The good, the bad, and the ugly

How different planting techniques hold up to HLB and other diseases

Megan M. Dewdney
Associate Professor of Plant Pathology and Extension Specialist
University of Florida, IFAS
Citrus Research and Education Center

UF | IFAS Extension
UNIVERSITY of FLORIDA

Research project to compare planting methods

General unknowns/challenges

- Return on investment
- Pest and pathogen management
  - What pests and pathogens will be problems?
  - How to scout
  - How to prevent and/or treat pest or pathogen outbreaks?
- What happens after trees grow out of the tools?
- Each tool changes the growing environment for plants, so we need to understand how that affects other organisms

Control trees

- All trees ‘Valencia’ on Kuharske
- Treatment representative of current industry activities
  - Monthly insecticide applications
  - Microjet irrigation
  - Bare soil
- Challenges:
  - Cost
  - Keeping young trees protected when flushing regularly

Reflective mulch

- Has the potential to reduce ACP infestation and therefore HLB
- Tested with and without regular insecticide regimen
  - Insecticide only at high pest pressure
  - Monthly applications
- Challenges:
  - Cost of material and installation
  - Material damages easily

Kaolin clay

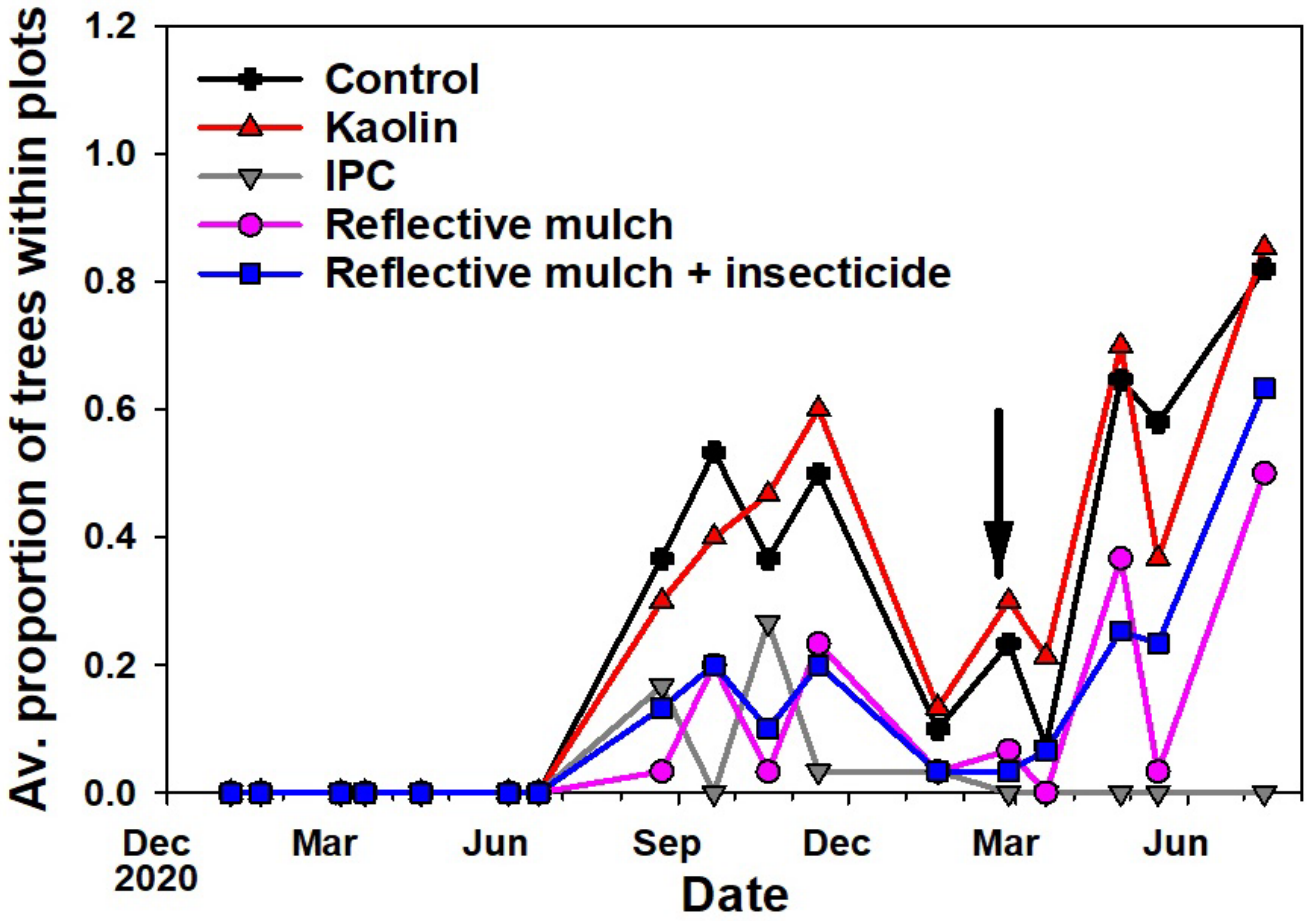
- Has been shown to reduce psyllid infestation and proportion of plants affected by HLB
- Challenges:
  - Applications - need good coverage, need equipment to apply (clogs jets)
  - Application on new flush
  - Wash off in rainy season

Individual protective covers (IPC)

- Prevent ACP access to plants therefore HLB low levels
- Challenges:
  - Cost
  - Varying quality (closures, spreader/no, mesh)
  - Installation time
  - Getting inside for pest scouting and plant maintenance

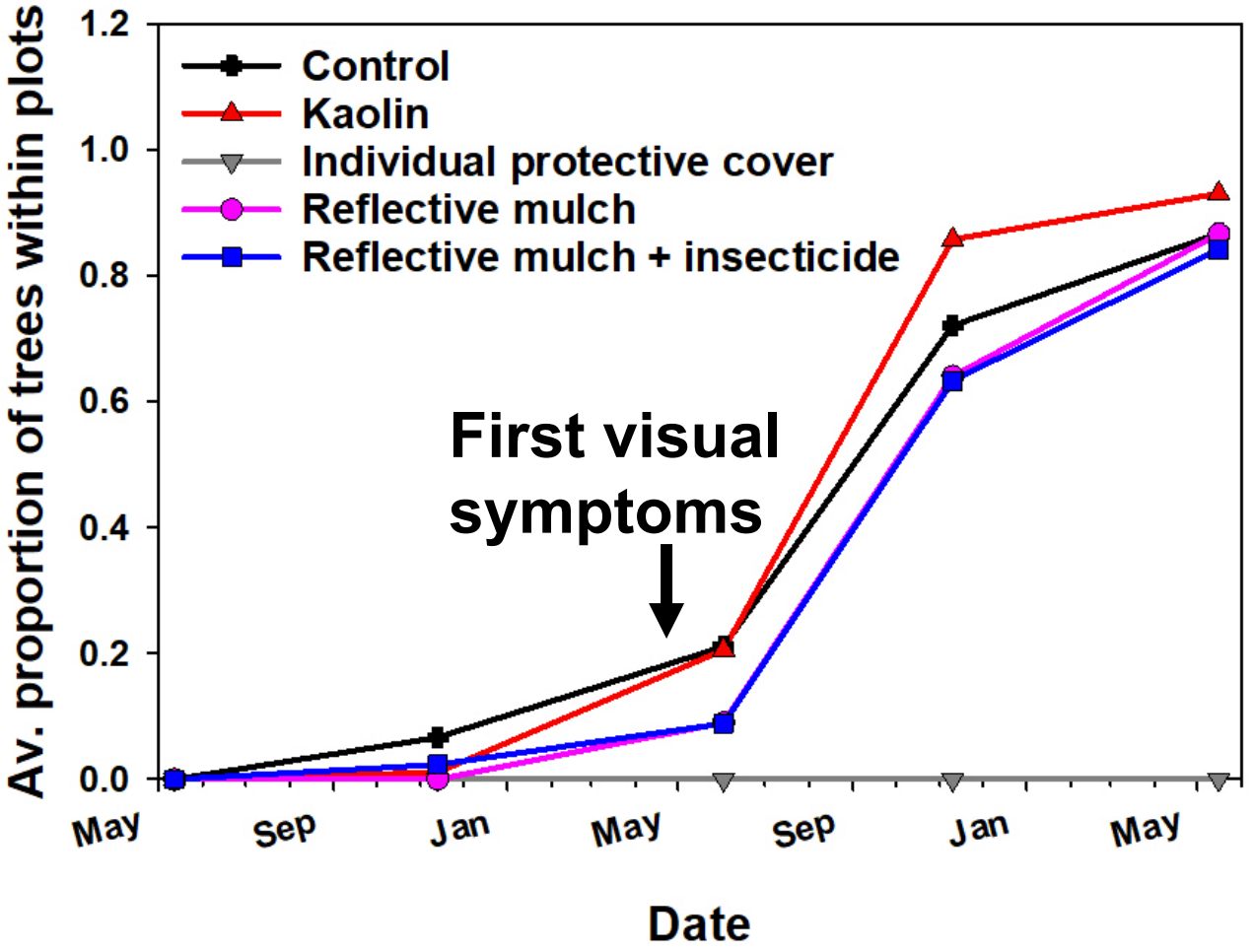
Visual HLB symptoms

- No symptoms for 15 months
  - Very little blotch mottle
- Less HLB for reflective mulch in first 2 years
  - Creeping up year 3
- Some symptoms in 2nd year for IPCs
  - Stressed trees also have similar symptoms



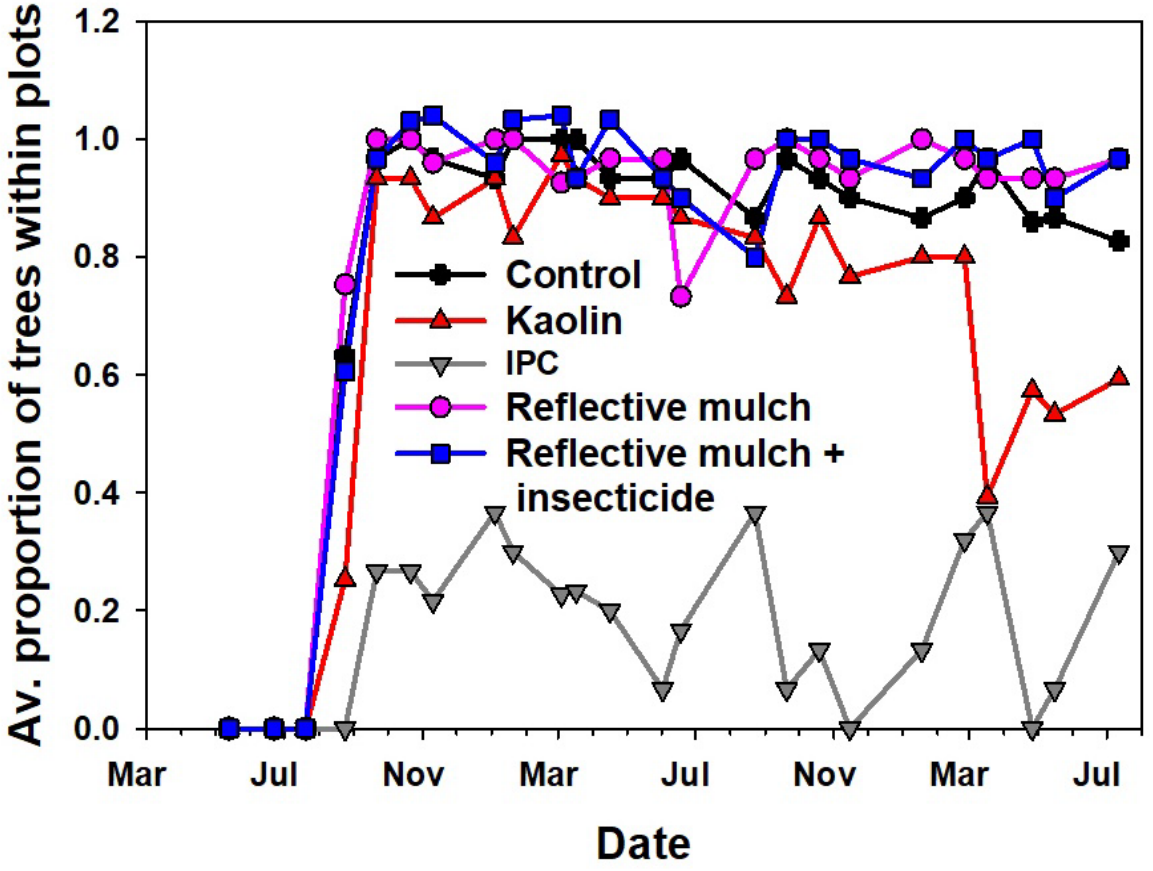
Trees with *Ca*. Liberibacter asiaticus

- First PCR detection in December 2020
- Fewer detections in reflective mulch treatments initially
  - Approach control levels by June 2022
- No detection in IPC trees



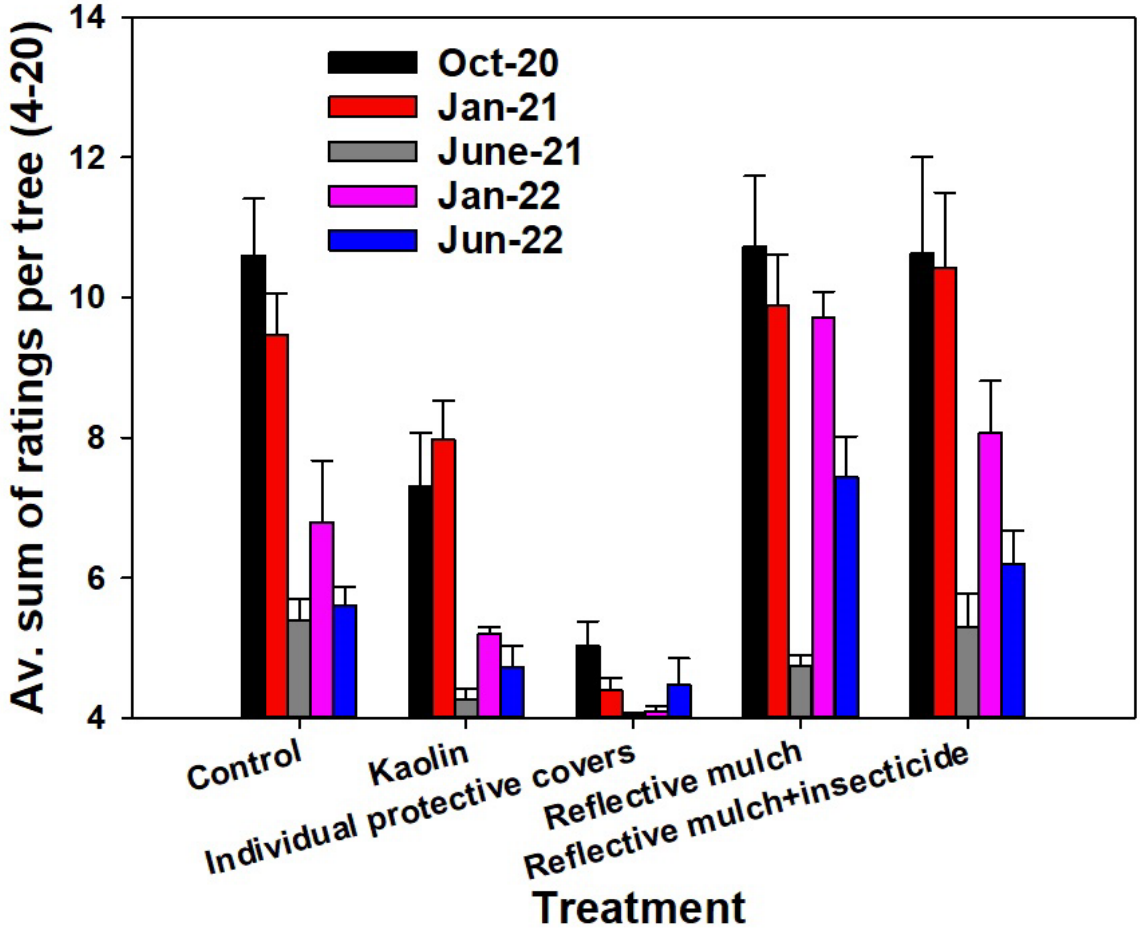
Canker presence or absence

- Canker arrived Summer 2020
- Nearly every tree affected
  - Exception within IPC
  - Slow windspeed; bacteria not blown in
- 3rd year reduction for Kaolin
  - Less flush to be infected



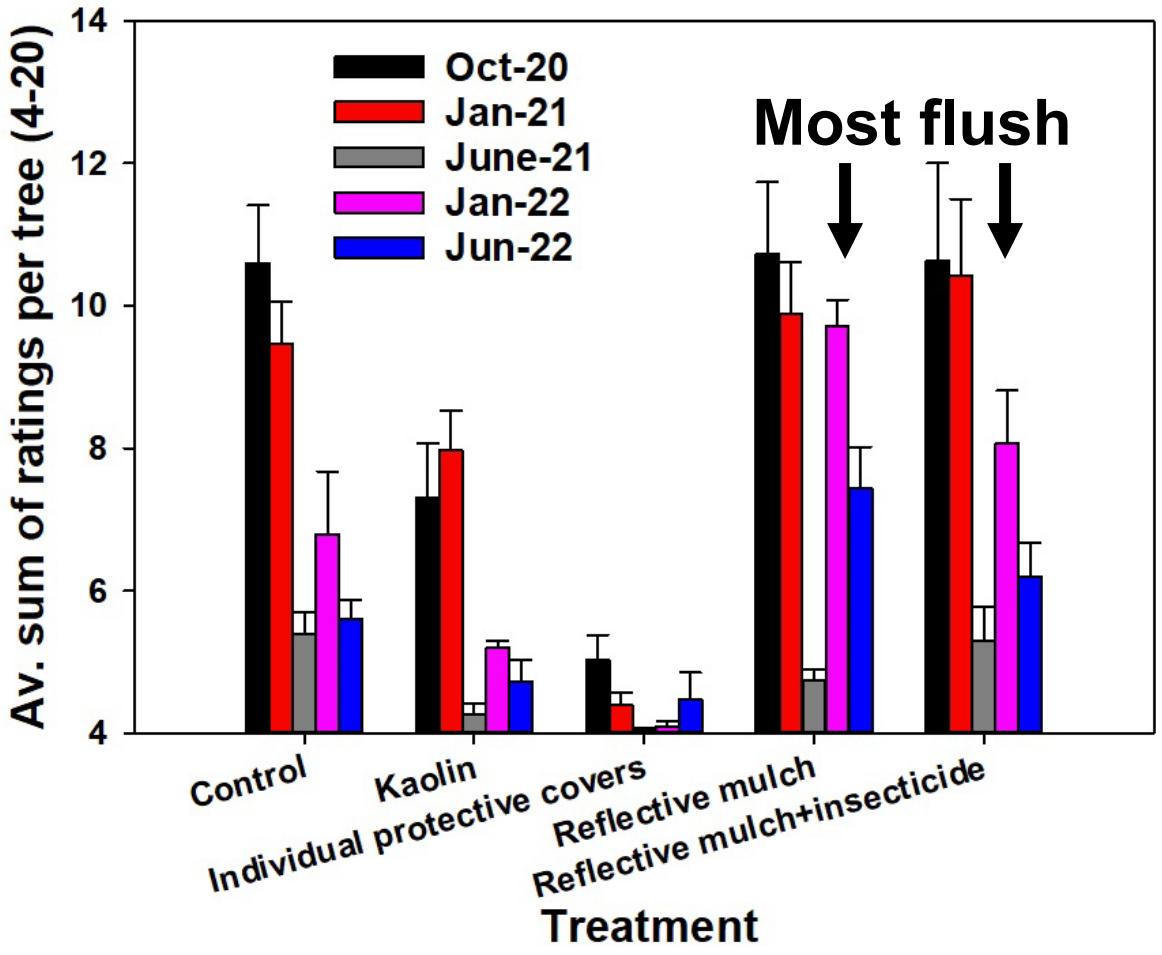
How much canker?

- Blockade application summer 2020, spring 2021, 2022
  - After leaf miner incursion
  - 2 copper applications first summer
- Worst in control and reflective mulch
  - Lower after 2020



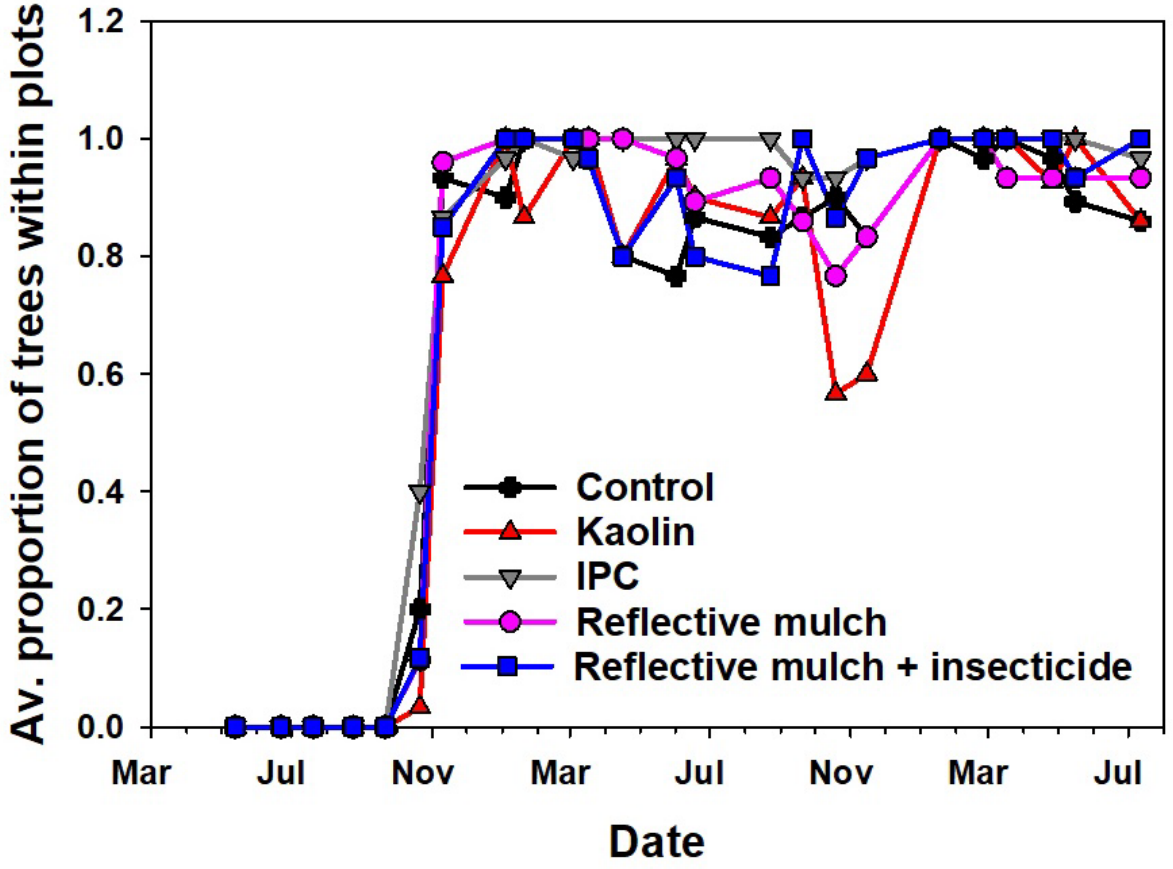
How much canker?

- Very few lesions in IPC
- Increased canker on reflective mulch in 2022
  - Corresponds to trees with greatest flush
  - Mostly at top



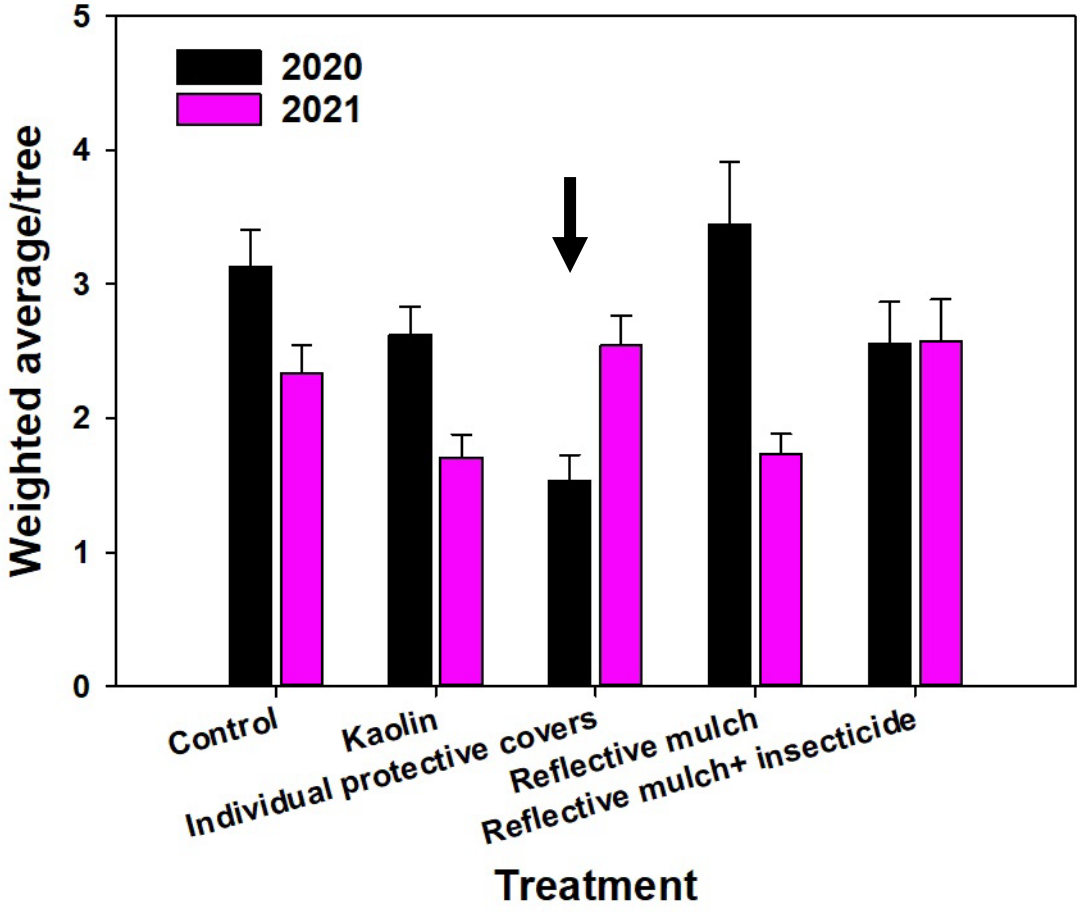
Greasy spot presence or absence

- Greasy spot on nearly all trees in all treatments
- First symptoms appeared when expected
  - Late summer/early fall 2020



How much greasy spot?

- Had more greasy spot on current year flush in 2020-2021 growing season
- Only IPC covered trees had more greasy spot in 2021-2022
  - Better environment?



Conclusions

- By the time visual HLB symptoms are apparent, between 10-20% of trees are infected
- No tree under IPC has had *Ca*. Liberibacter asiaticus detected
  - Trees were stressed before 6 ft IPC were replaced by 8 ft
  - Stress symptoms resembled HLB including zinc deficiency
- Kaolin may not be a good tool for newly planted trees

Conclusions

- Canker will affect most young healthy trees if in area with previously infected trees
  - Applications with Blockade were helpful with copper for management
  - IPCs slow wind speeds enough to reduce infection
  - Lower presence but also severity in IPCs means only some trees have canker and there are fewer lesions
- Reflective mulch allows trees to flush well
  - More flush means more canker susceptible tissue

Conclusions

- Greasy spot is everywhere
  - Can be seen with most trees being infected first year
  - Planting method did not affect whether tree infected
- Tends not to get to damaging levels on Valencia
  - Major concern is defoliation
  - Oil could keep disease in check
- 2021 season not as conducive for disease as 2020
- See increase in IPC over seasons
  - Environment more humid and undisturbed

More to come

- First harvest in March 2024
  - Look at fruit quality and yield
  - Trial should continue for at least one more year
- Current application technologies insufficient for pathogen management in IPC
- Economic analysis to be done with Dr. Singerman
- Have been investigating if phytophthora is influenced by mulch treatments
- Collaboration between multiple programs

Take home points

- Young trees can be kept HLB-free for over 2.5 years with IPC
  - Trees in all other treatments were between 80 and 100% infected
- Citrus canker was greatly reduced in IPCs
- Greasy spot got worse over time in IPCs, but was equivalent in other treatments
- IPCs can safeguard young trees from HLB better than reflective mulch or Kaolin clay, but other diseases will need to be managed too

Acknowledgments

- Project Investigators
  - Lauren Diepenbrock
  - Megan Dewdney
  - Christopher Vincent
  - Davie Kadyampakeni
  - Evan Johnson

Dewdney Lab

- Etelvina Aguilar
- Tracey Hobbs

- Funding sources:
  - APHIS MAC: AP19PPQST00C158
  - USDA-ECDRE: 2021-70029-36054

USDA United States Department of Agriculture National Institute of Food and Agriculture