

# Monitoring and Managing Seasonal Demand for Plant Nutrients with Smartphone Apps

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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 fruitlets are small, chlorotic, and may drop**



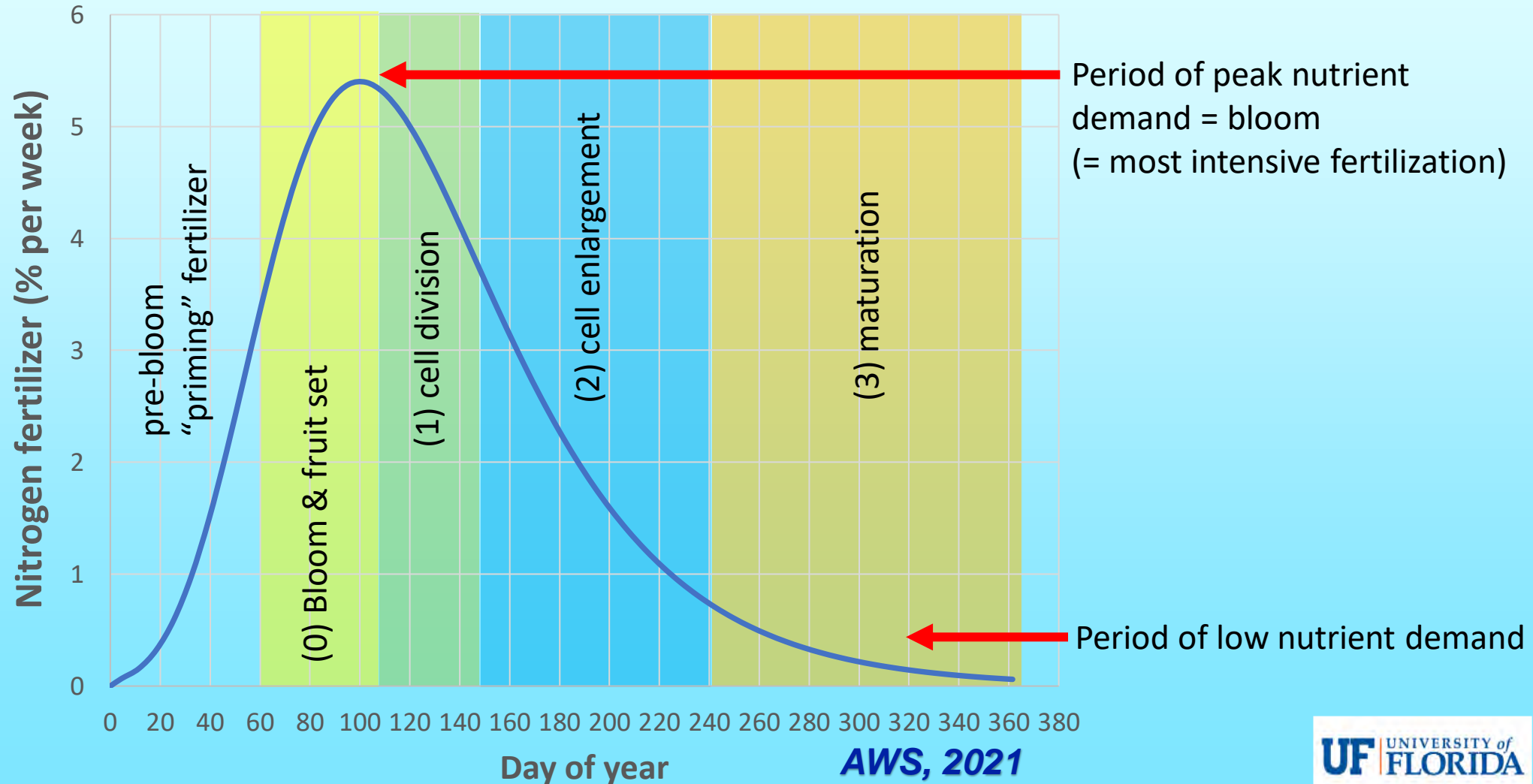


- **Optimal nutrition during and after bloom is essential**





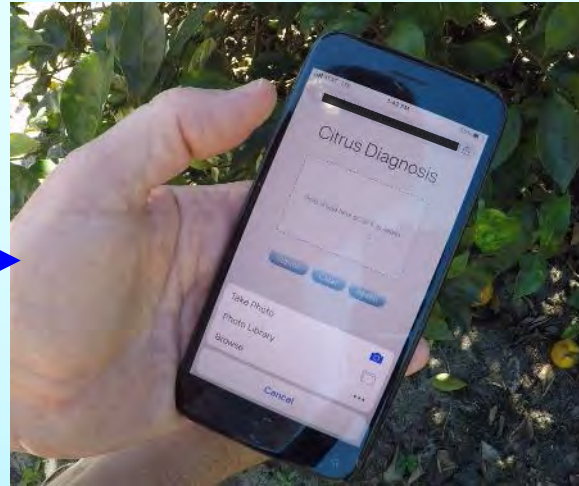
# Recognizing seasonal demand for nitrogen (% per week) in fruit-bearing citrus



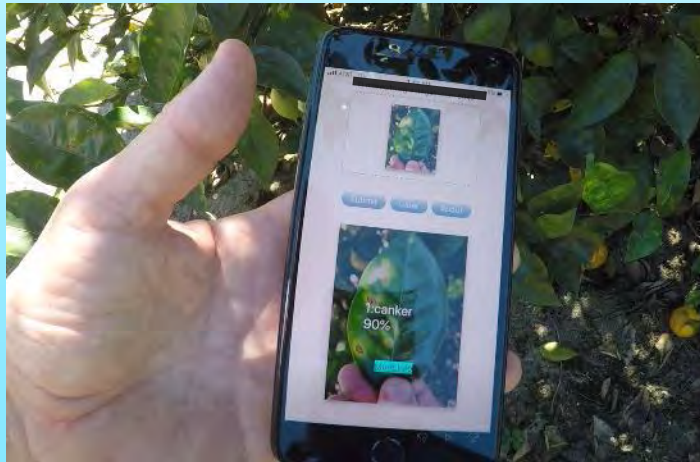
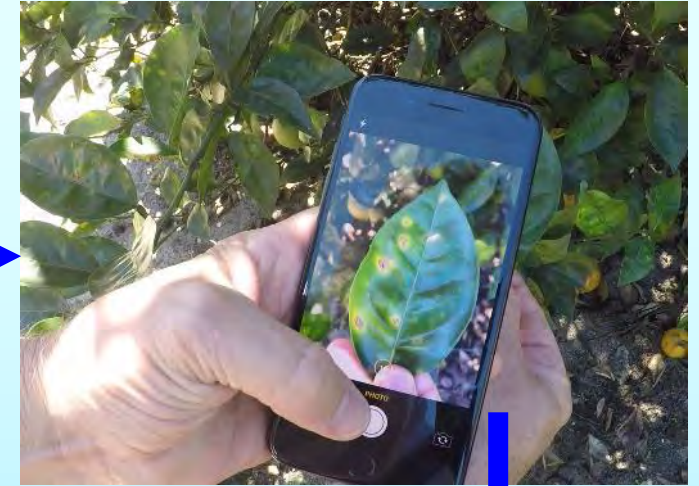
# Leaf symptom diagnosis with a smartphone web app:



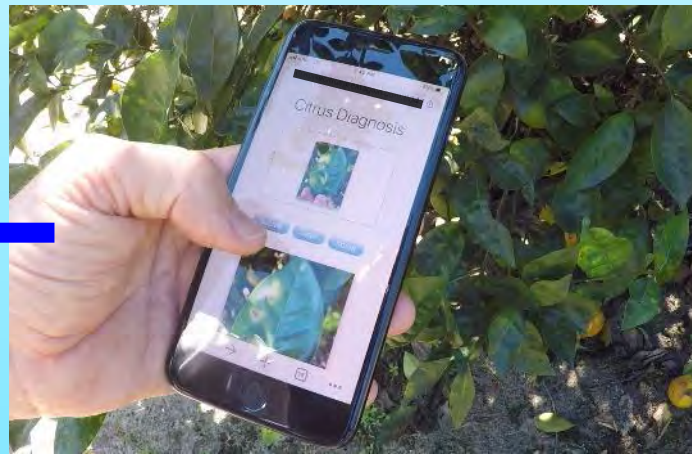
1. Pick a leaf



2-3. Take a photo



6. Show result



5. Submit photo

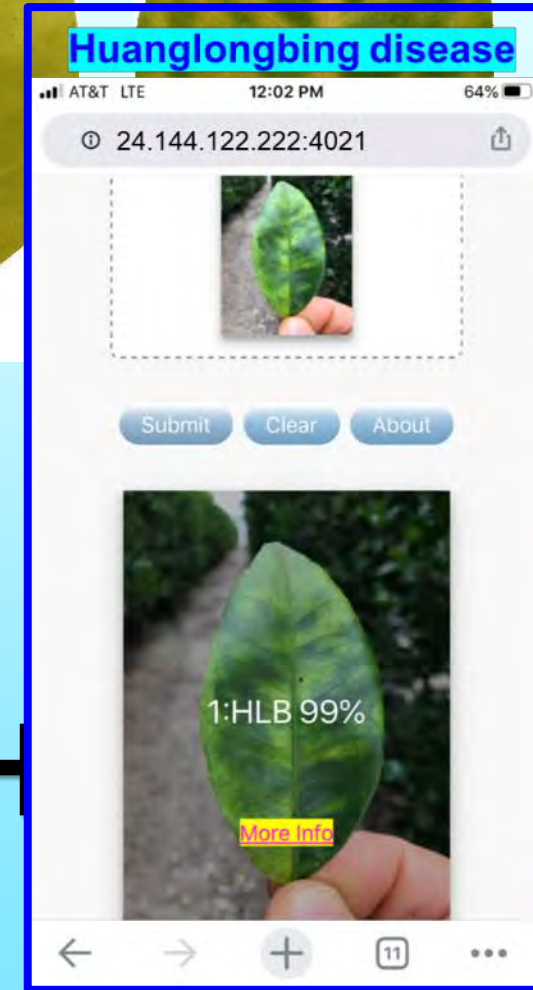


4. Use photo

<http://www.makecitrusgreatagain.com/SmartphoneApp.htm>

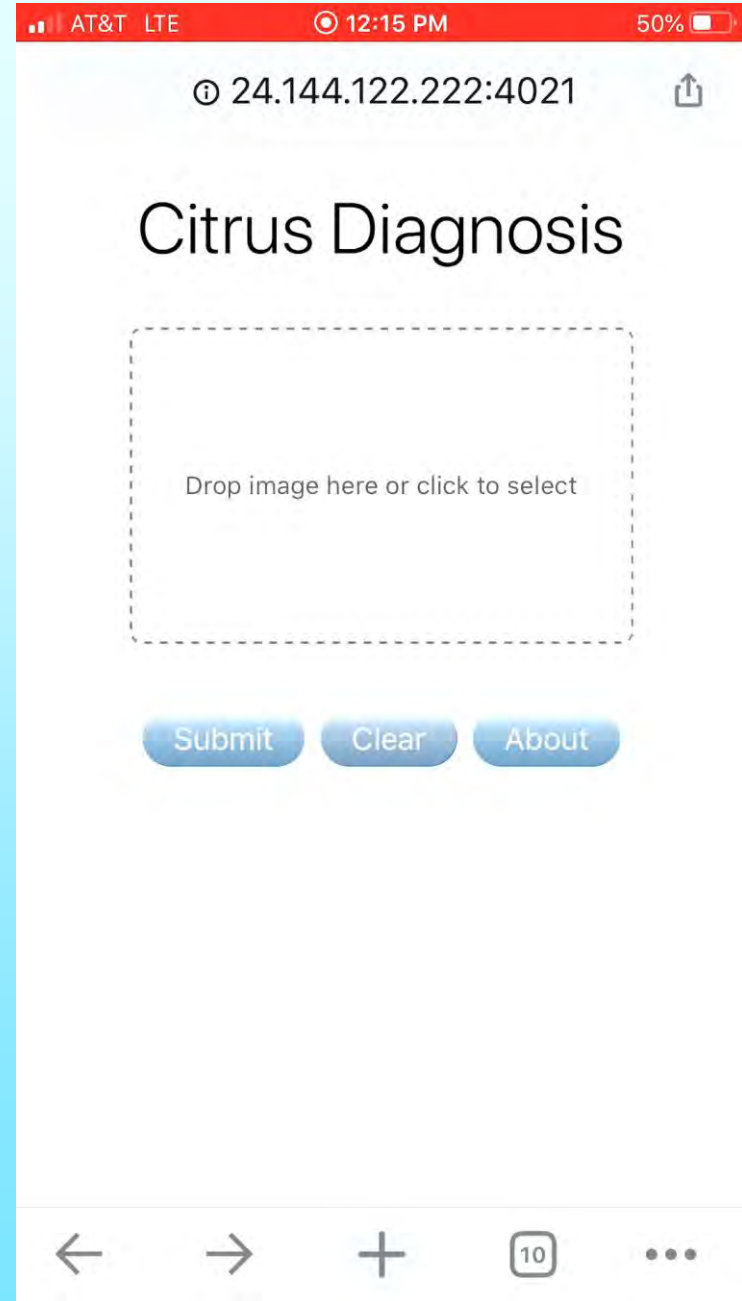
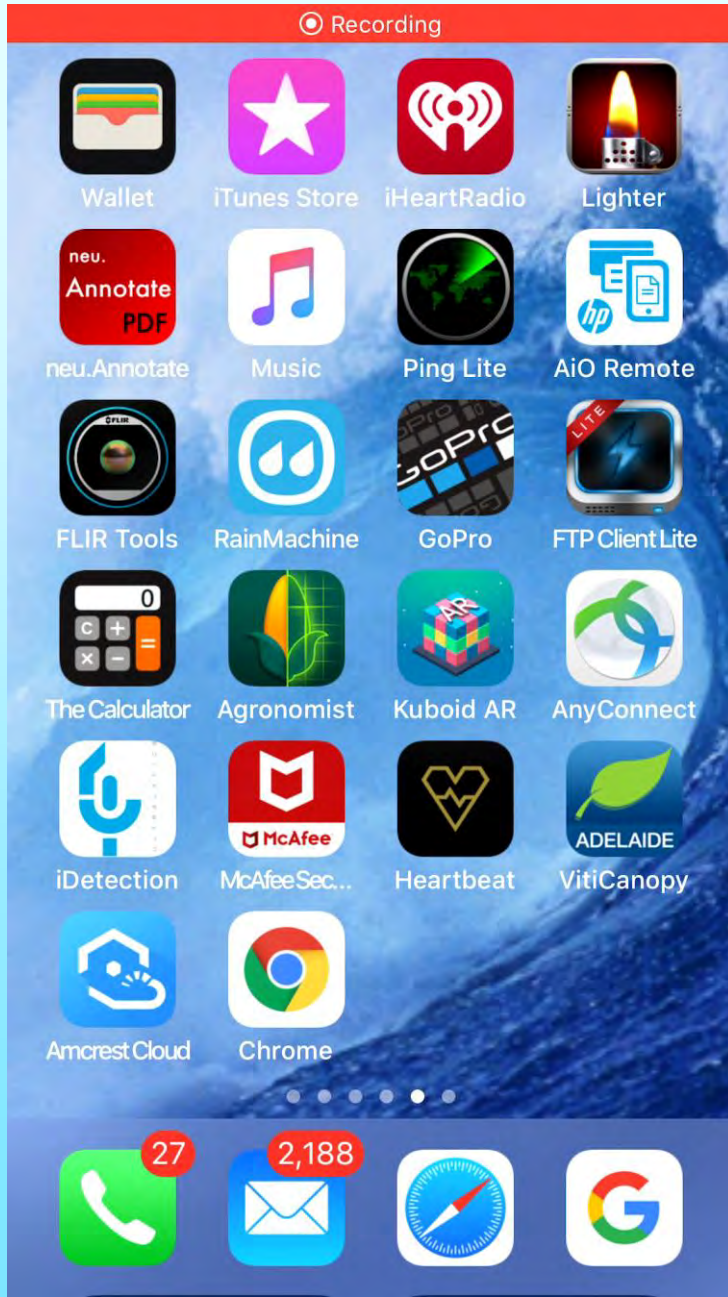


# Symptoms on HLB+ trees diagnosed with the smartphone web app:





# 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**



**Honey Murcott with full color break on 12/22/2020**



# **Detrimental effects of excess nutrition on fruit color break and quality: N,P,K :**

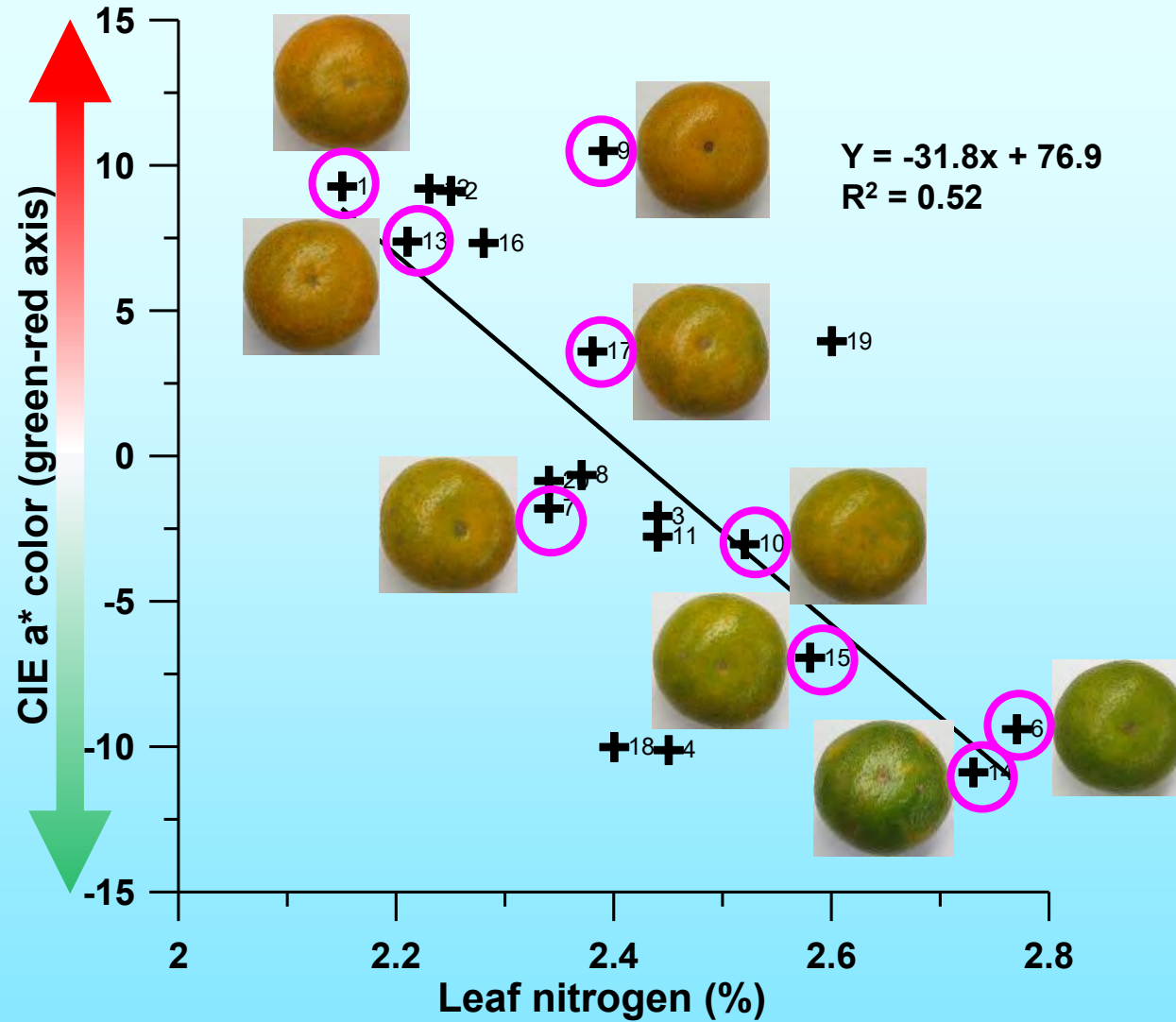
**“Nutrition of Florida Citrus Trees”**

**<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



# a\* (green-red peel color)



Early color break at lower leaf N concentrations



**Honey Murcott with full color break on 12/22/2020;  
notice pale green leaves showing low N status**



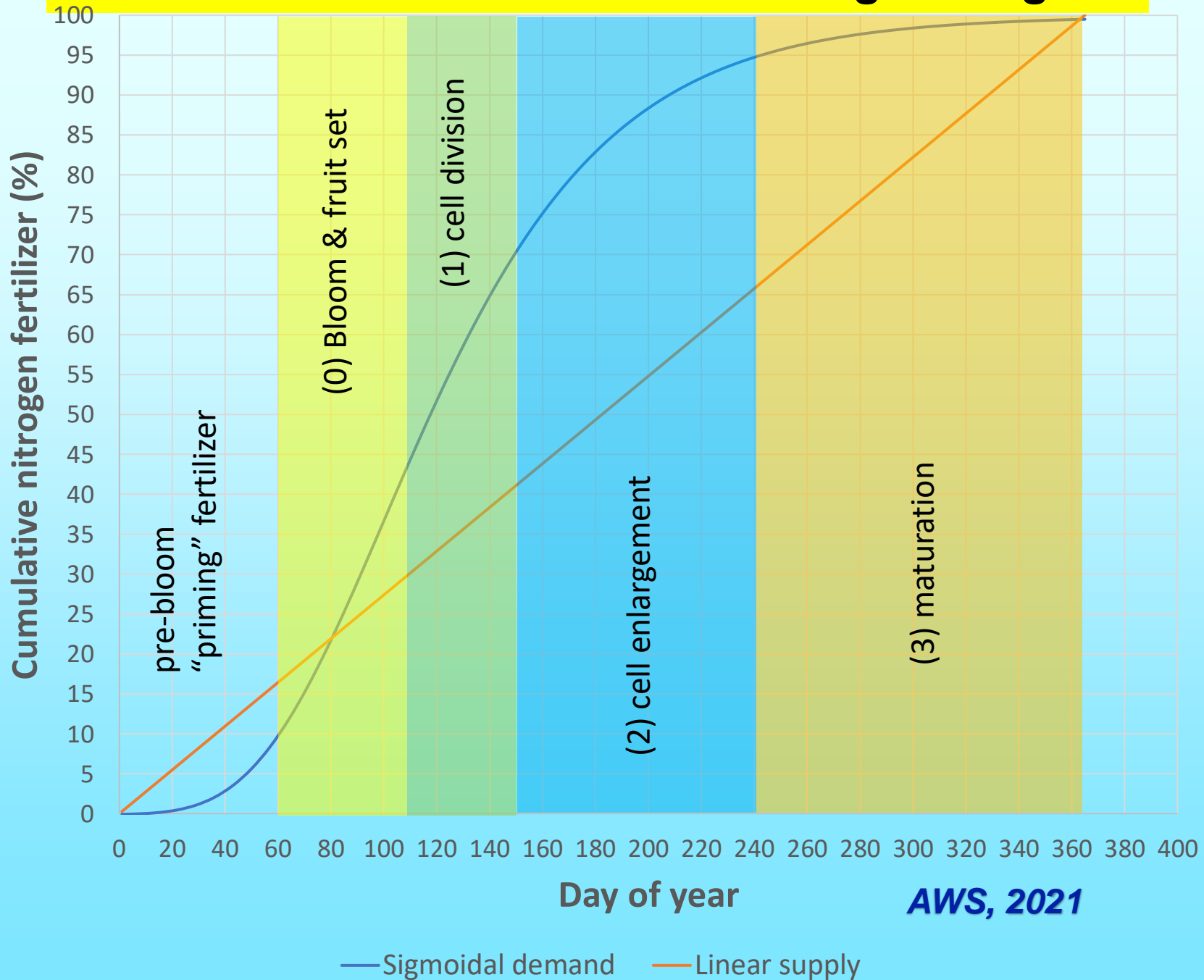


**6 January 2021, post-harvest grapefruit:  
pale green leaves, yellow veins showing low N status  
\*\*\* THIS IS COMPLETELY NORMAL \*\*\***

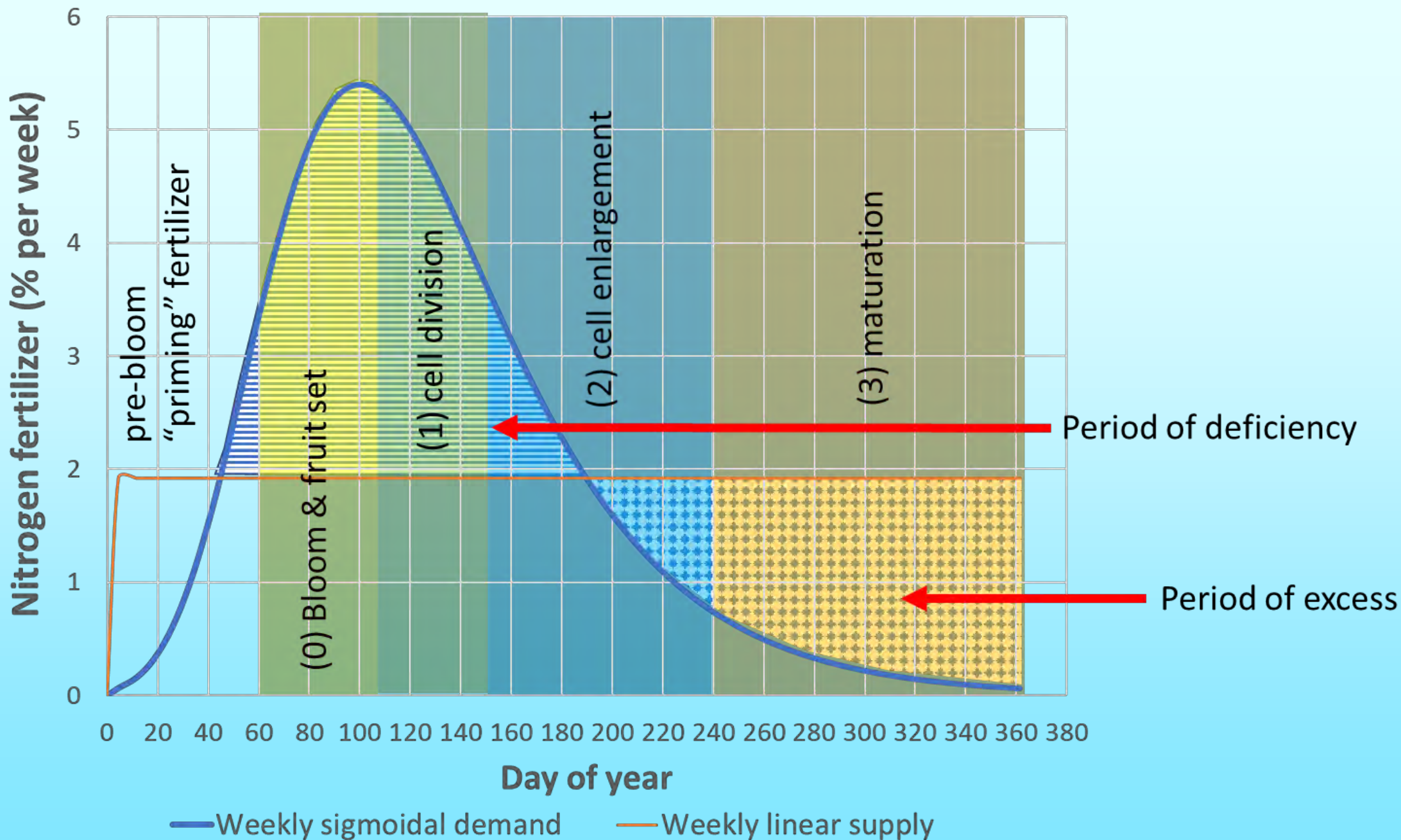




# Correct and incorrect fertilizer timing strategies:









## 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
  - [https://www.dpi.nsw.gov.au/data/assets/pdf\\_file/0005/138830/Fruit-Size-Guide-PART-1.pdf](https://www.dpi.nsw.gov.au/data/assets/pdf_file/0005/138830/Fruit-Size-Guide-PART-1.pdf)



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