

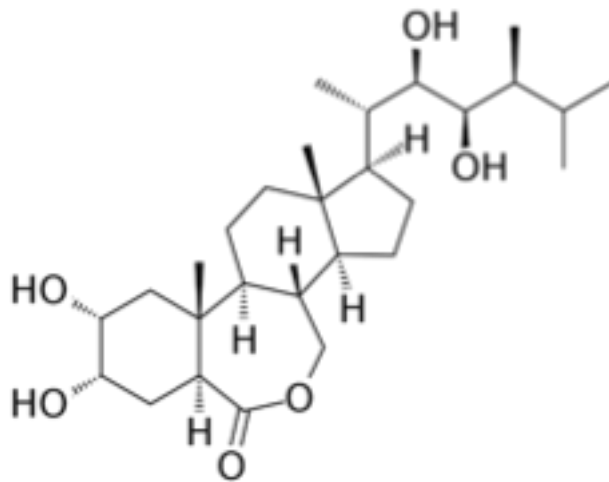
# Initial observations on the effect of Homobrassinolide on HLB-infected trees in Florida

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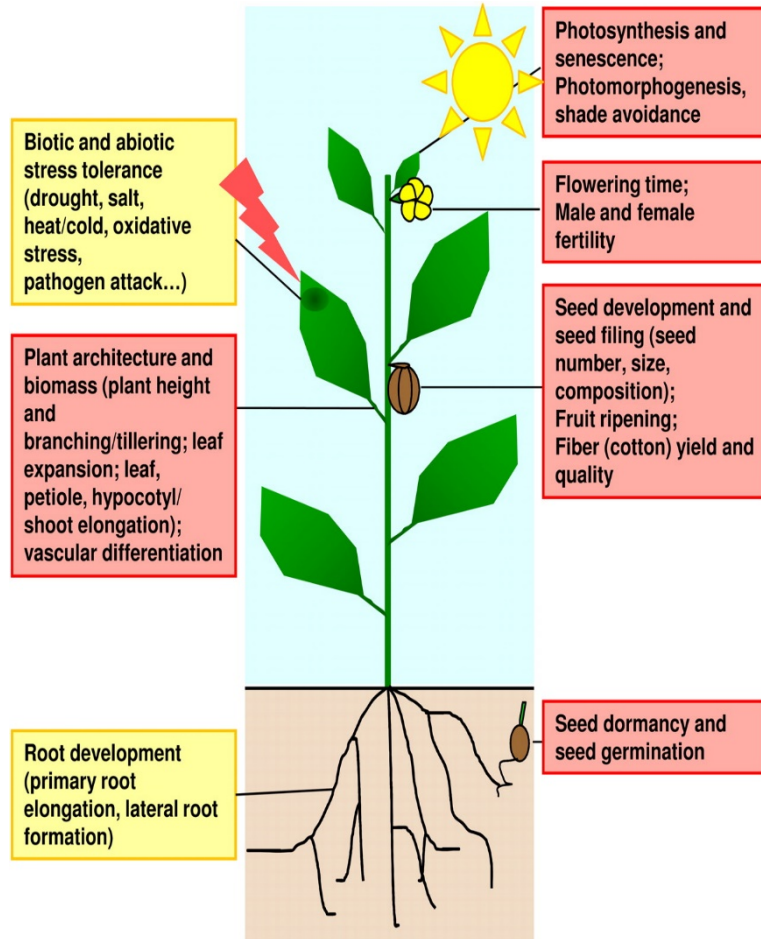
Fernando Alferez, Tripti Vashisth, Christopher Vincent  
UF-IFAS

# Brassinolides

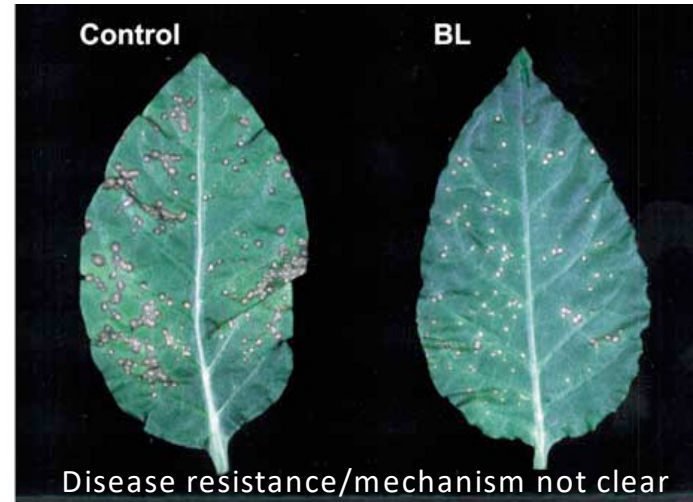
- Brassinolides (BRs) are a class of growth-promoting steroidal phytohormones.
- BRs control almost all aspects of plant growth and development, and also play significant role in plant adaptation to biotic and abiotic stresses.
- BR analogs are easy to produce and commercially available. HBr is available in the USA.



# Effects on other crops

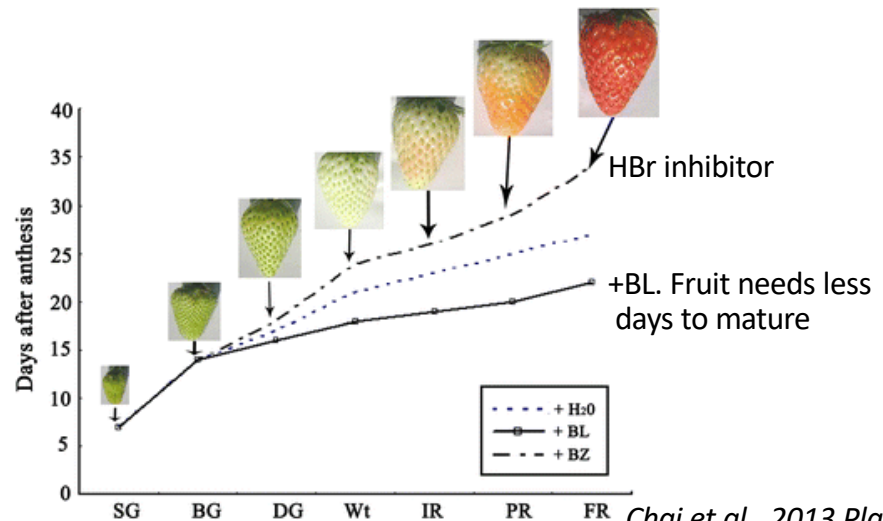


Vriet et al., 2012 Plant Cell



Nakashita et al., 2003 Plant Journal

Advances maturation in strawberry



Chai et al., 2013 Plant Growth Reg.

Could we use HBr in citrus?

## RESEARCH ARTICLE

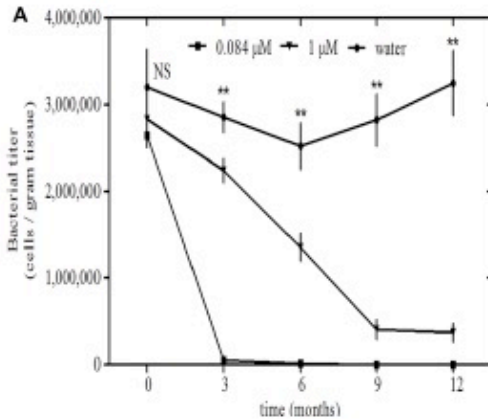
# *'Candidatus Liberibacter asiaticus'*, Causal Agent of Citrus Huanglongbing, Is Reduced by Treatment with Brassinosteroids

Eduardo Canales<sup>1☯</sup>, Yamilet Coll<sup>2☯</sup>, Ingrid Hernández<sup>1</sup>, Roxana Portieles<sup>1</sup>, Mayra Rodríguez García<sup>1</sup>, Yuniór López<sup>1</sup>, Miguel Aranguren<sup>3</sup>, Eugenio Alonso<sup>4</sup>, Roger Delgado<sup>4</sup>, Maritza Luis<sup>3</sup>, Lochy Batista<sup>3</sup>, Camilo Paredes<sup>3</sup>, Meilyn Rodríguez<sup>1</sup>, Merardo Pujol<sup>1</sup>, María Elena Ochagavía<sup>1</sup>, Viviana Falcón<sup>1</sup>, Ryohei Terauchi<sup>5</sup>, Hideo Matsumura<sup>6</sup>, Camilo Ayra-Pardo<sup>1</sup>, Raixa Llauger<sup>3</sup>, María del Carmen Pérez<sup>7</sup>, Mirian Núñez<sup>7</sup>, Melissa S. Borrusch<sup>8</sup>, Jonathan D. Walton<sup>8</sup>, Yussuan Silva<sup>9</sup>, Eulogio Pimentel<sup>1</sup>, Carlos Borroto<sup>1</sup>, Orlando Borrás-Hidalgo<sup>1\*</sup>



# Canales et al., 2016 main findings

## Greenhouse

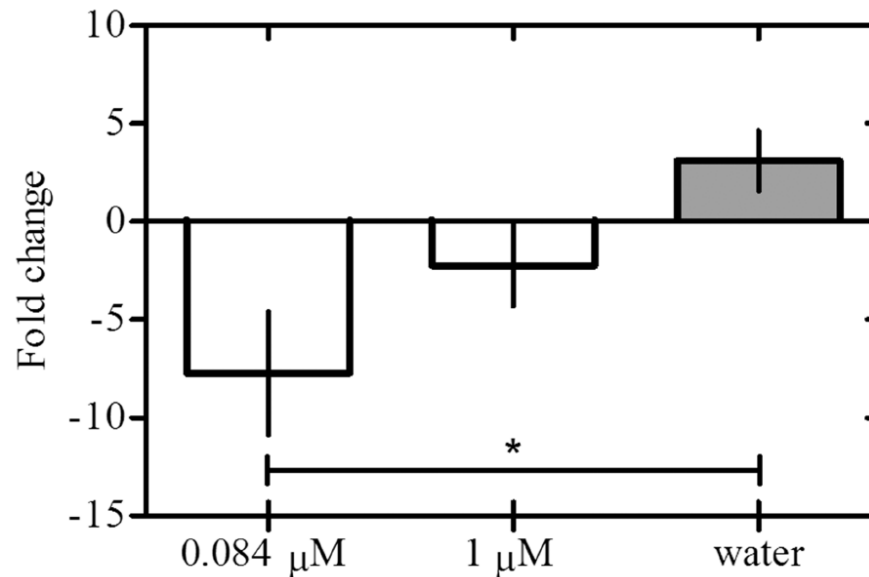


## Mexican lime



## Field

### Valencia trees



After 12 months  
of applications



# Our approach

- Replicated experiments in Immokalee (SWFREC) and Lake Alfred (CREC).
- Valencia adult trees on Swingle. We could not use younger plants in greenhouse this year due to hurricane impact.
- 45 trees at each location, 5 reps of 3 trees each.
- Biweekly application of the two concentrations of HBr, starting in December-January.



# Results



Ct values did not change  
No significant effect on bacteria population so far

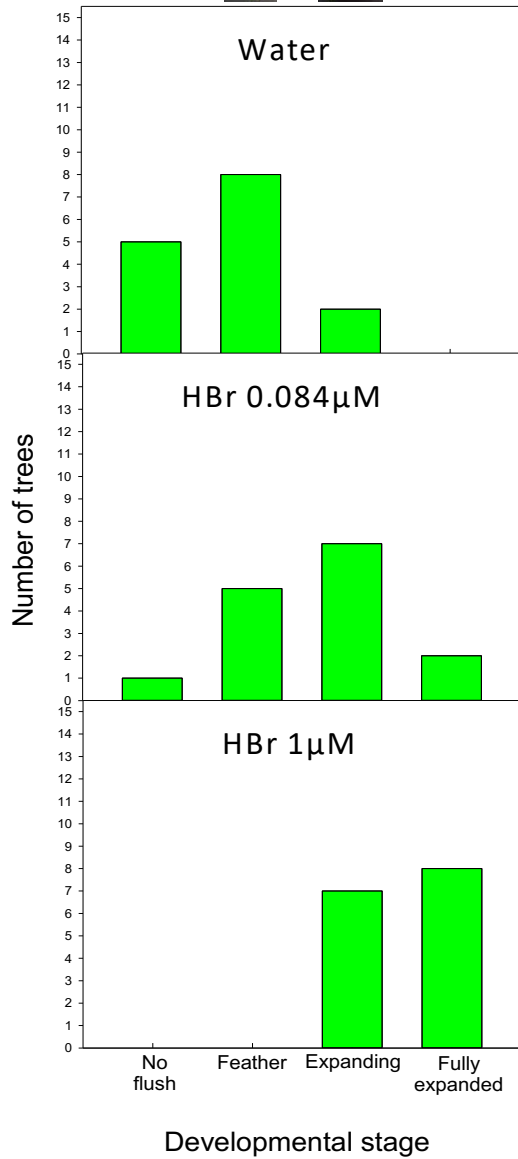


# Phenological results

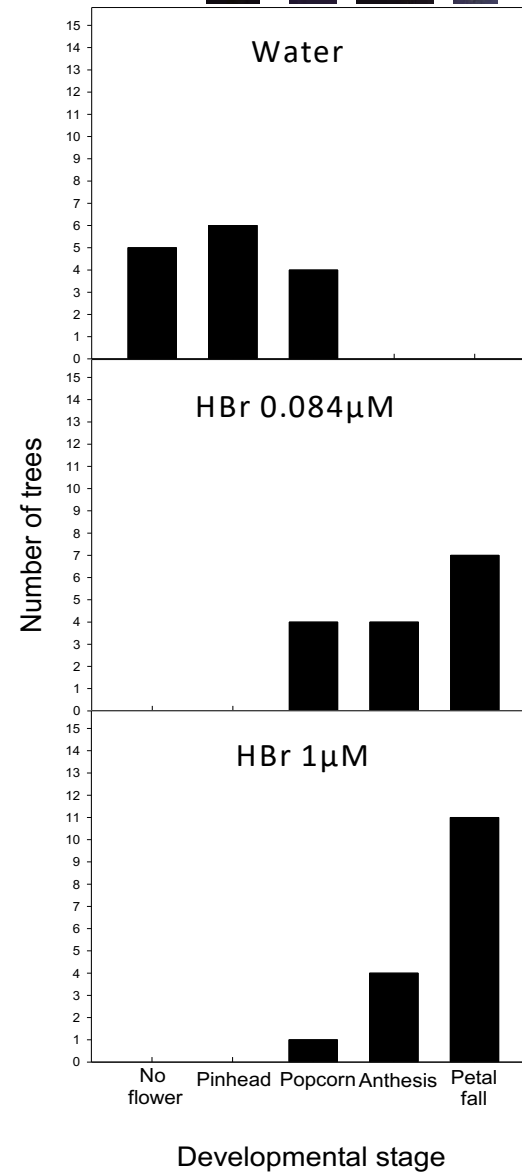
- Earlier blooming/flushing.
- Advancement in fruit coloration.
- More chlorophyll content in new leaves. Enhanced photosynthesis.
- Less fruit drop.
- Increase in yield.

Feb 14, 2018

## Flushing



## Flowering



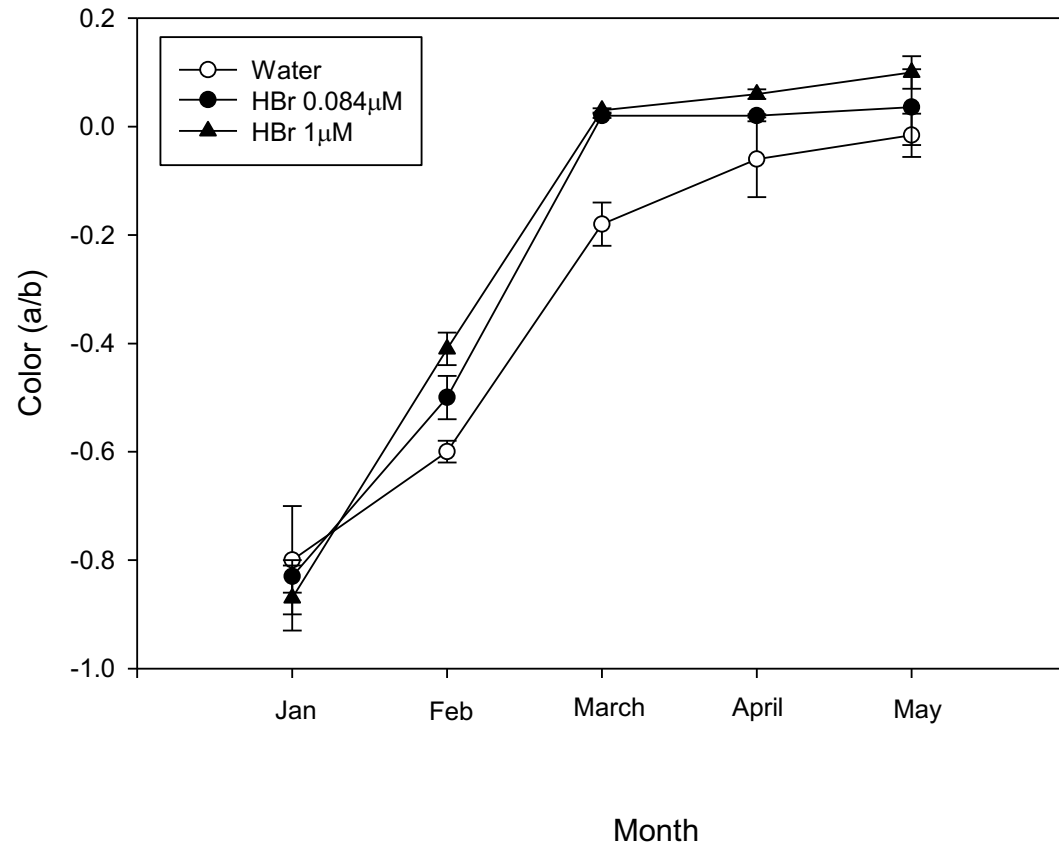
Feb 14, 2018

Water

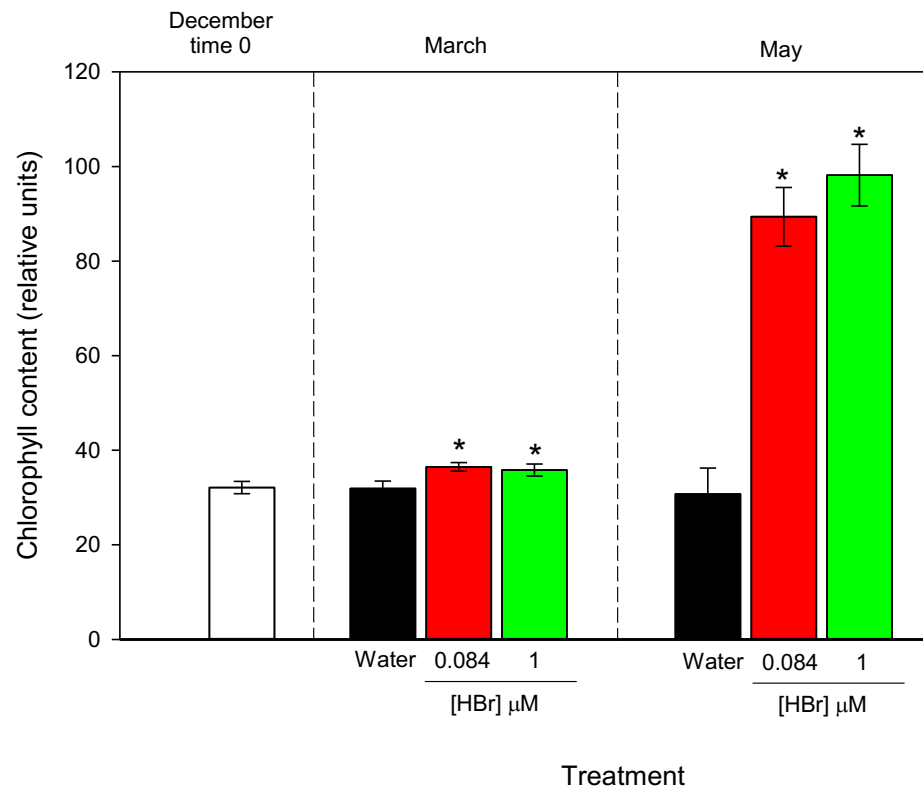
HBr 1 $\mu$ M



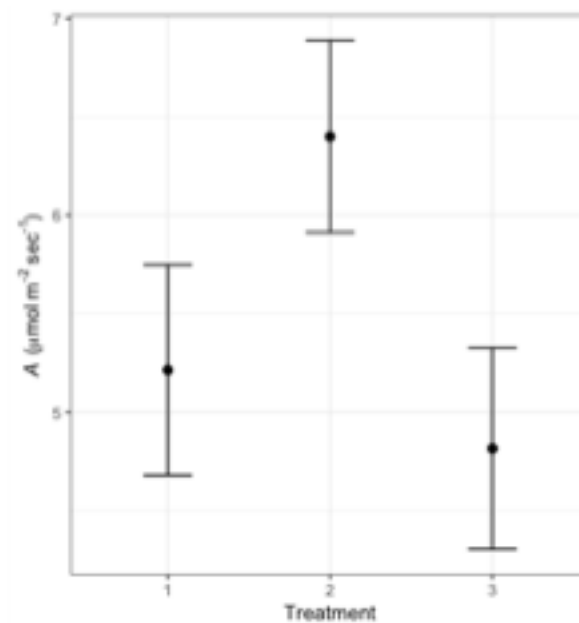
## Peel color developed earlier after treatment

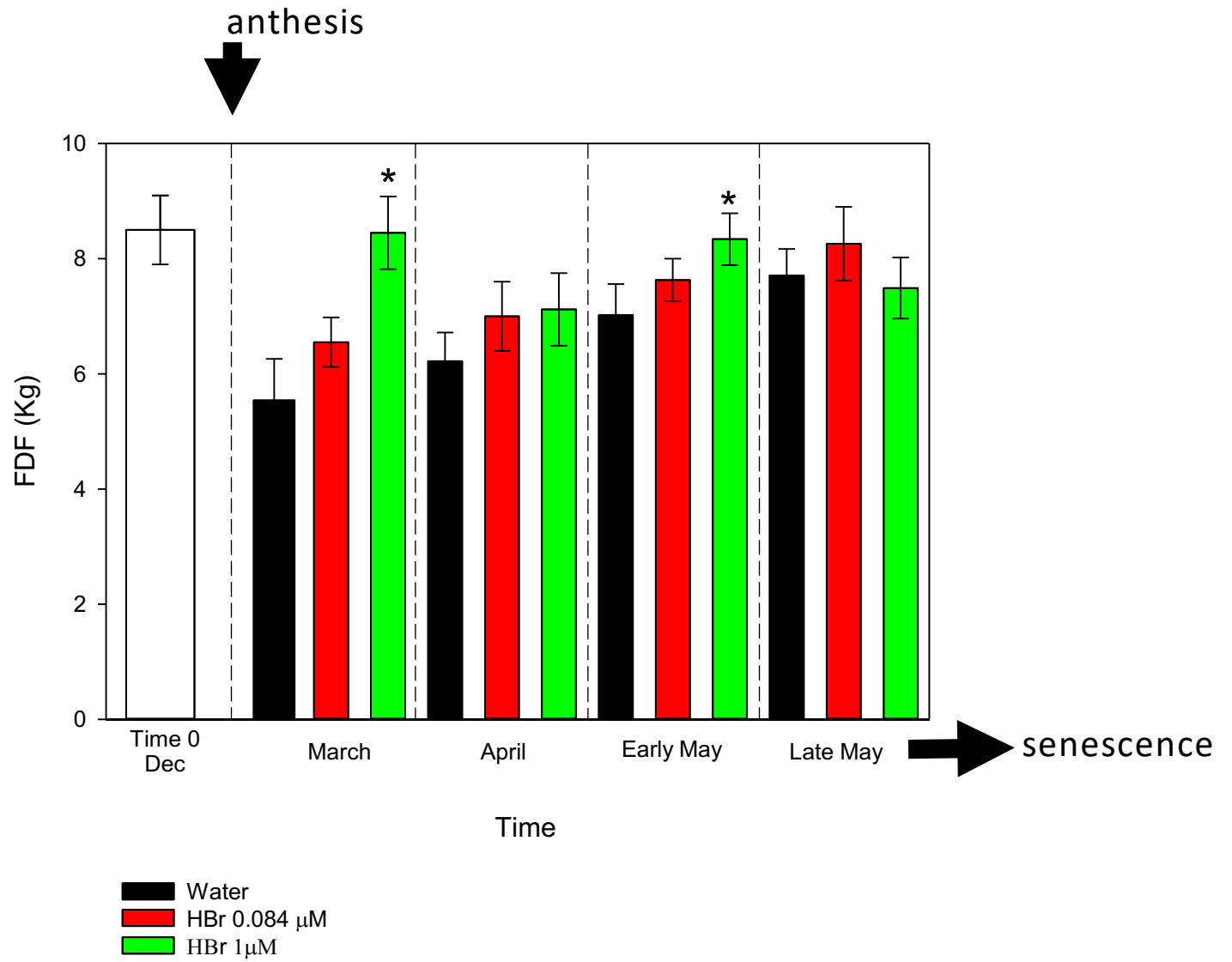




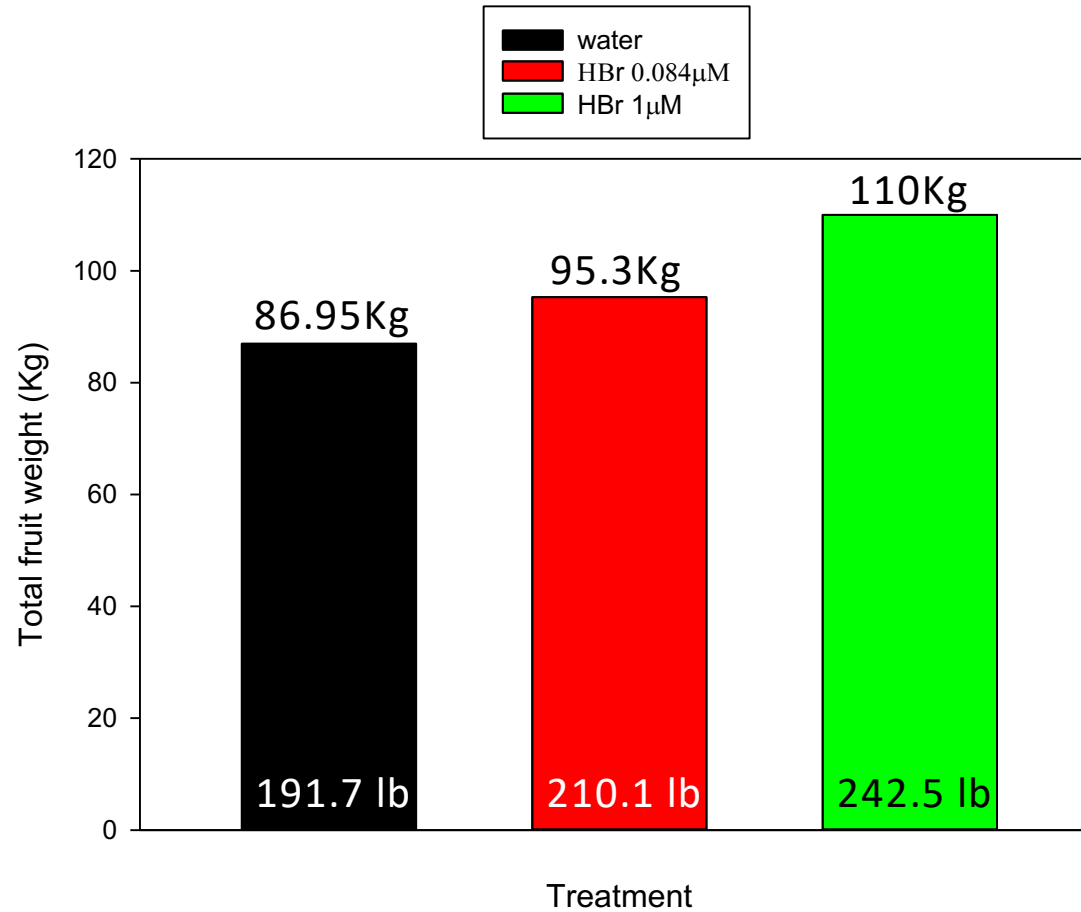


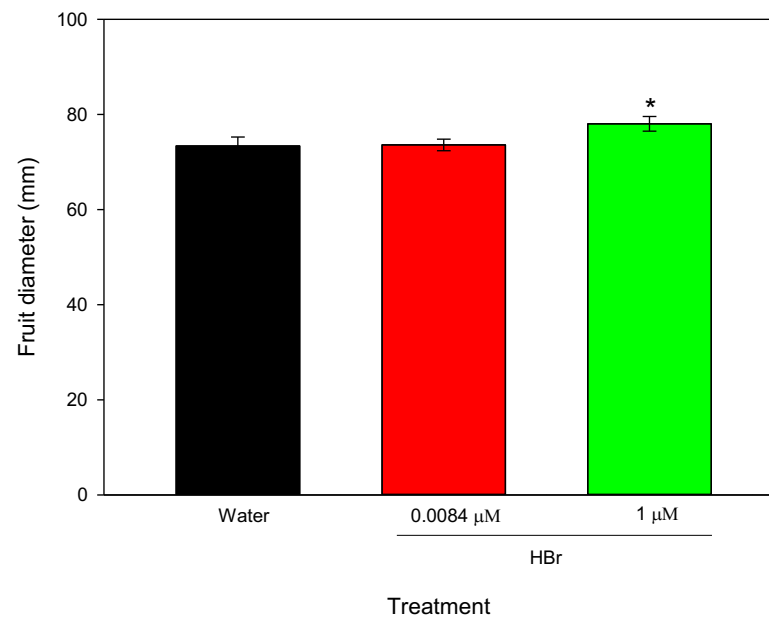
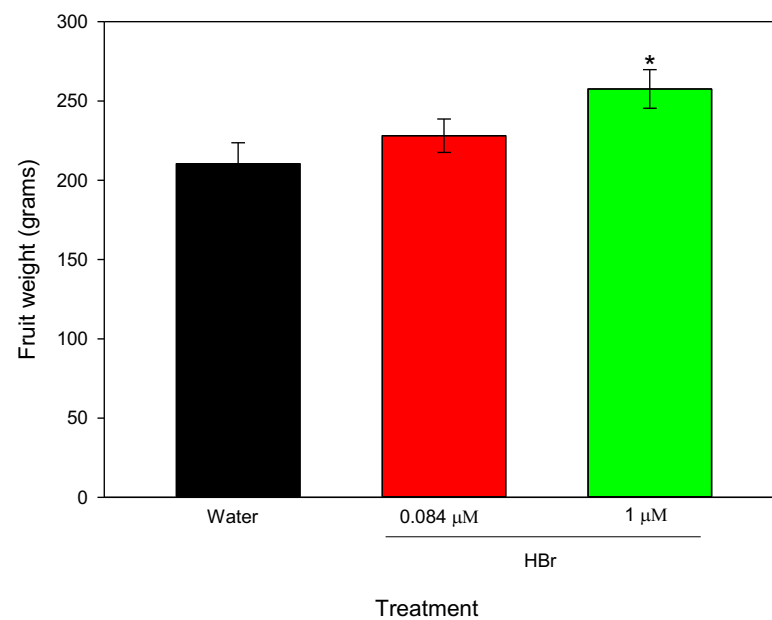
## Photosynthesis rate





Fruit yield increased around 20% at harvest (May)







# Conclusions

- So far, we have not observed the reduction in bacteria titer. Three possibilities at least:
  - It is too soon
  - Our formulation (HBr) is different from theirs (eBr)
  - They used younger trees (2 year old trees)
- Other effects on tree health and fruit quality are visible and worth to study in more depth.

Dosage used were

-2.4 fl oz / 100 gallons

-24 fl oz/ 100 gallons

We got positive results with both

Applied every 15 days

(manufacturer recommends only one application to fruit at marble stage)

At this time we are assaying other dosages/timing.

For example, based on manufacturers recommendations (26fl oz per acre), we are scaling down different rates and apply only at desired stages to ideally produce these effects:

-Before flowering (after winter). To maximize uniform blooming.

-After fruit set. To increase fruit set.

-At fruit color change. To accelerate coloration.

-At the end of the season. To reduce fruit drop.

# Acknowledgements

## Citrus Research Initiative



Repar Corporation



### Vincent's Lab CREC, Lake Alfred

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- Christopher Vincent
- Myrtho Pierre

### Vashisth's Lab CREC, Lake Alfred

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- Tripti Vashisth
- Taylor Livingston
- Marissa Caspari
- Wesley Webb



### Alferez's Lab and Citrus Hort Program SWFREC/Immokalee

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- Fernando Alferez
- Tim Gast
- Daniel Boakye
- Christine Darbouze
- Jorge (George) Ocanas
- Jose Rosas

