

**Citrus Research and Development Foundation, Inc.**

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# **CRDF Grower Bactericide Trials**

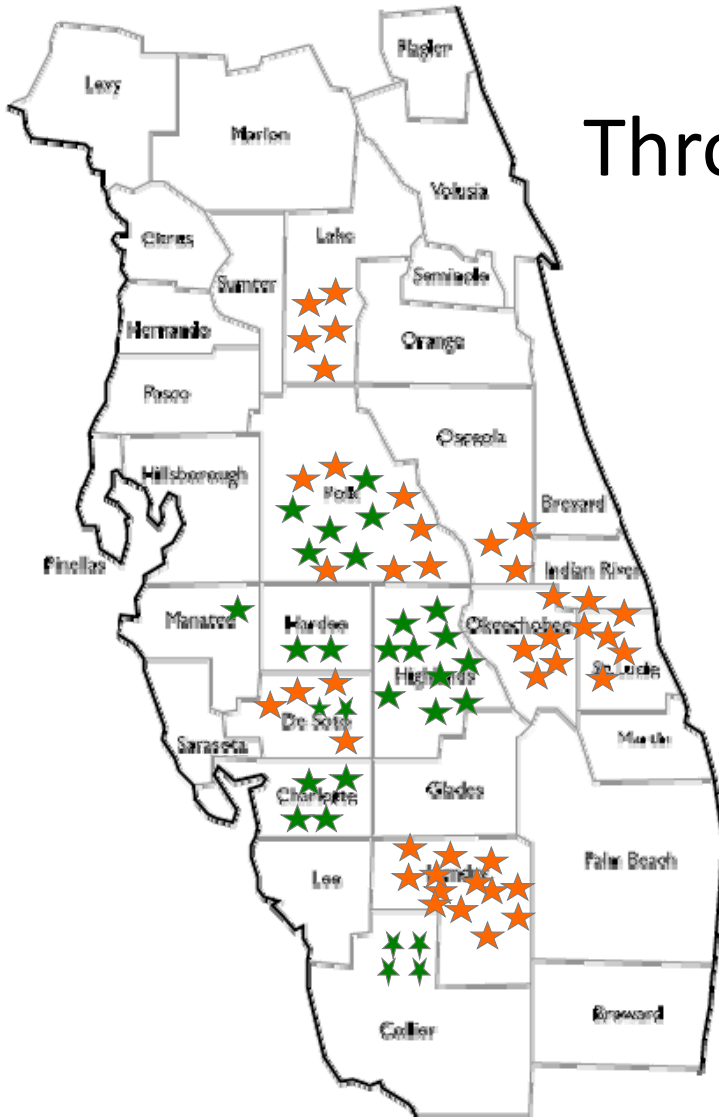
**Stephanie Slinski**  
**Citrus Expo August 18, 2016**



## Why evaluate grower bactericide applications?

- Field trials to evaluate grower applications of oxytetracycline (OTC) and streptomycin treatment
  - What works?
- Support the Section 18 renewal (formal approval pending)

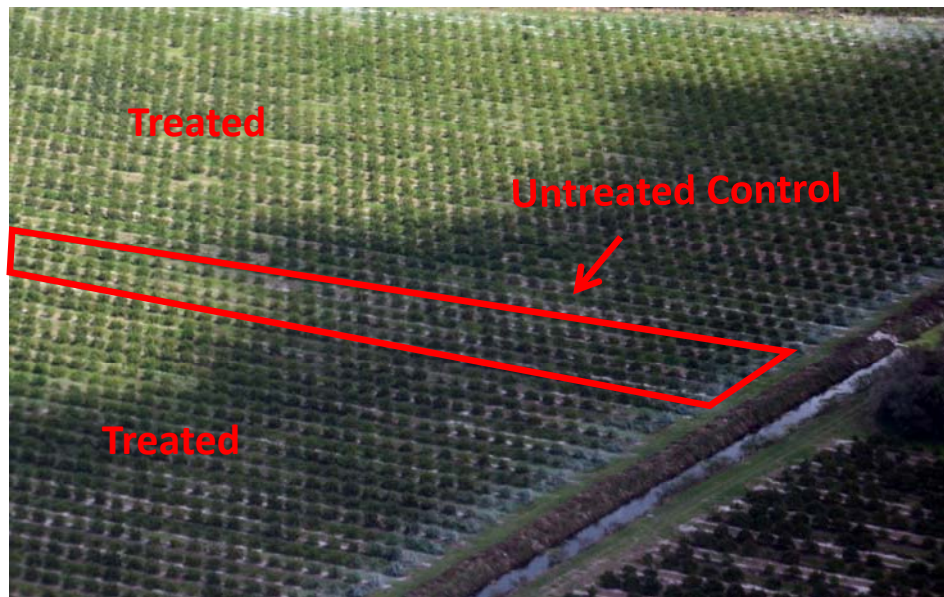
# Throughout FL citrus growing regions



CRDF Evaluated Trials	Other Evaluator
42	31



Two types of trial design were used



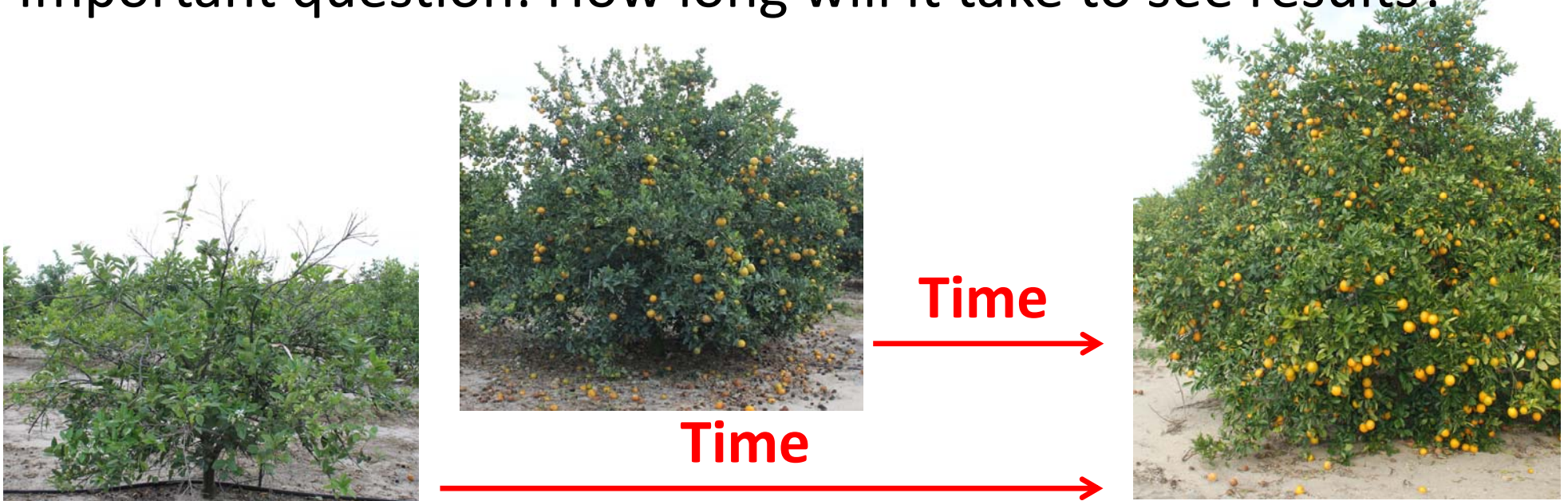
Trials were evaluated by these metrics

- Bacterial titer (concentration)
- Disease severity (DI)
- Fruit drop
- Yield



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Important question: How long will it take to see results?



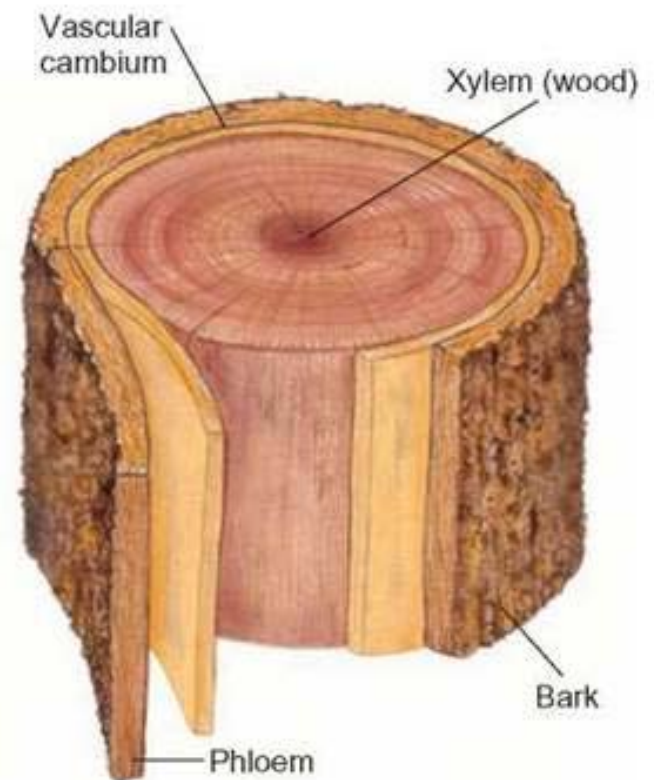
Reduction in bacteria & production of new phloem (new growth) =

Improvement in tree health, yield and fruit quality



## Production of new phloem is important because...

- Replaces blocked/collapsed phloem
  - No phloem (carbohydrate transport) = no flush (needs carbohydrates)
  - Requires a reduction in the bacterial population





Important question: How do we separate seasonal changes in tree appearance with improvement due to bactericides?

- Untreated control
- Evaluation over time

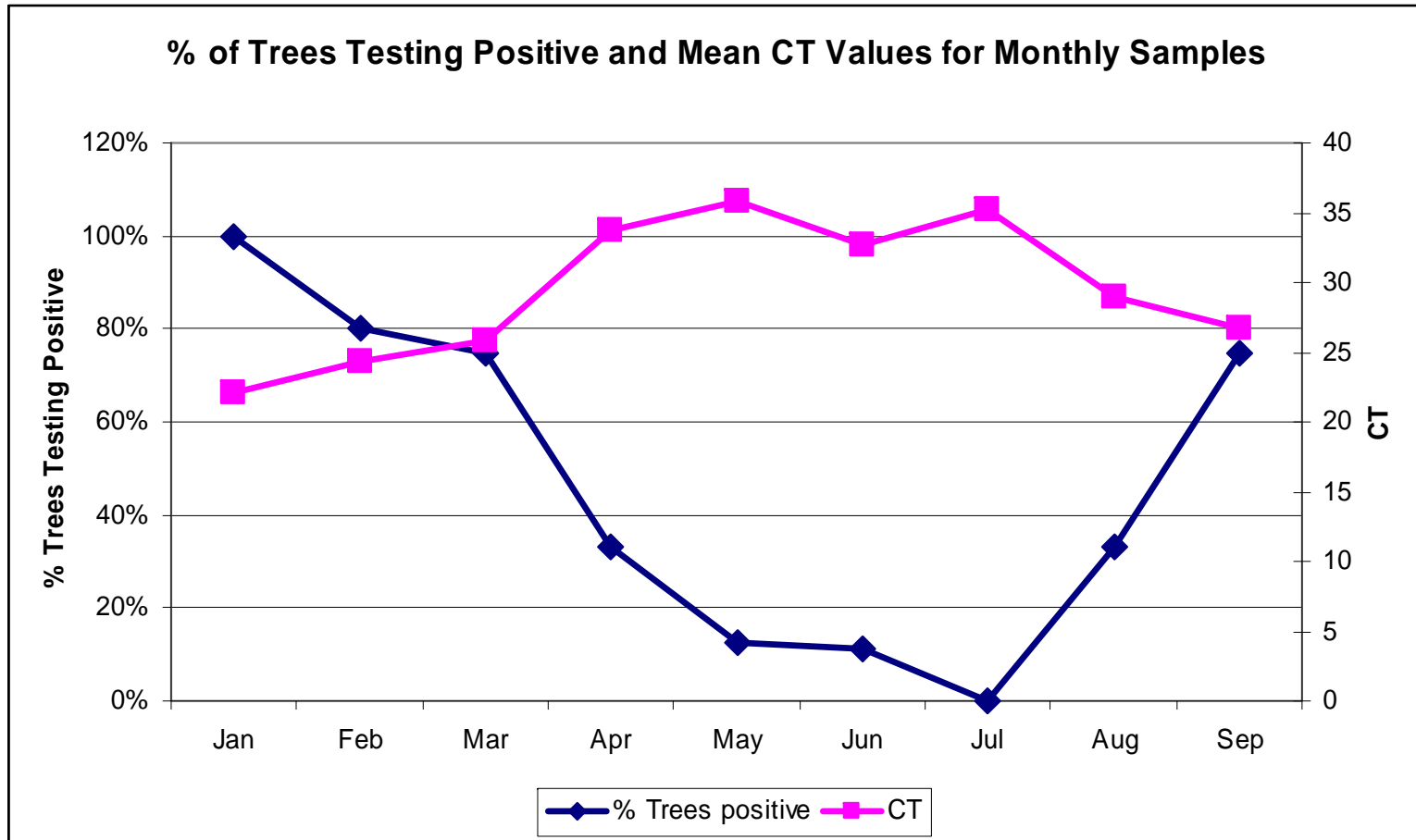


**Winter Summer Spring Fall**  
→  
**Less Disease?**



# Changes in detection and concentration of bacteria over time

Greater number of samples that had detectable bacteria



Less bacteria detected

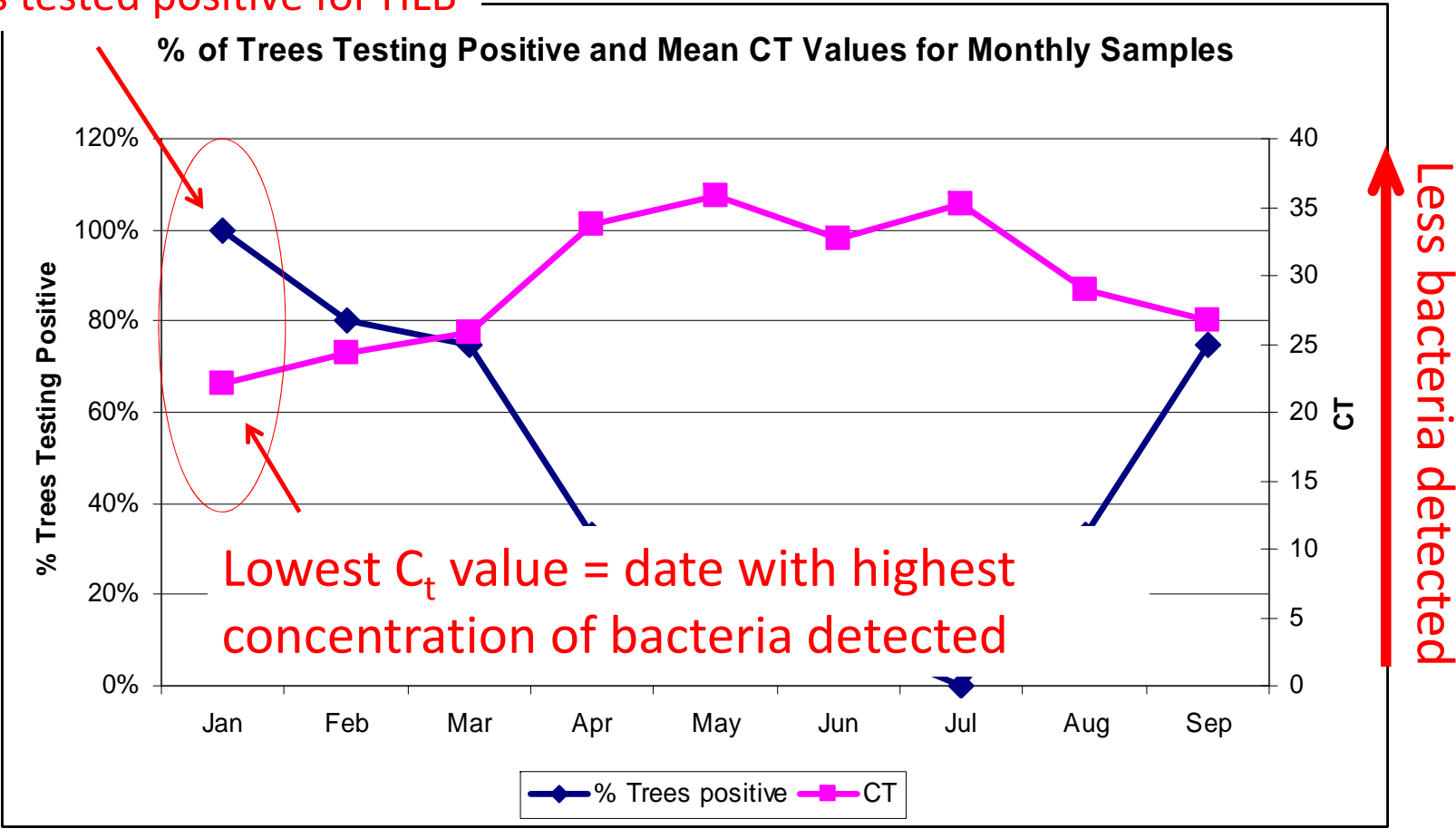


Courtesy of Mike Irey, Southern Gardens Citrus



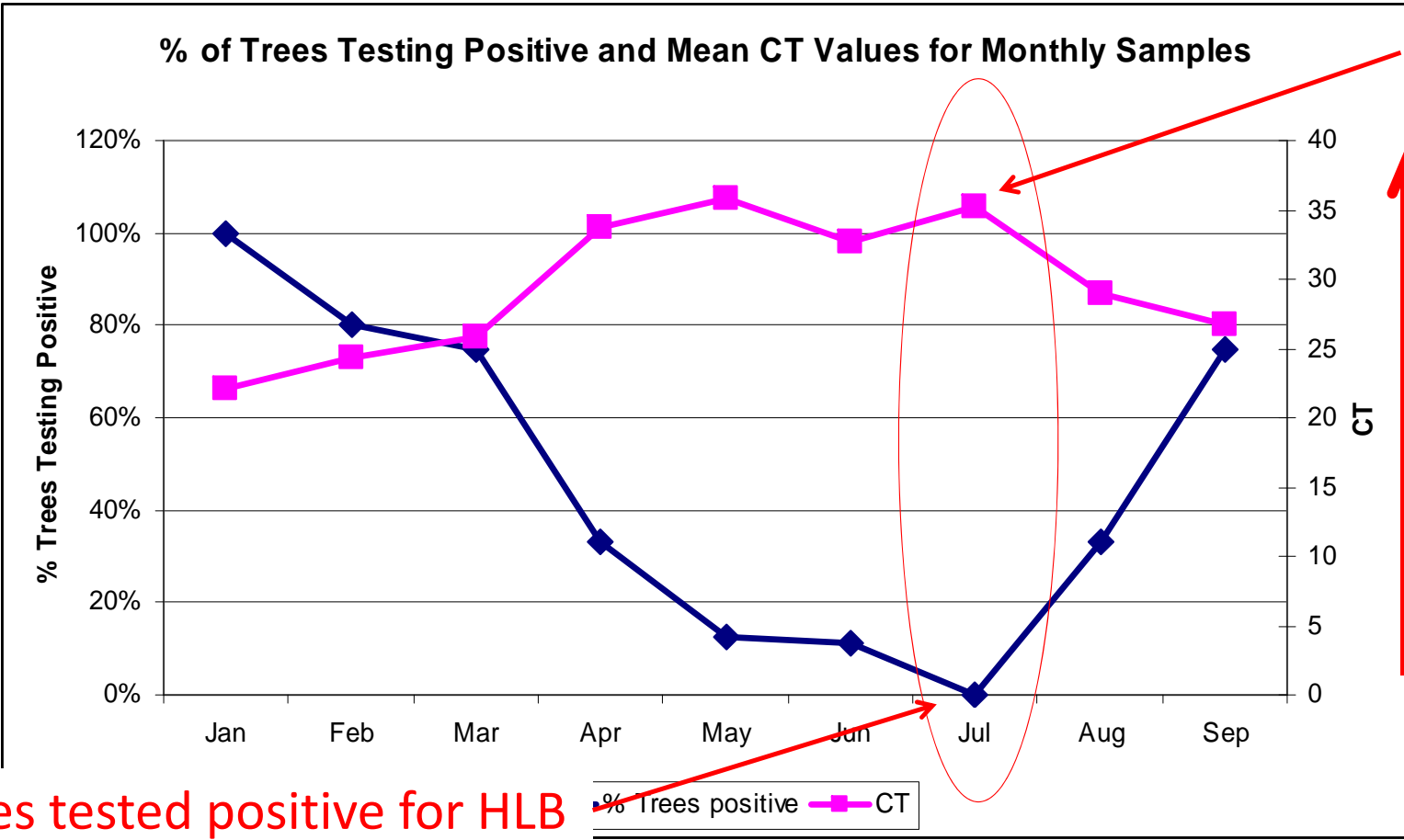
# Detection of bacteria over time

All trees tested positive for HLB



Courtesy of Mike Irey, Southern Gardens Citrus

# Detection of bacteria over time



HLB negative

Less bacteria detected

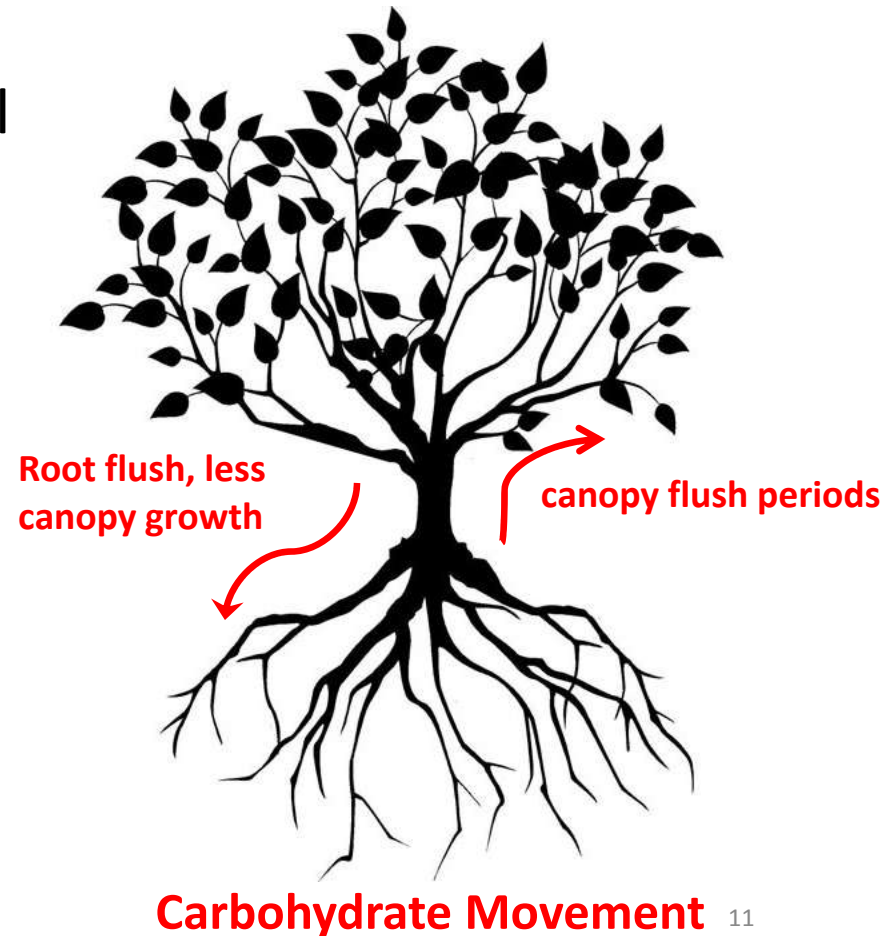
No trees tested positive for HLB

Courtesy of Mike Irey, Southern Gardens Citrus



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- A study in Brazil showed similar seasonal trends (Plant Disease (2015) 99, 1125-1132)
- Bacteria appears to be moving with carbohydrate transport
- Seasonal changes in bacterial concentrations may be due to transport of bacteria with carbohydrate stream to and from roots.
  - fruit set
  - foliar flush
  - root flush

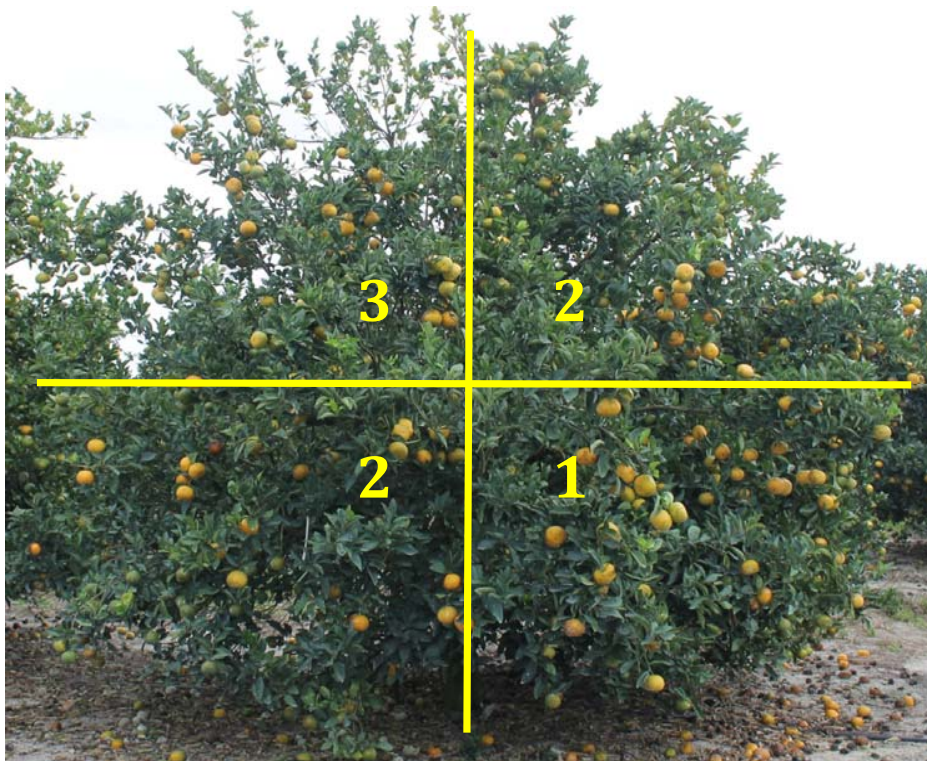


**Carbohydrate Movement** 11



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Evaluating changes in tree health over time is also important



How to evaluate tree health

- Divide each side of tree into quadrants
- 1-5 rating for each quadrant
- Total of both sides = 0-40
- Frequency = every 3-6 months

Field trial evaluation methods:  
<http://bit.ly/1PQEPGT> or page 10 of  
Citrus Industry Magazine



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- What works? What does this mean?
  - Bactericides for agriculture
    - preventative or maintenance treatment
- What would we expect from OTC and strep. if it “works”?
  - Increase in tree health
  - Increase in yield and quality
  - Keep trees in production until resistant trees are in production



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## CRDF Grower Bactericide Trials

- When will we see results
  - Trials initiated April-June 2016
  - Disease severity (DI) and fruit drop
  - 2<sup>nd</sup> PCR Nov.-January + DI
- Some data may be available early 2017
- Full year-one report
  - post-harvest 2017





## **Conclusions**

- We will provide data to help growers make economic decisions
- Recovery after reducing bacterial population takes time
- Healthier trees will recover sooner than severely declining trees
- Bactericides are a stop-gap solution until resistant trees are in production



## Complementary efforts by CRDF

- CRDF is testing potential bactericides
  - biopesticides
  - botanical oils
  - new active ingredients
- And evaluating alternative application strategies
  - trunk injection



## PFD survey - What worked and what didn't work Spring 2016

- Not a field trial
- 25-30 groves around the state
- Grove info
  - rainfall
  - monitoring of flowering
  - PFD treatments
  - application timing
- Button and fruit count
- To participate contact: [sslinski@citrusrdf.org](mailto:sslinski@citrusrdf.org)



**Thank you!**

PFD survey contact: [sslinski@citrusrdf.org](mailto:sslinski@citrusrdf.org)  
Field trial evaluation methods: <http://bit.ly/1PQEPGT>

**CRDF is proud to provide support to the Florida citrus industry**