

# Zinc and Potassium research update

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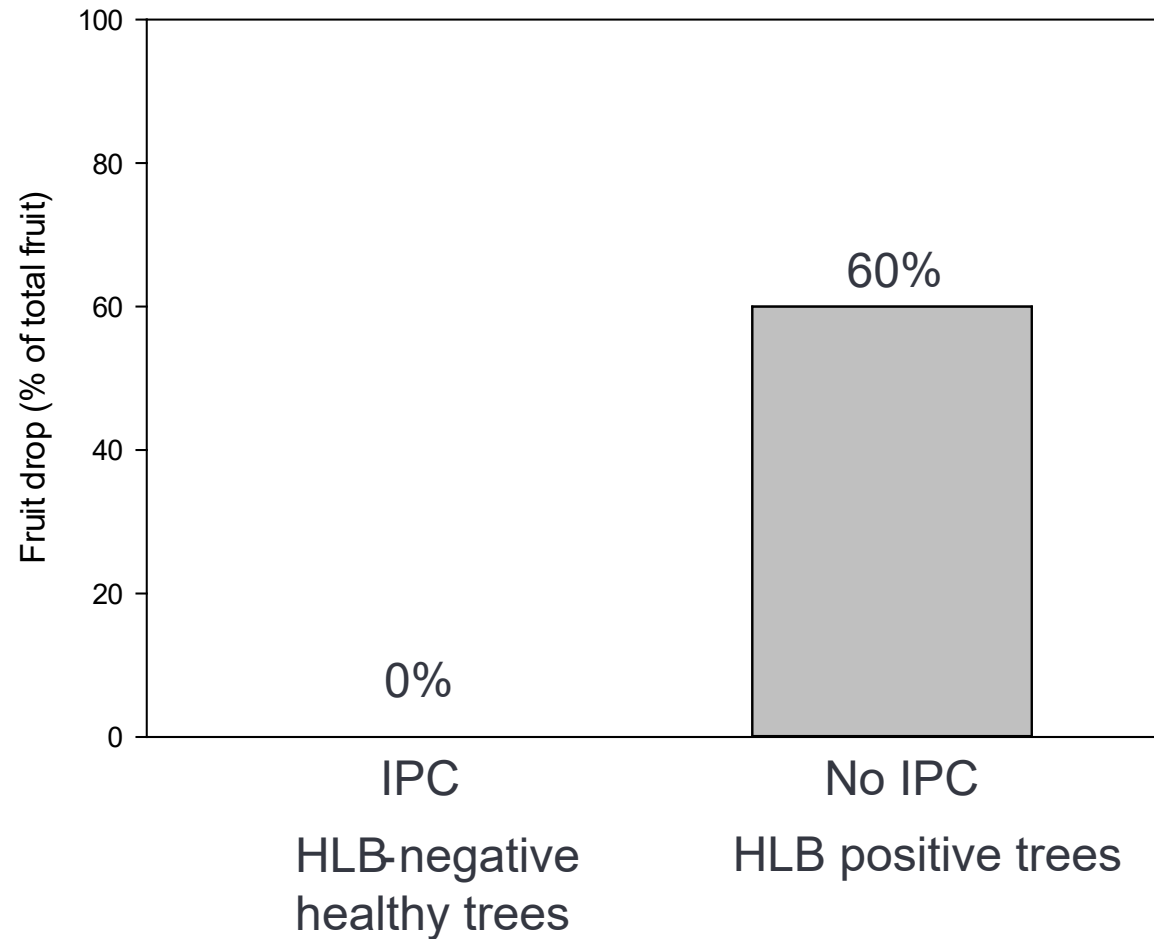
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SWFREC UF/IFAS Immokalee  
Citrus Nutrition day, Jan 22, 2025

# Our main finding

- Over a 5-year study we have found that different formulations of Zinc applied by foliar spray **increase fruit yield by reducing fruit drop** in Hamlin and Valencia oranges. In some cases, combination with Potassium enhances the beneficial effects of Zinc.

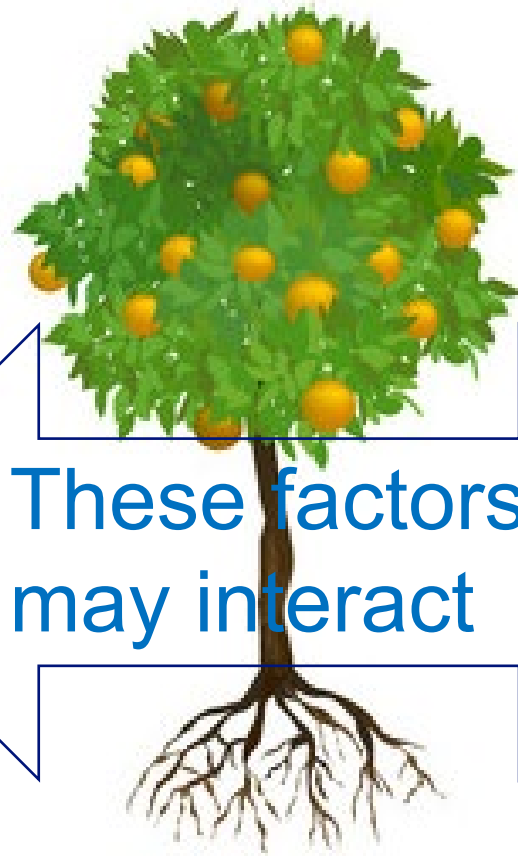
# HLB is a major cause of increased preharvest fruit drop



# Other possible causes of fruit drop?

## Endogenous

- ❖ Loss of root density
- ❖ Altered hormonal balance
- ❖ Off blooms



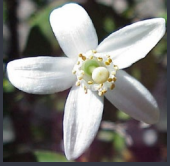
These factors may interact

## Exogenous

- ❖ Other diseases
- ❖ Warmer and drier than normal weather

All related to HLB

March



Late season  
harvest  
Dec-Jan

**HAMLIN**

Previous year's crop

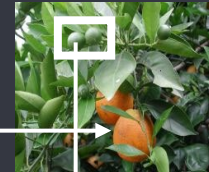
Next year's crop

March



1 year for fruit development

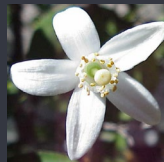
April-May



**VALENCIA**

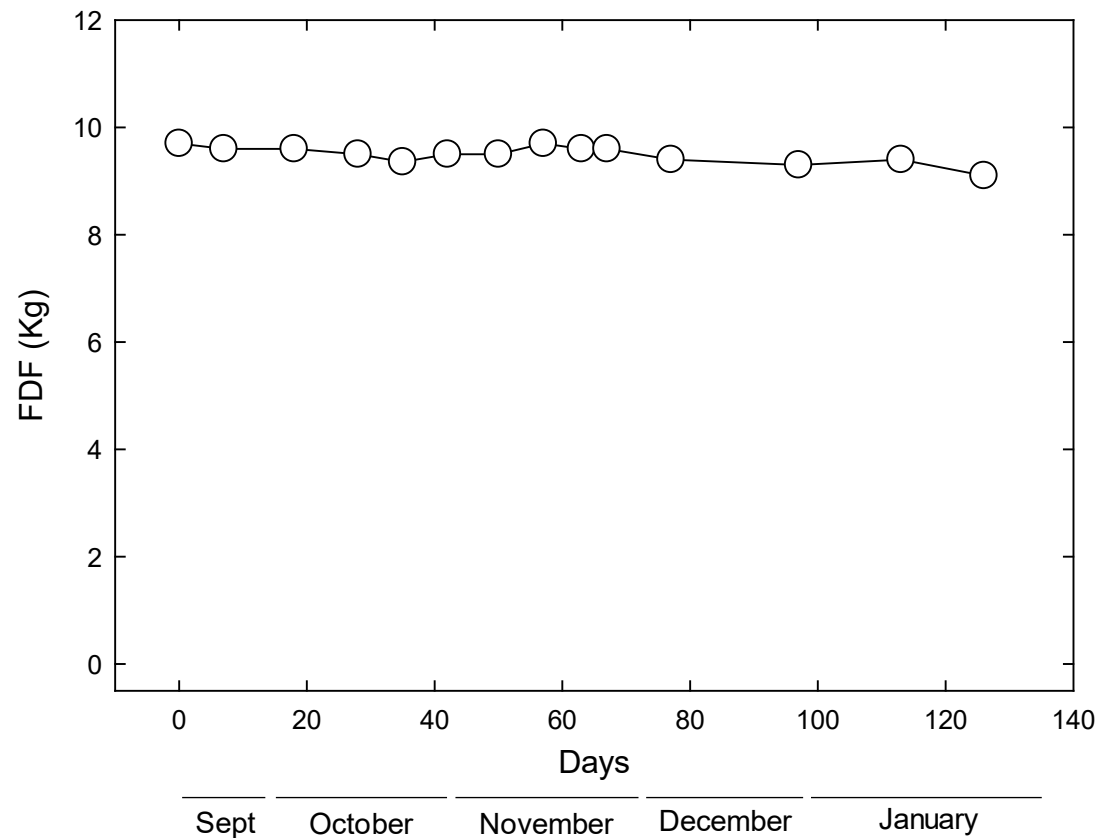
Previous year's crop

Next year's crop



# Fruit retention in healthy Hamlin and Valencia trees

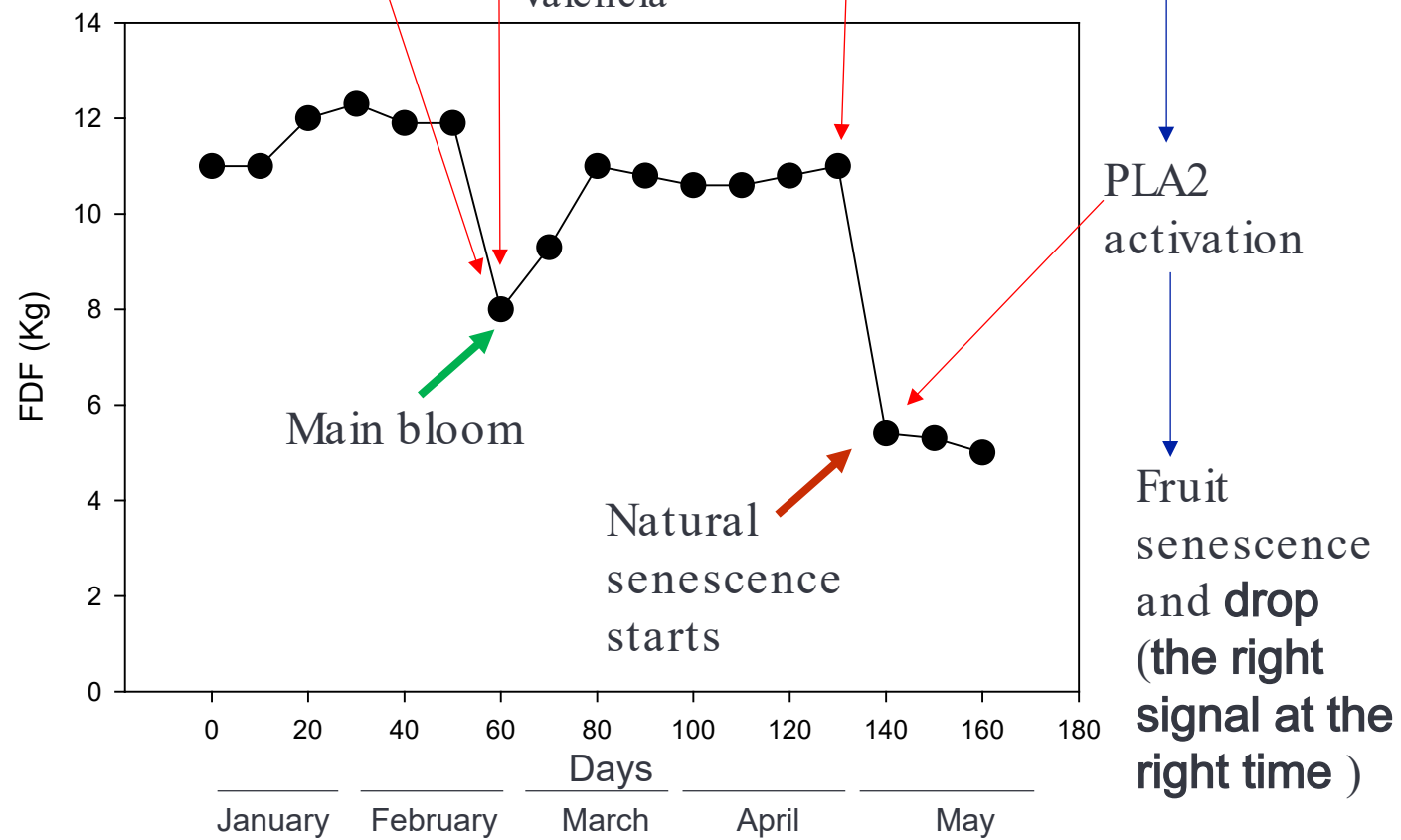
Hamlin



High competence for resources



Valencia



PLA2 activation

Fruit senescence and drop (the right signal at the right time)

# Environmental stress



Endemic  
HLB



The wrong signal  
at the wrong  
time



Massive preharvest fruit drop

## HLB-infected Hamlin



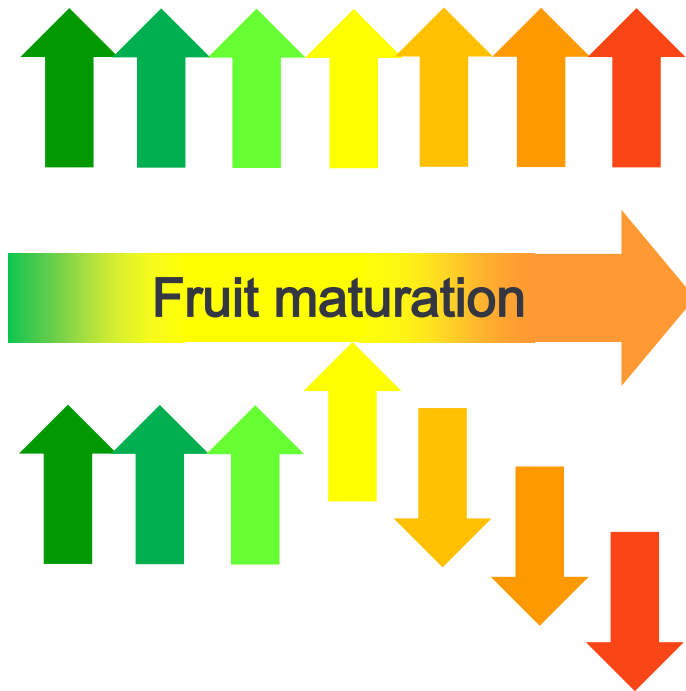
Diversity of developmental stages affects  
hormonal interactions within the tree

**Transient peaks of auxins are observed during fruit maturation**

**The wrong signal at the wrong time**



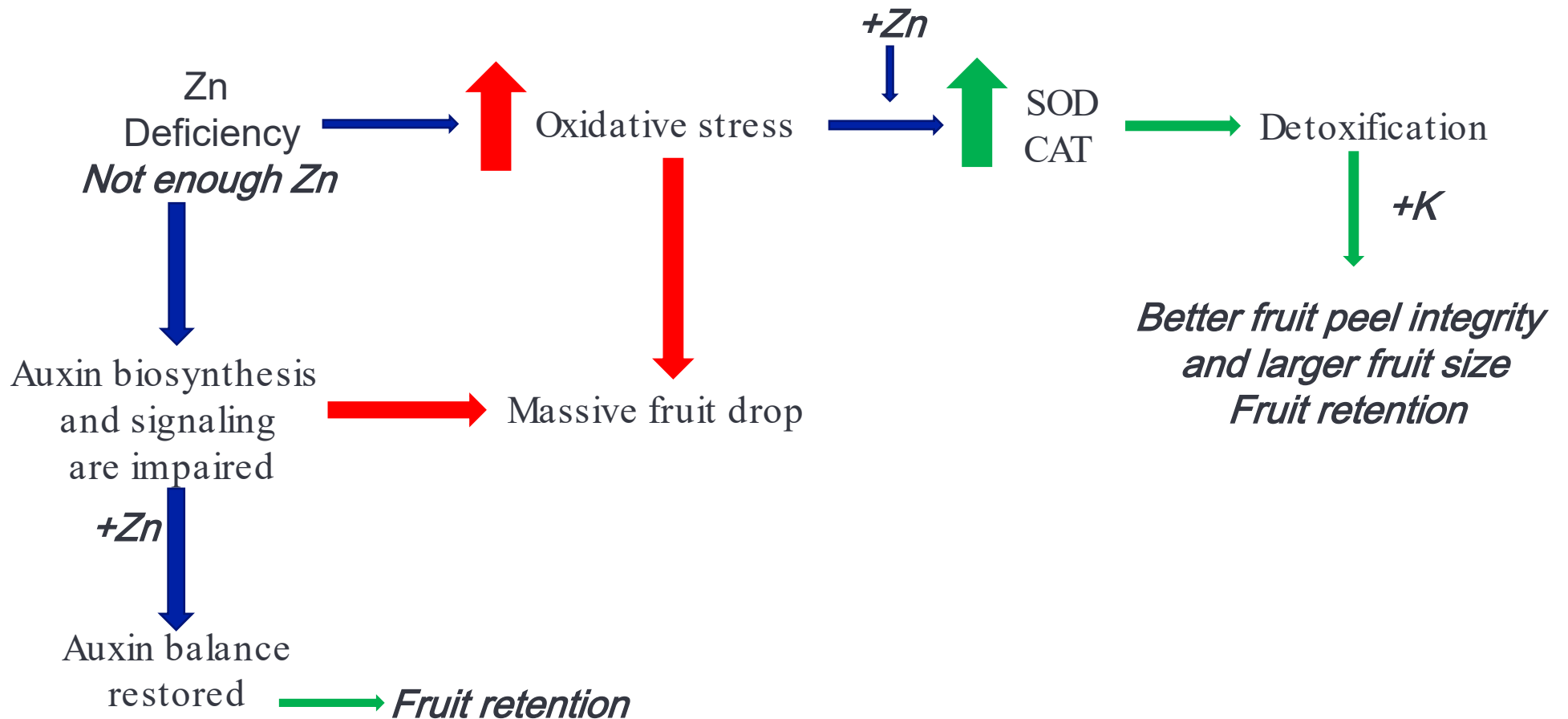
# Our hypothesis: Auxin levels must be maintained high to avoid fruit abscission triggering and drop



Auxin levels **maintained** → No abscission/no fruit drop

Auxin levels **transiently increase** to **decrease** thereafter → Abscission/ fruit drop

# Zn may modulate fruit physiology and retention by maintaining auxin levels. K increases fruit quality



# Zn products

Advanced Liquid Zn Products	Zn Species
FertiZink (400 and 800 ppm) (Nutritional Zn) from TM Nitrogen	Zn hydroxide
NuZinc (400 and 800 ppm) (Nutritional Zn) From TM Nitrogen	Zn Sulfide

Application frequency: 45-day interval (8 applications/year)

Also Zn sulfate and Potassium sulfate at a rate of 50 grams/tree

# HAMLIN, harvest on Jan 10, 2023

10 reps of 5 trees

2 rates:

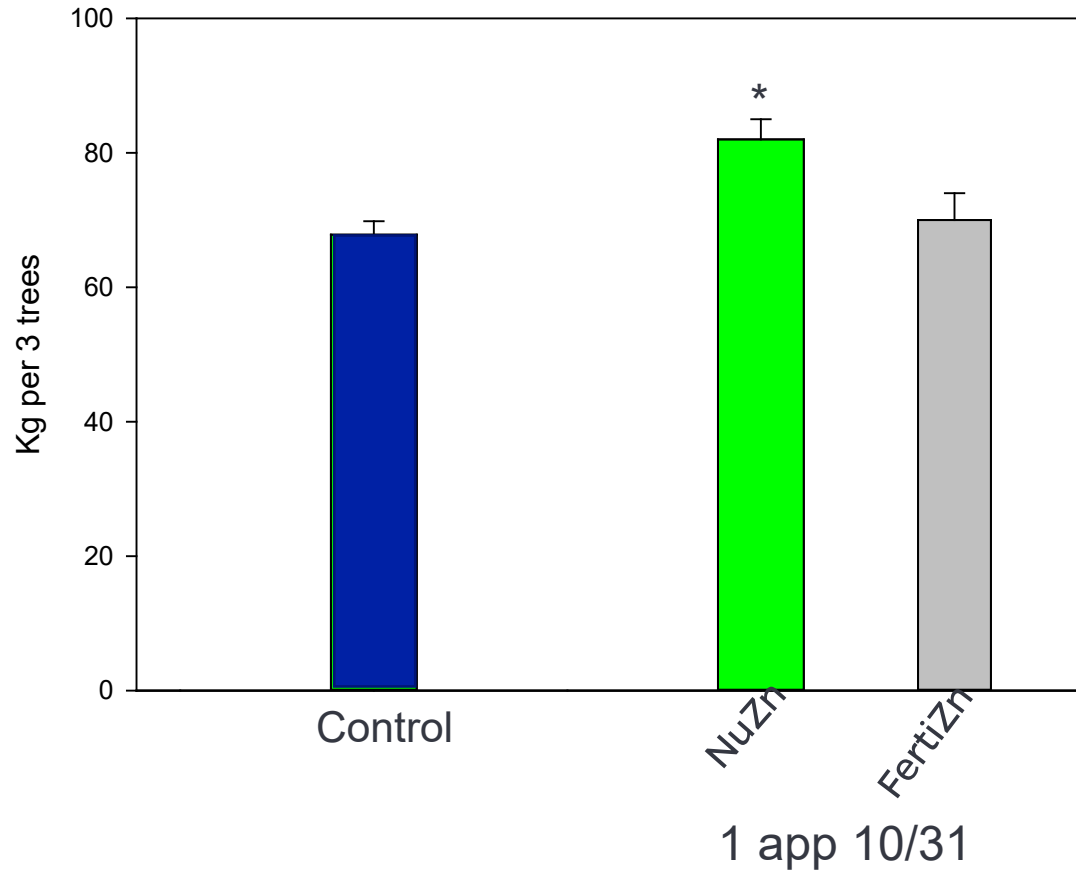
400 ppm

800 ppm

No significant differences between them.

Depicted, 400 ppm

Harvested, Jan 10

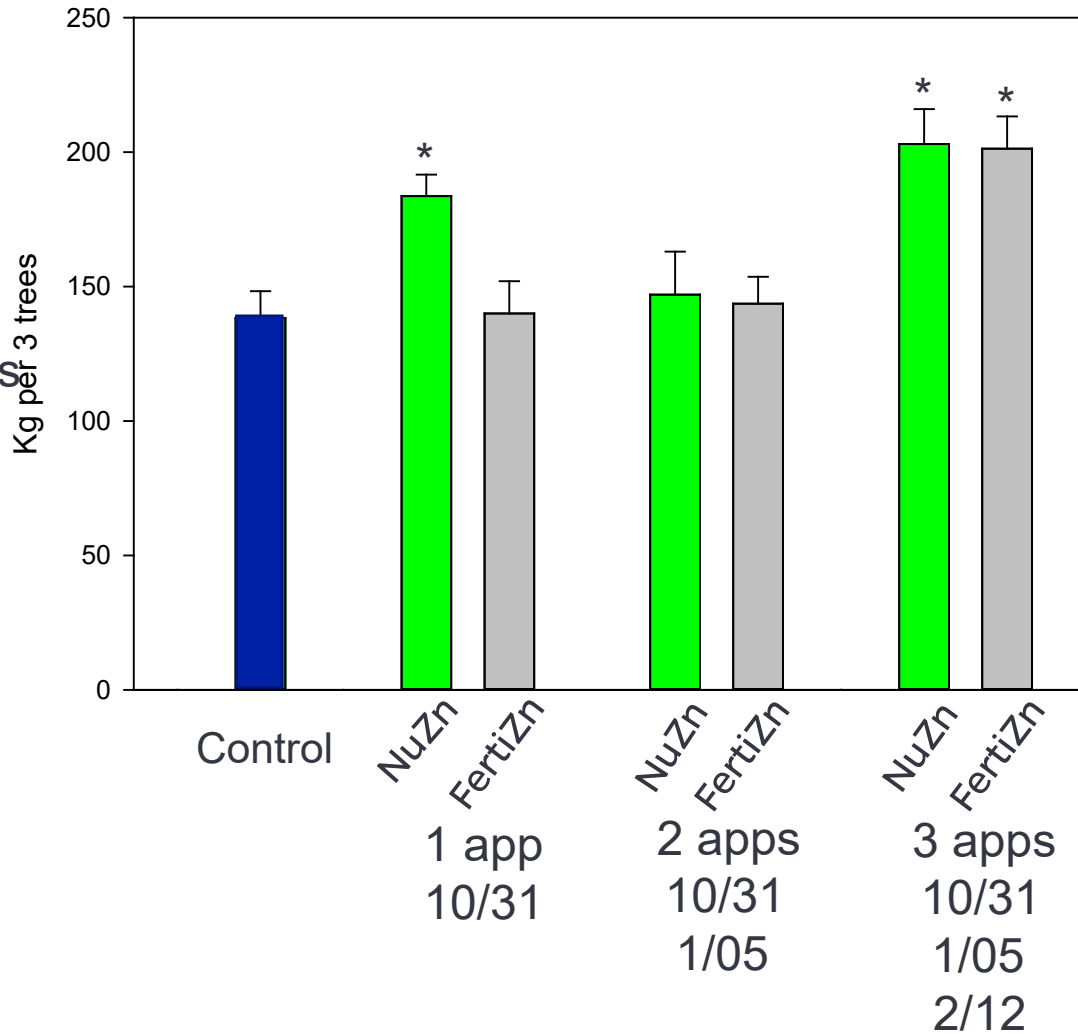


	Brix	Ratio
Control	7.1	12.0
NuZn	8.1	13.9
FertiZn	7.9	12.6

# VALENCIA, harvest on 3/30/2023

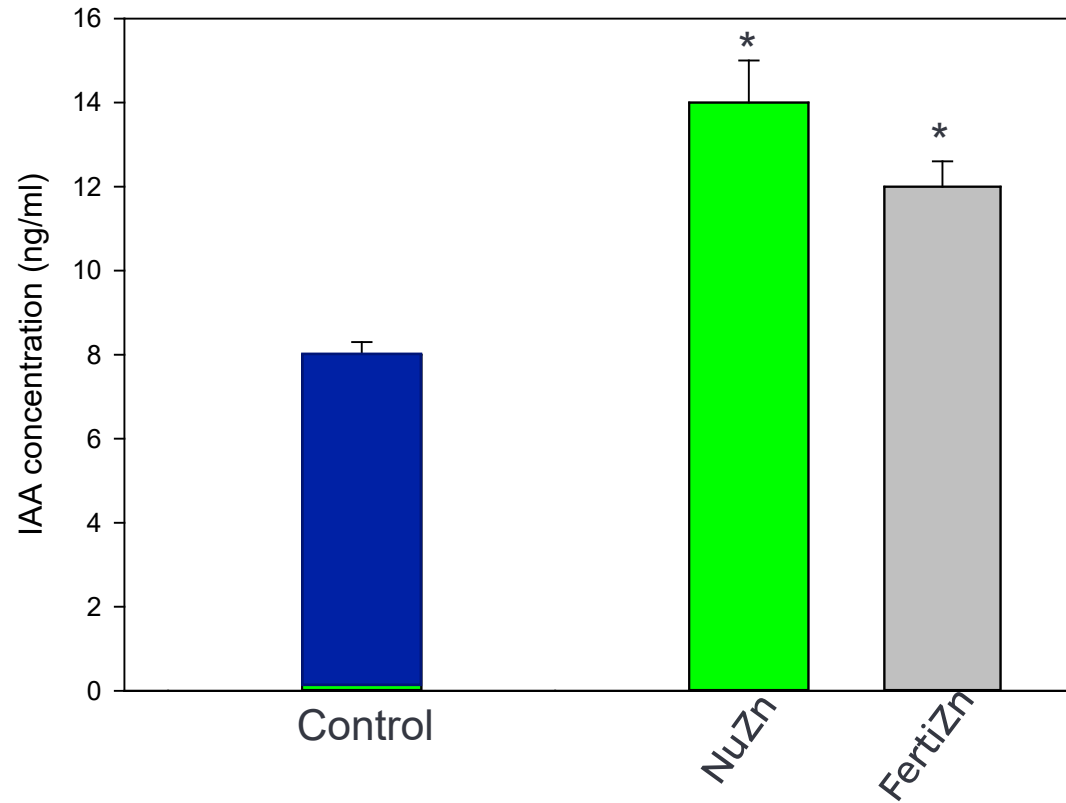
10 reps of 5 trees  
 2 rates:  
 400 ppm  
 800 ppm

No significant differences  
 between them.  
 Depicted, 400 ppm



		Brix	Ratio
	Control	8.1	9.7
1 app	NuZn	8.1	11.0
	FertiZn	7.8	10.5
2 apps	NuZn	8	10.7
	FertiZn	8	9
3 apps	NuZn	8.5	10.6
	FertiZn	8.5	10.7

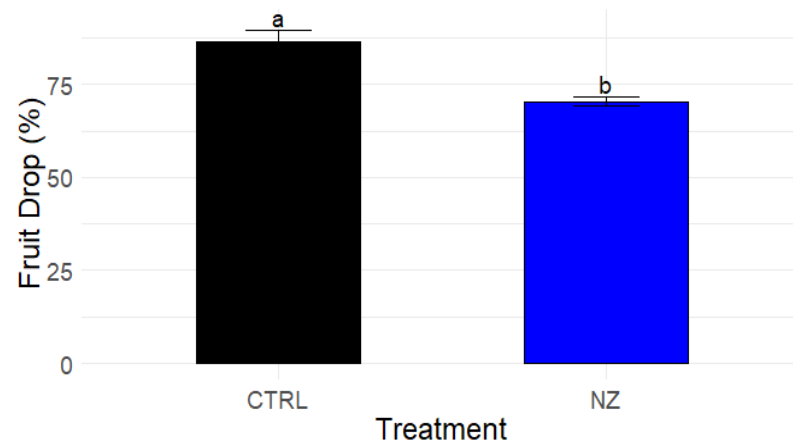
# VALENCIA, Auxin content in mature fruit flavedo



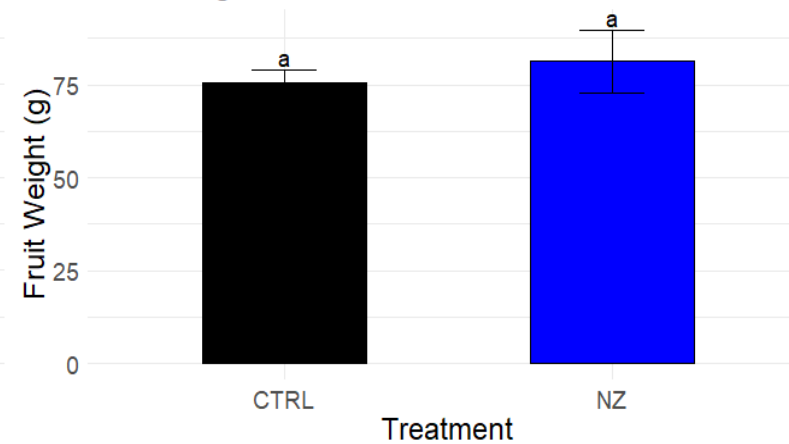
3 apps  
10/31  
1/05  
2/12

# HAMLIN, December 2024

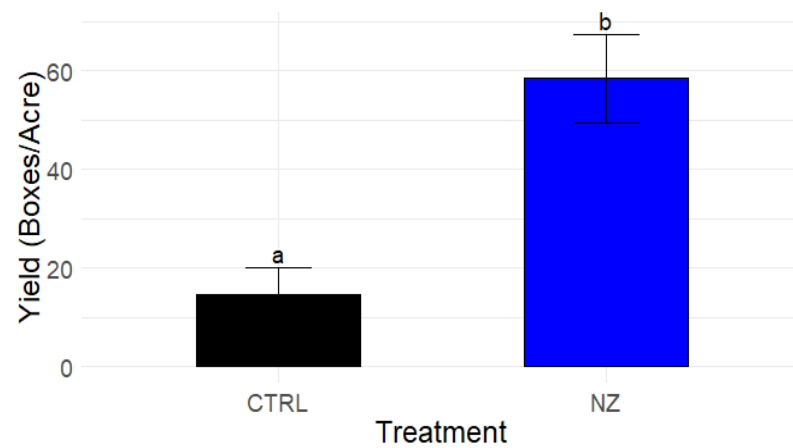
**A** FD: CTRL vs NZ



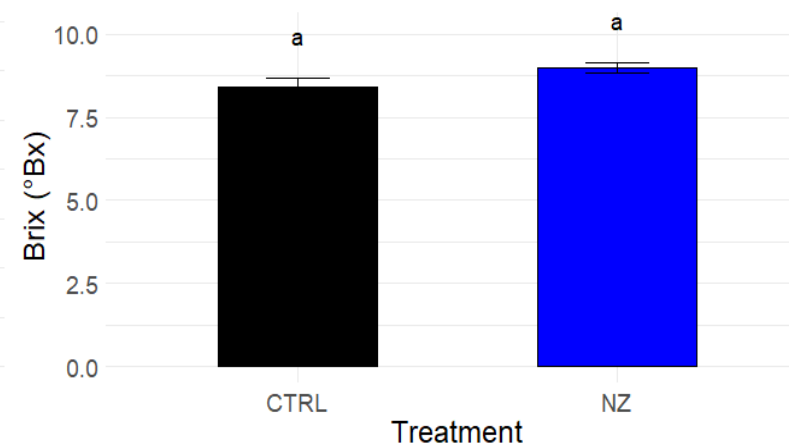
**B** Fruit Weight: CTRL vs NZ



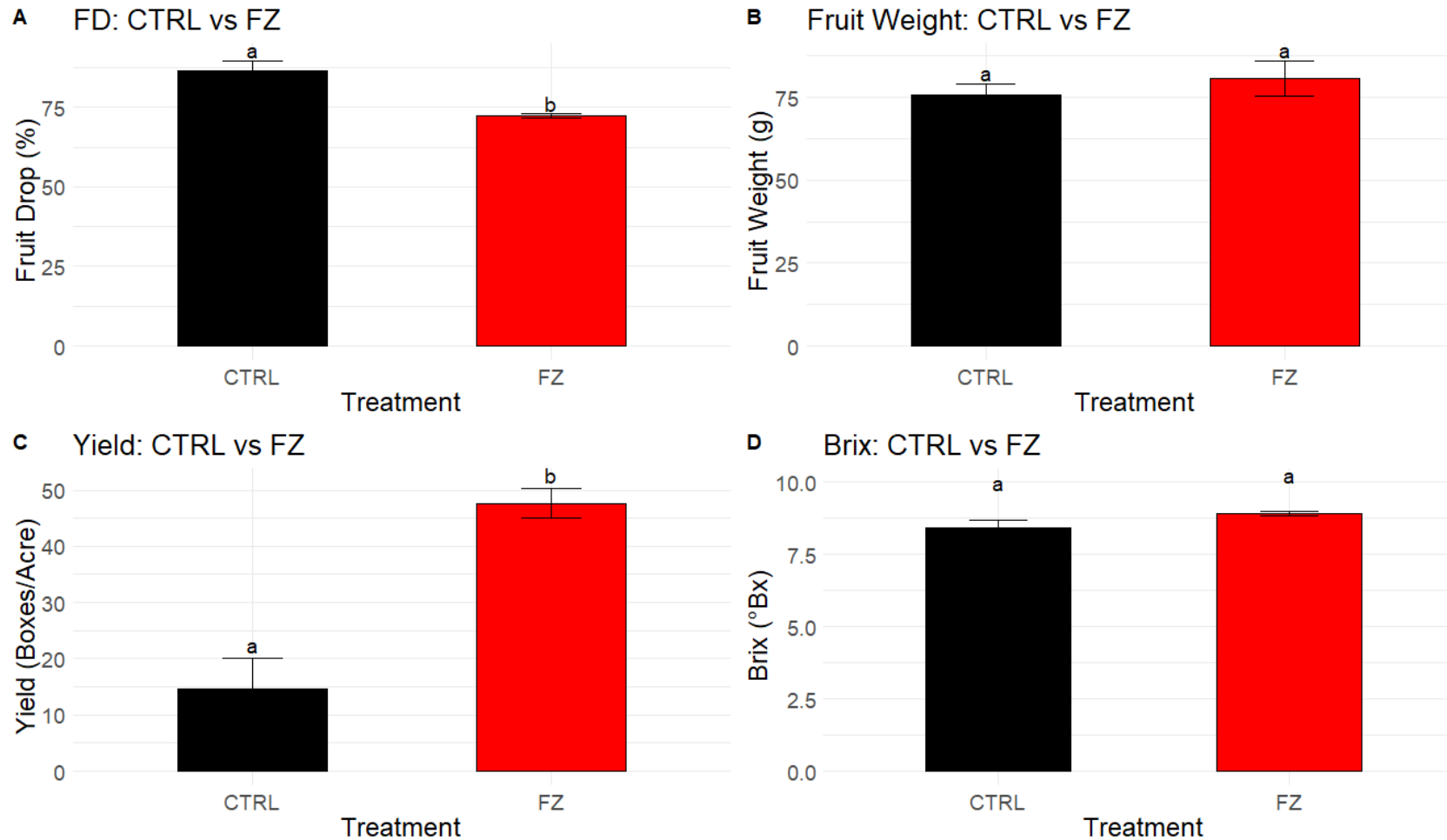
**C** Yield: CTRL vs NZ



**D** Brix: CTRL vs NZ



# HAMLIN, December 2024





# Summary

- Valencia fruit yield and quality (2022-2023): Particulate Zn treatments increased yield by 53% as compared to controls and by 10% as compared to trees treated with Zn Sulfate. Brix was not significantly affected, but the brix to acid ratio was increased (around 11 as compared 9.7)
- Hamlin fruit yield (Jan 2024): A significant increase in yield was observed with FertiZinK and NuZinK as compared to Zn Sulfate.
- Hamlin Fruit drop was reduced by ~30% in all treatments until December 2024. Increase in yield is directly related to better fruit retention. This is likely due to maintained auxin levels in the fruit flavedo.
- Overall tree health was improved by foliar application of Zn. Particulate Zn formulations (Fertizink and Nuzinc) improved tree health better than Zinc Sulfate standard. The better the tree health, the better the results. Currently we are assaying Zn applications in OTC-treated trees. As they are in better shape, we expect more fruit retention and more fruit yield as a result of OTC and Zn treatments.

# Thank You



Grants  
#21-007  
#22-002

- Swadesh Santra, UCF
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- Mark Ritenour, UF, IRREC Fort Pierce
- Tripti Vashisth, UF, CREC Lake Alfred

