fruit Size Management Guide”, Part 1
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Contact: schumaw@ufl.edu