

Horticultural Strategies to Improve Health and Productivity of HLB-affected Trees

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Take home message

- HLB-affected tree have compromised root system
- Limited water and nutrient uptake
- Low rainfall periods coincides with fruit set and preharvest fruit drop
- Frequent irrigation, NOT MORE WATER can improve productivity
- Hormonal imbalance in HLB-affected trees
- Timely PGR application can improve productivity

Irrigation to improve health and productivity of HLB-affected 'Valencia'



Mary Sutton
PhD candidate



Wes Webb
Field Technician

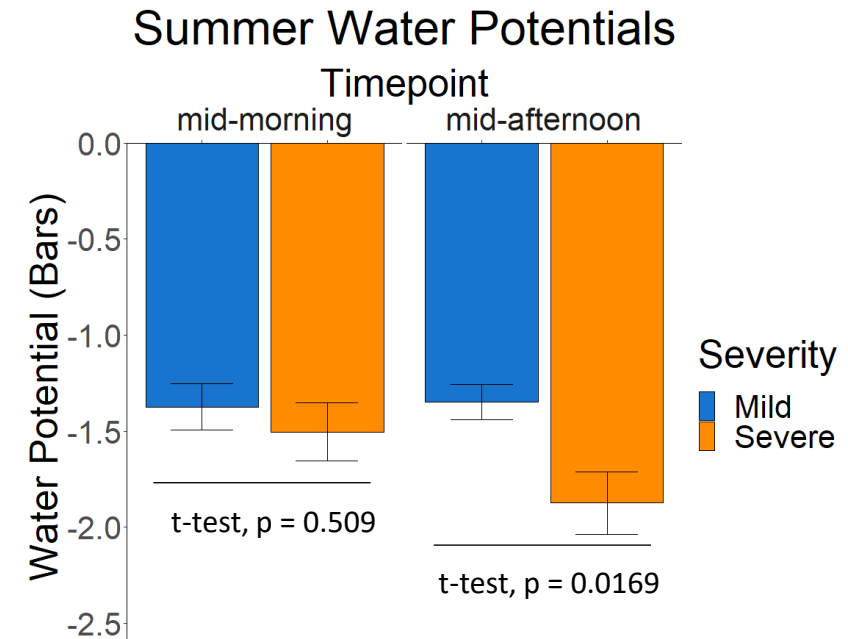
Roots in HLB-Affected Trees

- 🍊 Smaller roots limited in uptake capacity



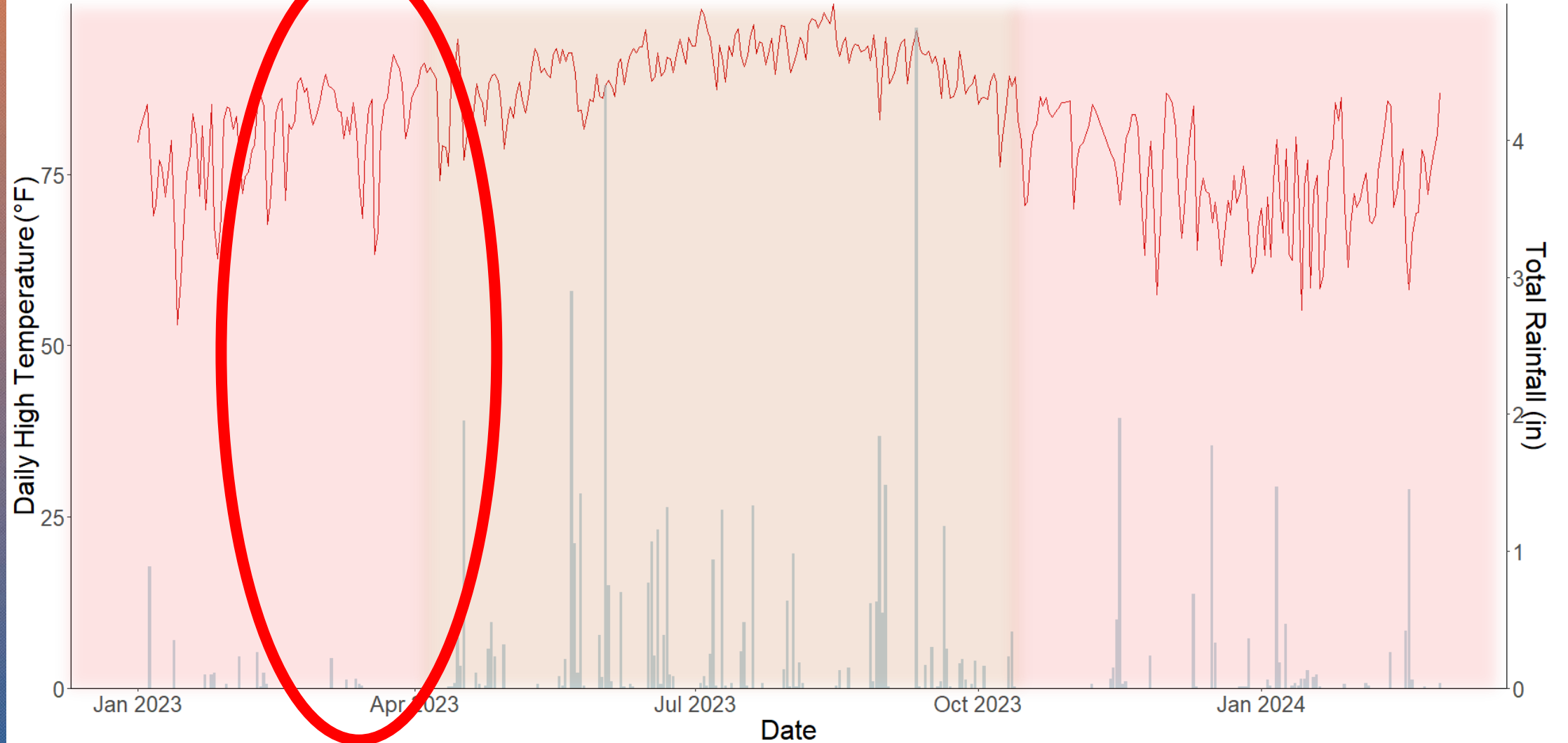
Water-deficit

- Lower leaf water potentials and sap flow in HLB compared to healthy trees
- Severely symptomatic HLB trees undergo more water deficit compared to mildly symptomatic

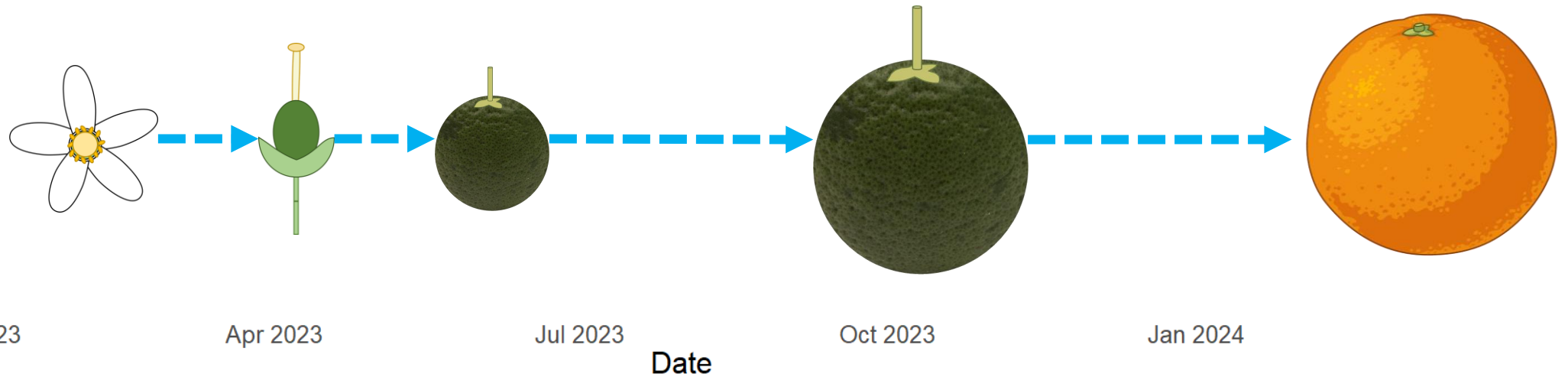
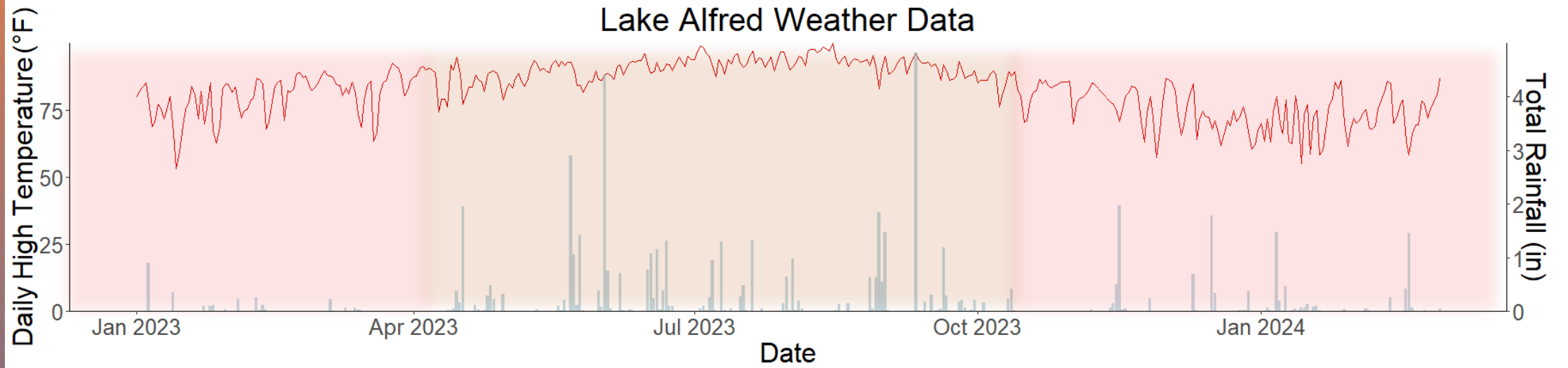


Dry Season

Lake Alfred Weather Data



Dry Season

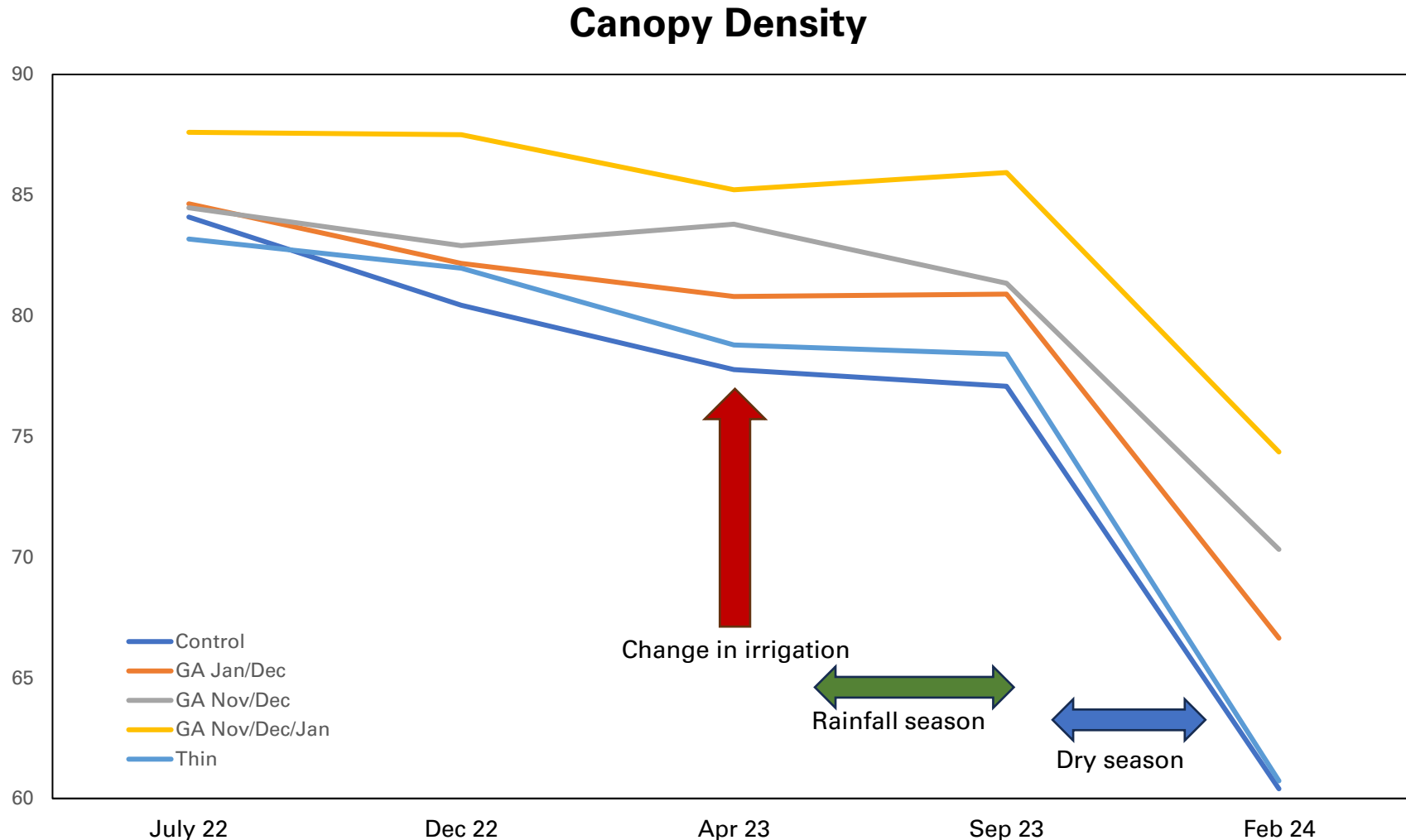


'Valencia'
Sweet Orange

Drought Stress and HLB

- 🍊 Off-season flowering
- 🍊 Fruit drop
- 🍊 Reduced canopy growth Increased ABA levels
- 🍊 Poor quality fruit
- 🍊 Lower yields

Change in irrigation frequency resulted in sharp decline in canopy density.



Hypothesis

- 🍊 Frequent irrigation will increase water availability throughout the day, increasing opportunity for water uptake in HLB-affected trees
 - 🍊 Will result in trees with more well-watered status

Experimental Design

- Control: Standard
 - Every other day
 - 2 hours
 - 6:00 AM
 - 12 gal/hour
- Experimental: Frequent
 - Every day
 - 3x a day
 - 20 minutes
 - 5:40 AM, 10:00 AM, 2:00 PM
 - 12 gal/hour

The two treatments receive the same amount of water over time

Material and Methods

- 15-year-old 'Valencia' on 'Swingle'
- CREC grove, Lake Alfred, FL
- Treatments applied to blocks of 3 trees
 - n = 5
- 2 years: 2022-2024

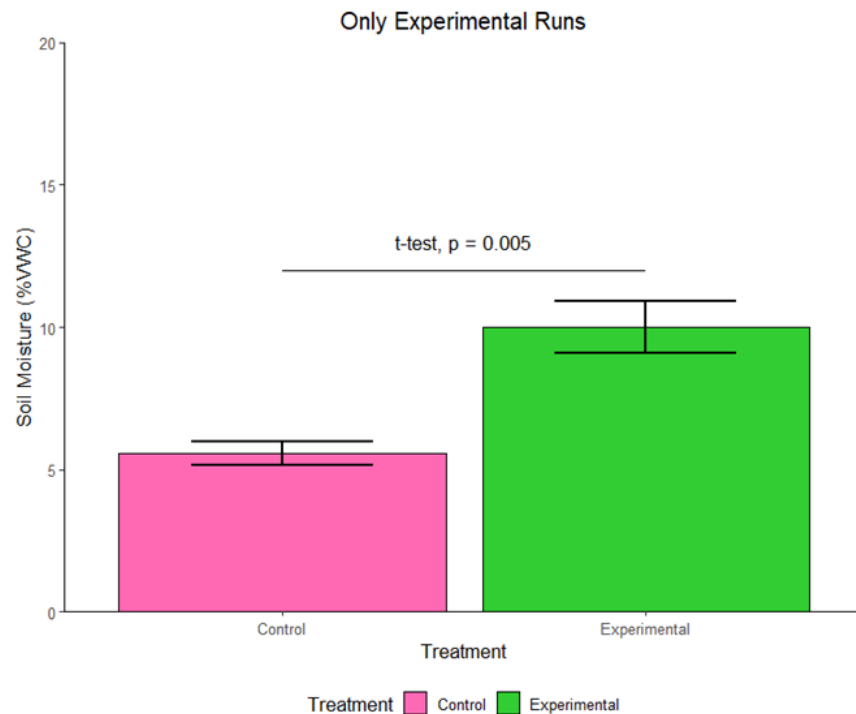


A close-up photograph of an orange tree branch. The branch is covered with vibrant green, glossy leaves. Several bright orange, ripe oranges are visible, some partially obscured by the foliage. Interspersed among the leaves and fruit are several white, five-petaled blossoms with prominent yellow centers. The background is a soft-focus view of more green leaves and branches, suggesting a dense orchard. A semi-transparent white rectangular box with a black border is centered over the image, containing the word "Results" in a bold, black, sans-serif font.

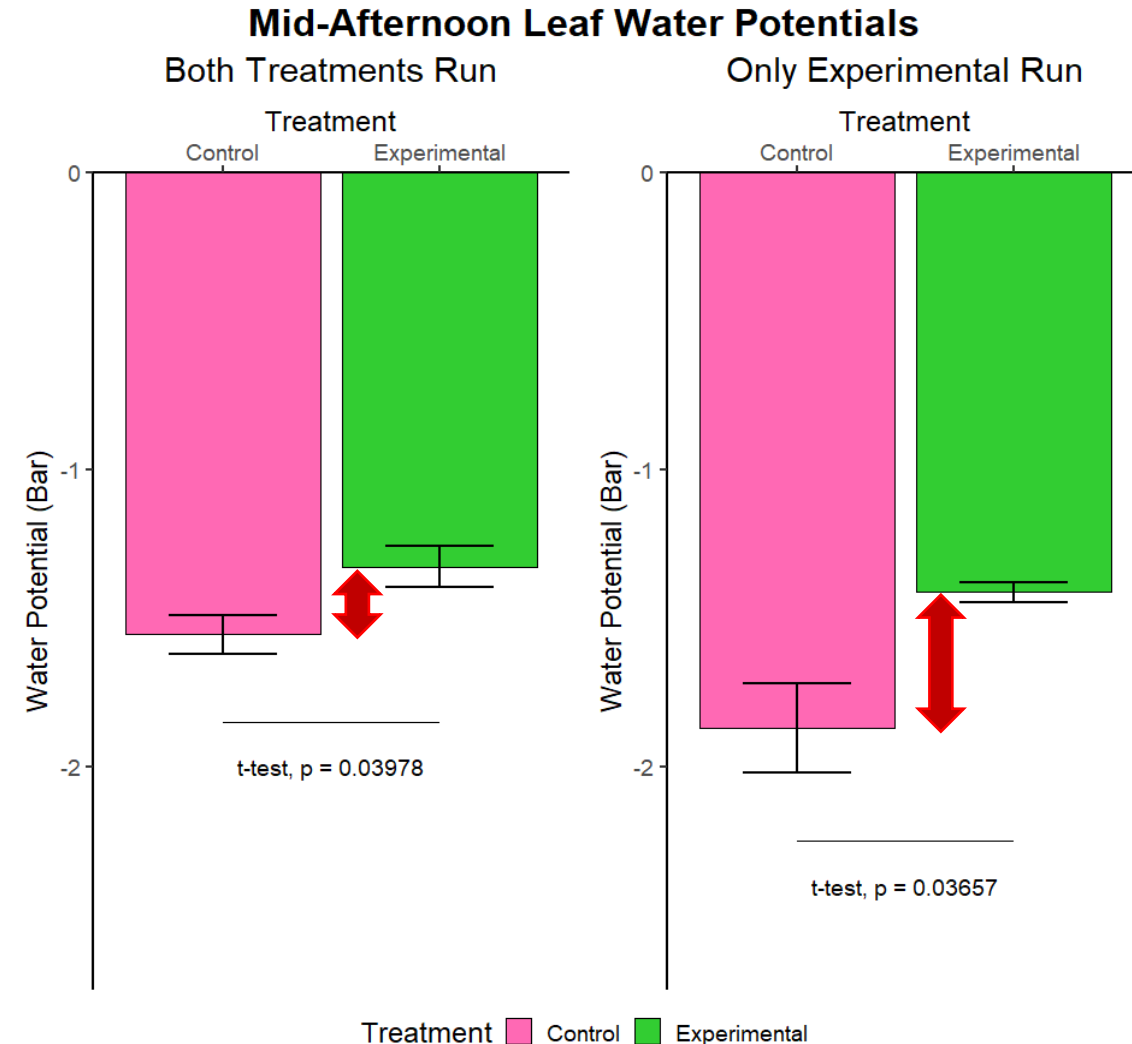
Results

Water Relations

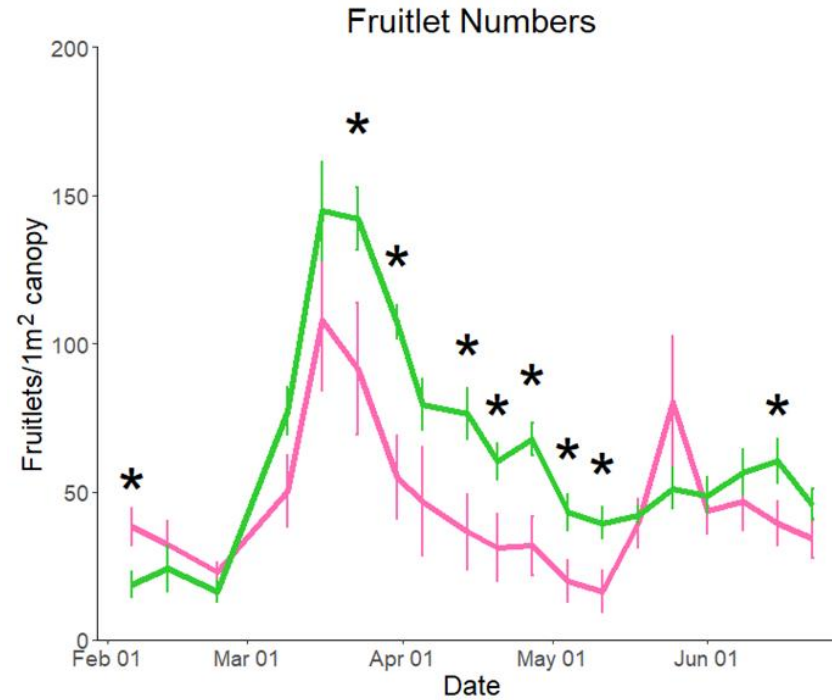
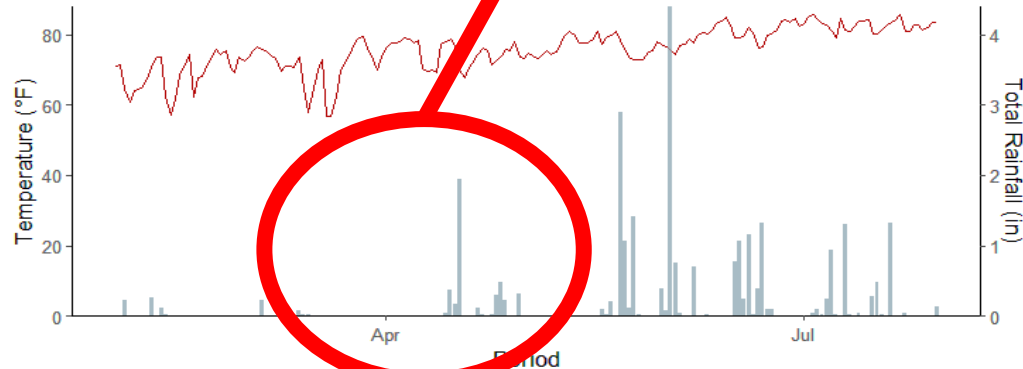
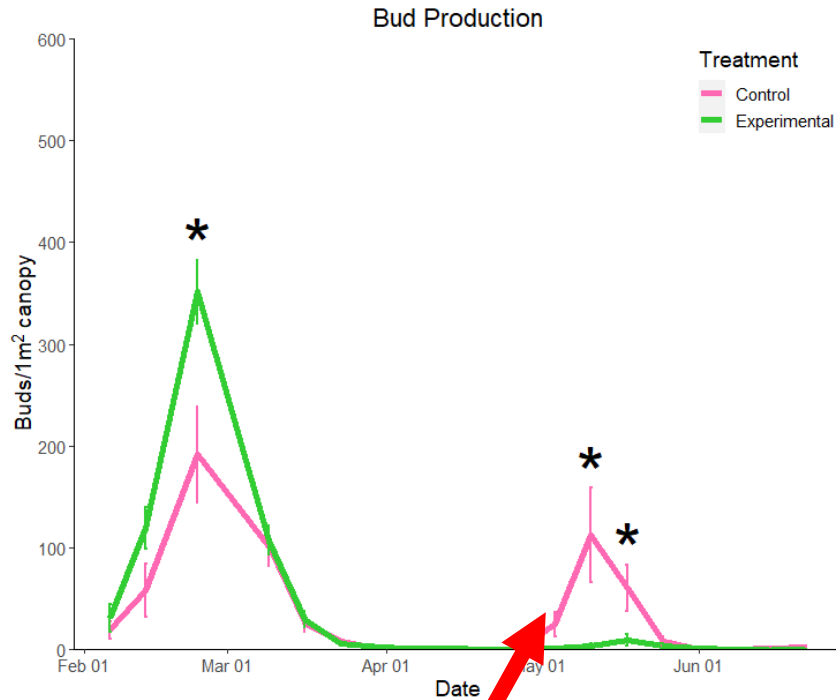
Higher mid-afternoon soil moisture in experimental treatment



- Experimental consistently higher leaf water potentials = low water deficit



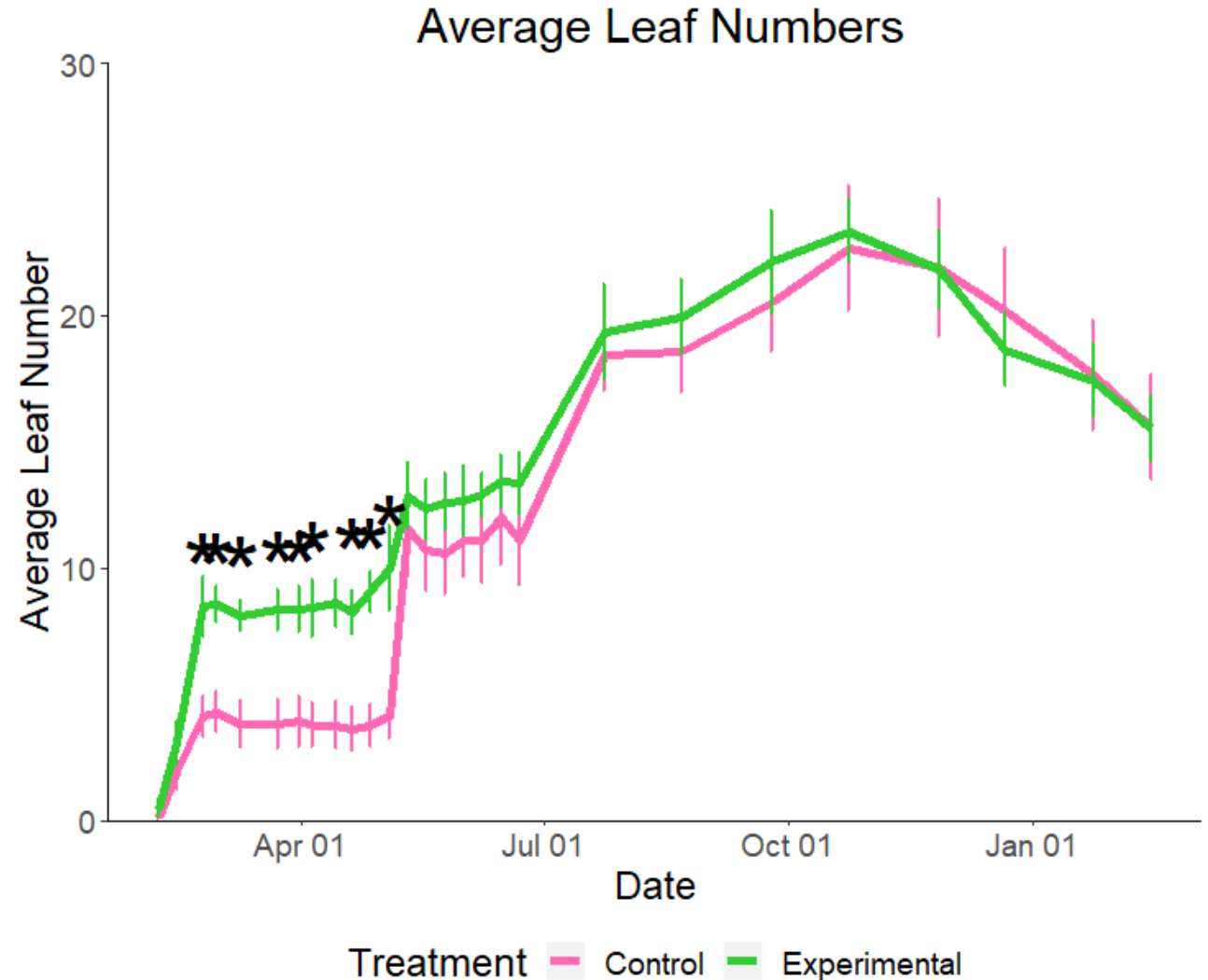
Flowering



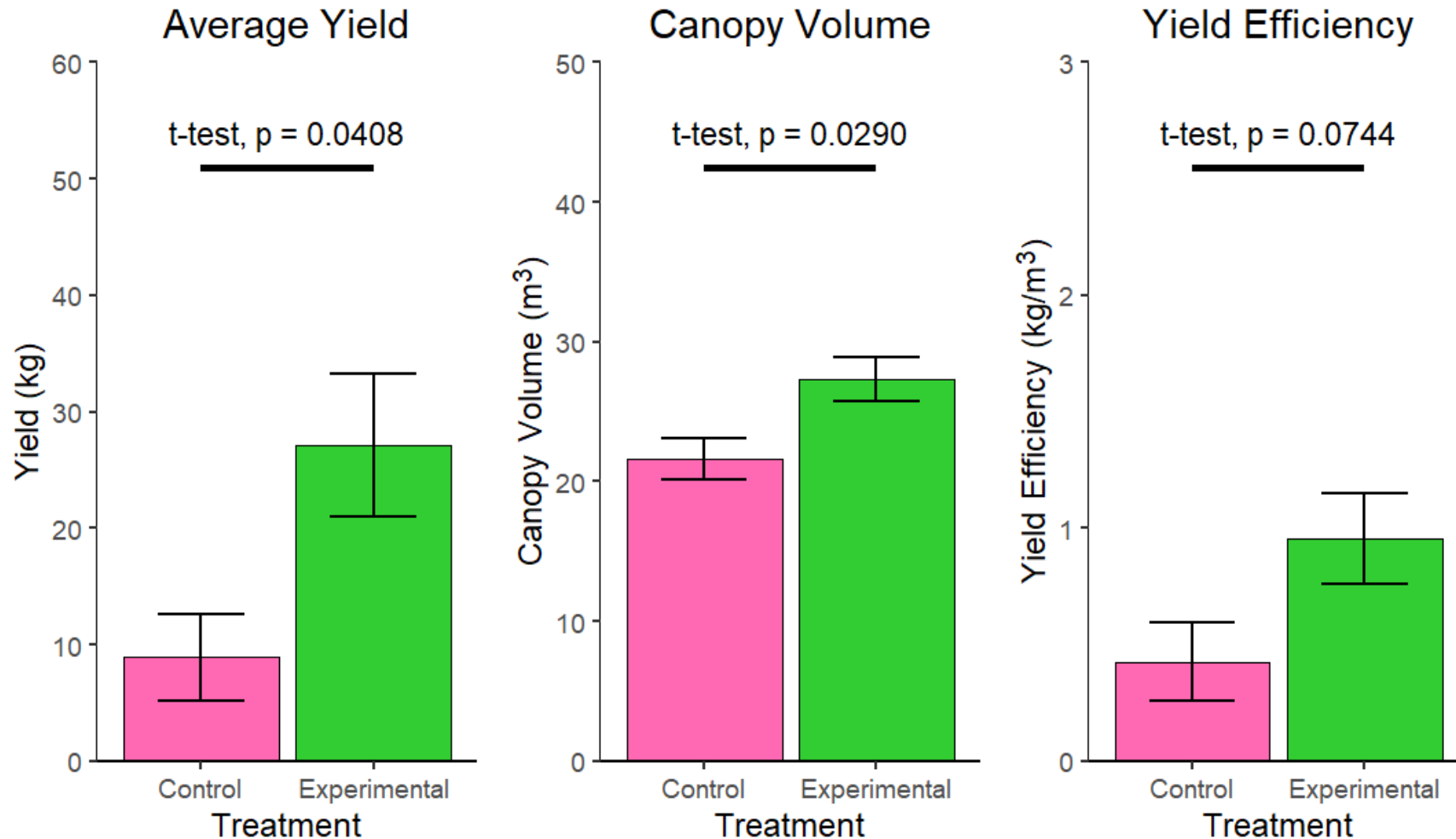
Experimental had higher and more synchronized bud, flower, and fruitlet production

Leaf Production

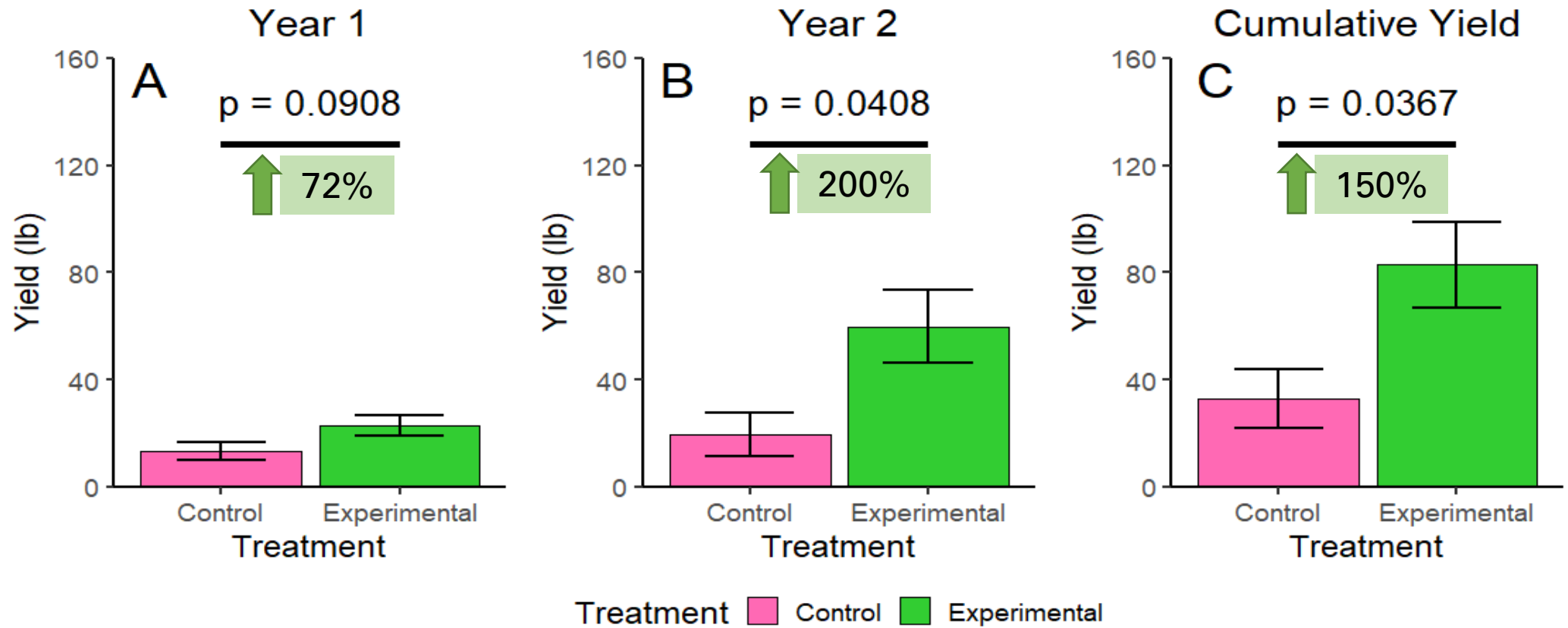
- Leaf production also higher in experimental during spring flush
 - More leaves to support new fruit
- Control caught up in summer flush



Frequent irrigation yielded in more fruit and larger canopy. The yield efficiency was also improved with frequent irrigation

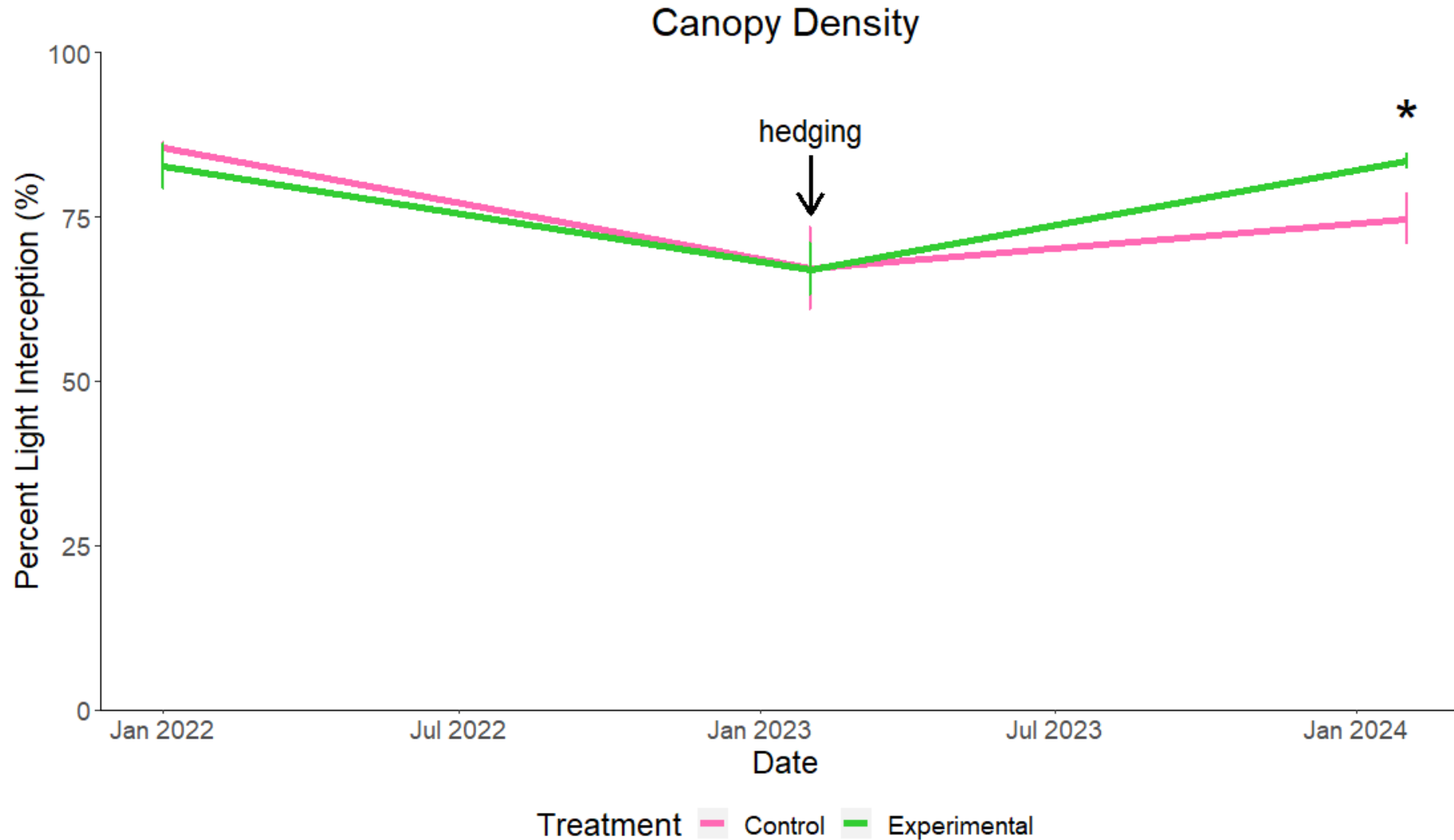


Cumulative Yield



Over the two years, the experimental treatment produced significantly higher yields than the control treatments

Canopy Density



Frequent Irrigation Summary

- High
- High
- Inc
- Mo
-

It is recommended to irrigate everyday. HLB trees need frequent irrigation.

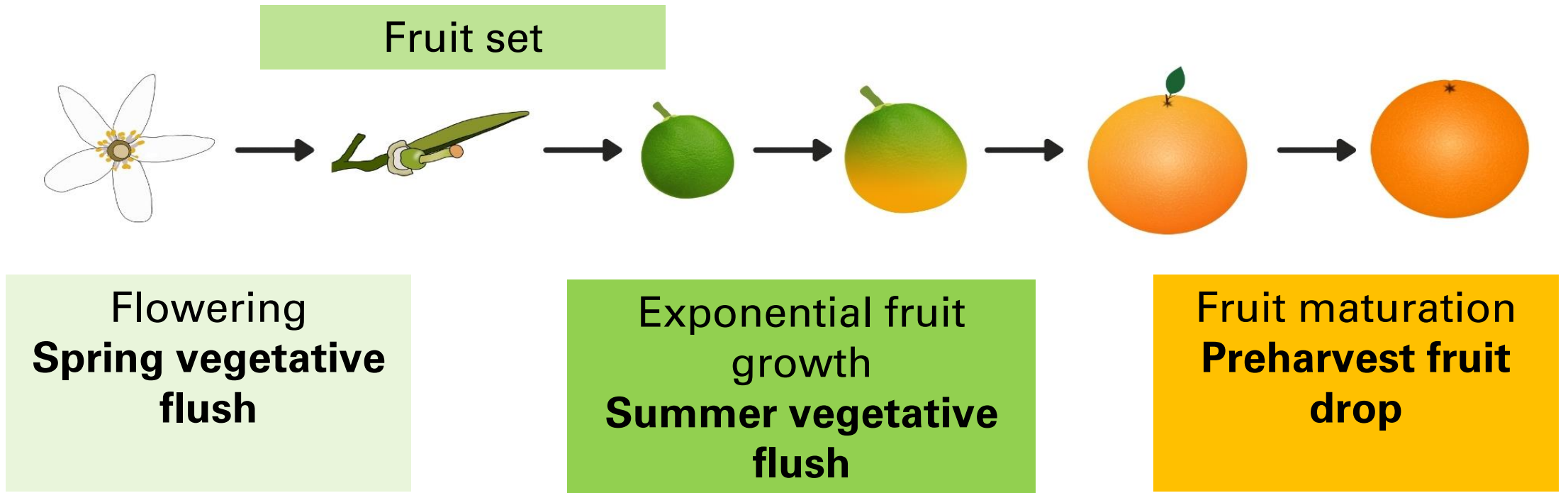
Don't let the tree experience water deficit

New PGR Research

Objective:

To evaluate the efficacy of GA, auxin, and cytokinin when applied in combination according to tree phenology in improving yield and productivity of HLB-affected sweet orange trees

Tree phenology



Field Trial

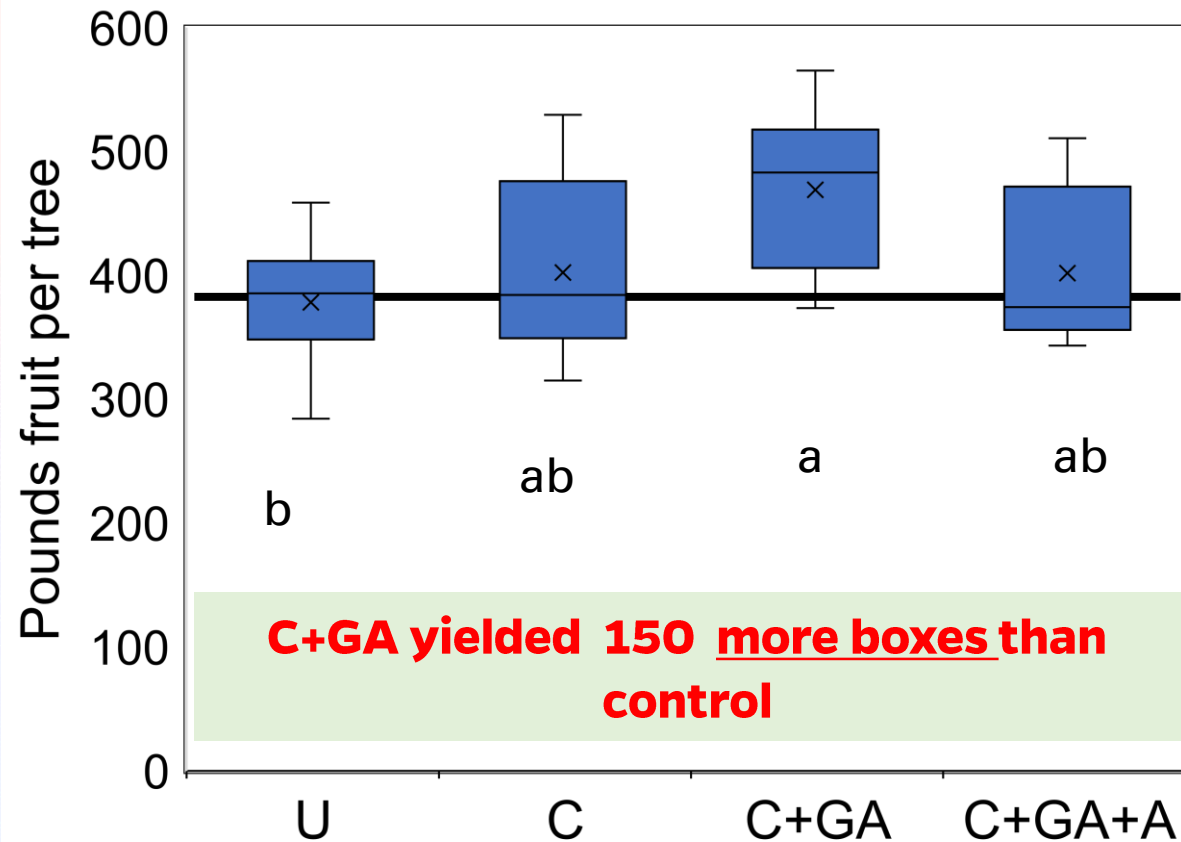
- Fifteen year old 'Hamlin' on swingle
- Trial was initiated in Spring 2022
- Treatments included:
 1. Untreated Control (**U**)
 2. Cytokinin (**C**)
 3. Cytokinin + GA (**C+GA**)
 4. Cytokinin + Prodigiosin + Auxin (**C+GA+A**)

Cytokinin was applied in March, April, May
GA and Auxin was applied in July, September, November
In 2023, all trees were injected with OTC

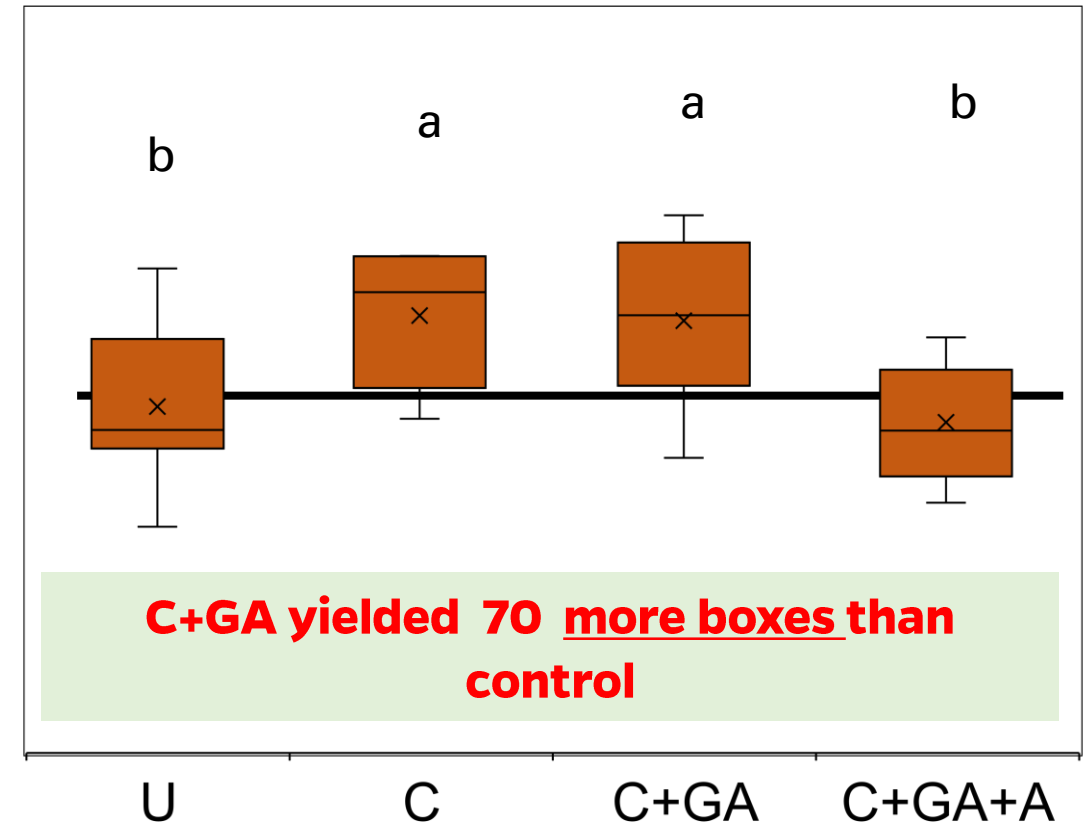
Harvest

The grower collaborator has very low fruit drop, 2,4-D does not seem to be helpful when fruit drop is not an issue.

Yield 2022



Yield 2023



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- Hormonal imbalance in HLB-affected trees
- Timely PGR application can improve productivity, Cytokinin+GA

Thank you!

- Mr. James Shinn
- Valent USA
- Amvac
- CREC grove crew
- Lab staff, post docs, and students



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FUNDED BY THE
FLORIDA LEGISLATURE

