Can the new tools to support establishment of young groves keep diseases at bay over multiple years?

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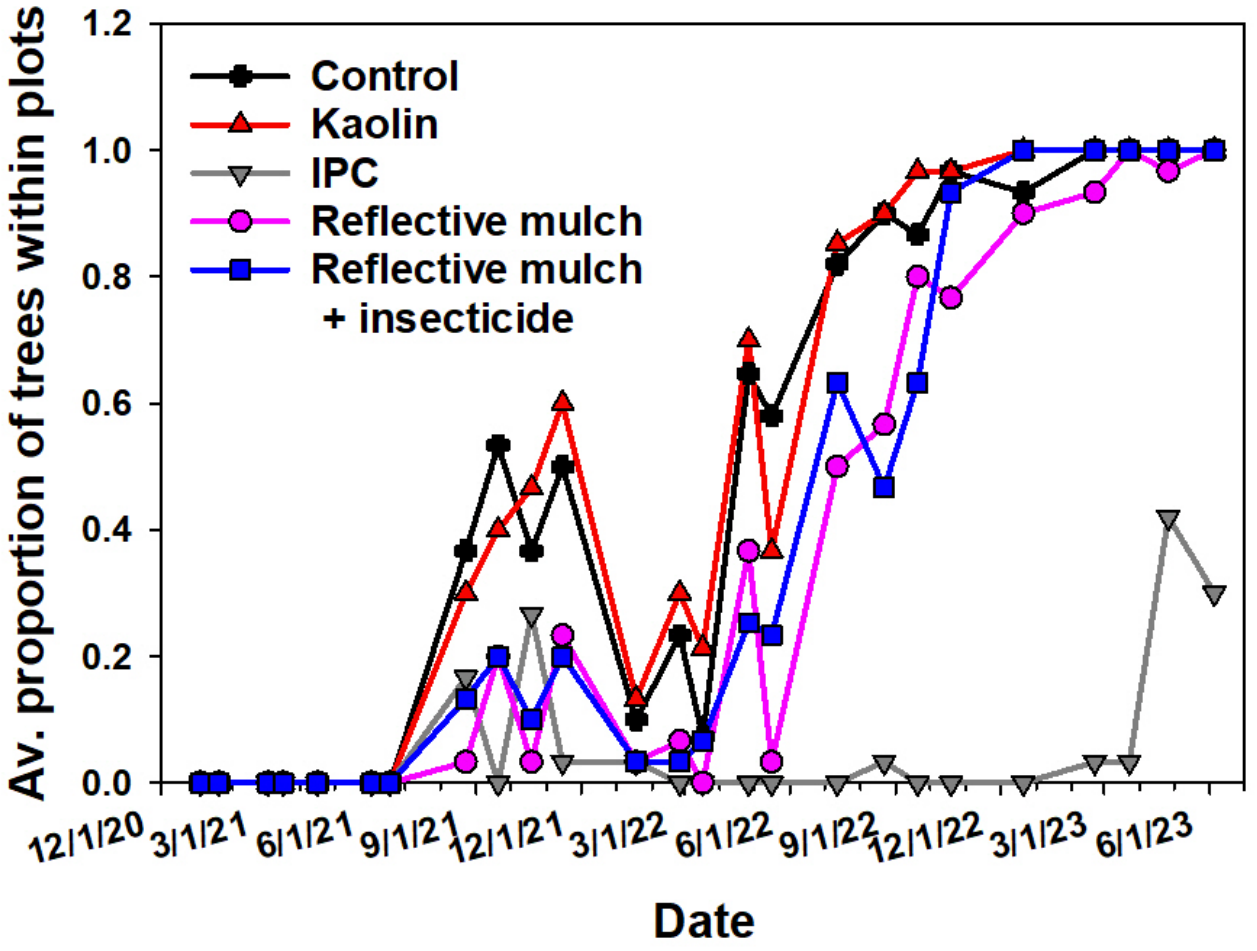
Take Home Messages

- Individual protective covers are effective to protect newly planted trees
  - Protection for three years possible
  - Must keep them in good repair
- Other diseases are affected by IPCS
  - Canker is reduced
  - Sooty mold is more common
  - Greasy spot tends to be more severe
  - See more phytophthora root rot because there is a root system to be infected

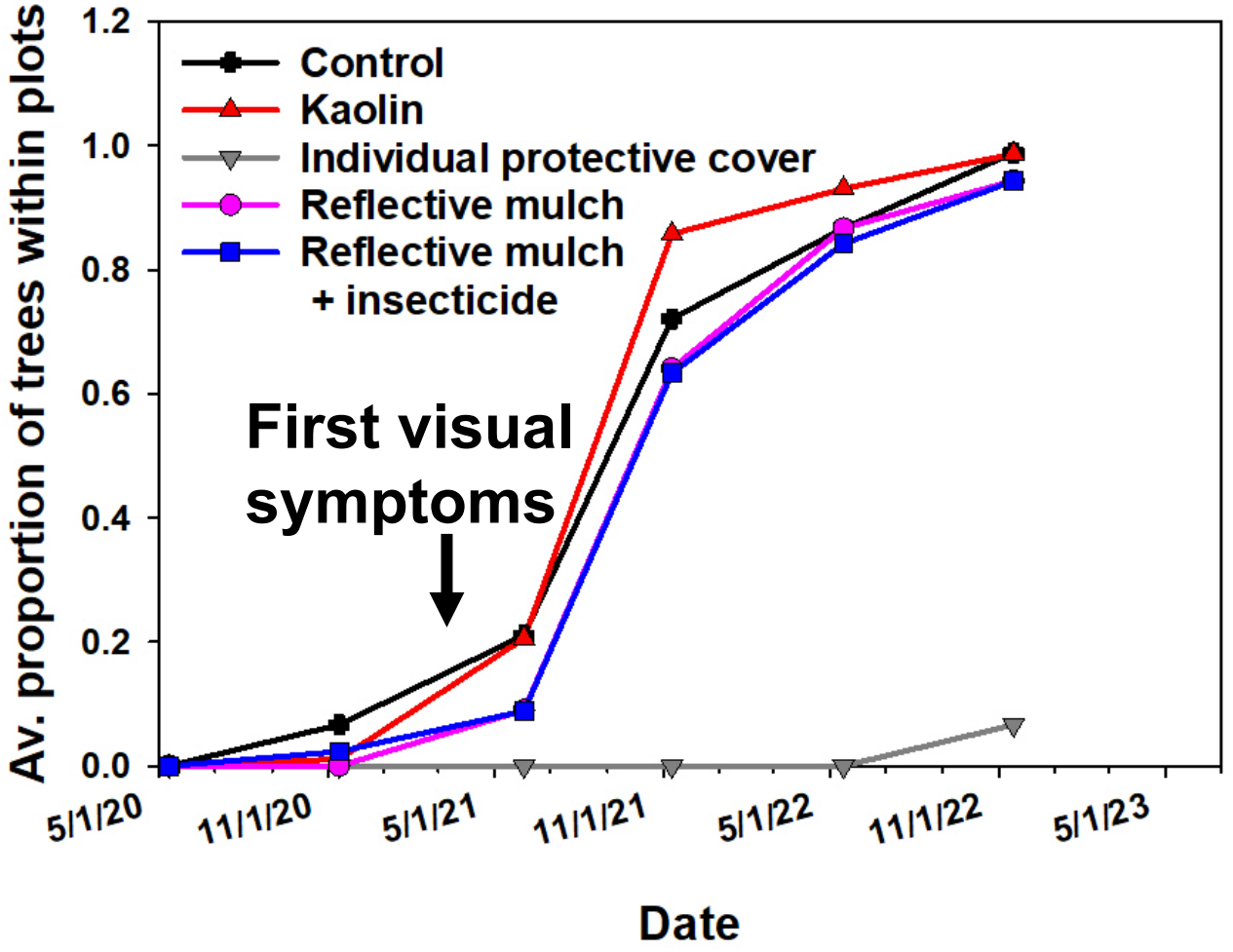
Visual HLB symptoms

- No symptoms for 15 months
  - Very little blotchy mottle
- Less HLB for reflective mulch in first 2 years
  - By Dec 2022, reach near 100%
- In IPCs, some symptoms seen in 2021 and 2023
  - Likely stress in 2021, disappeared
  - 2023 holes in mesh from storms; likely HLB



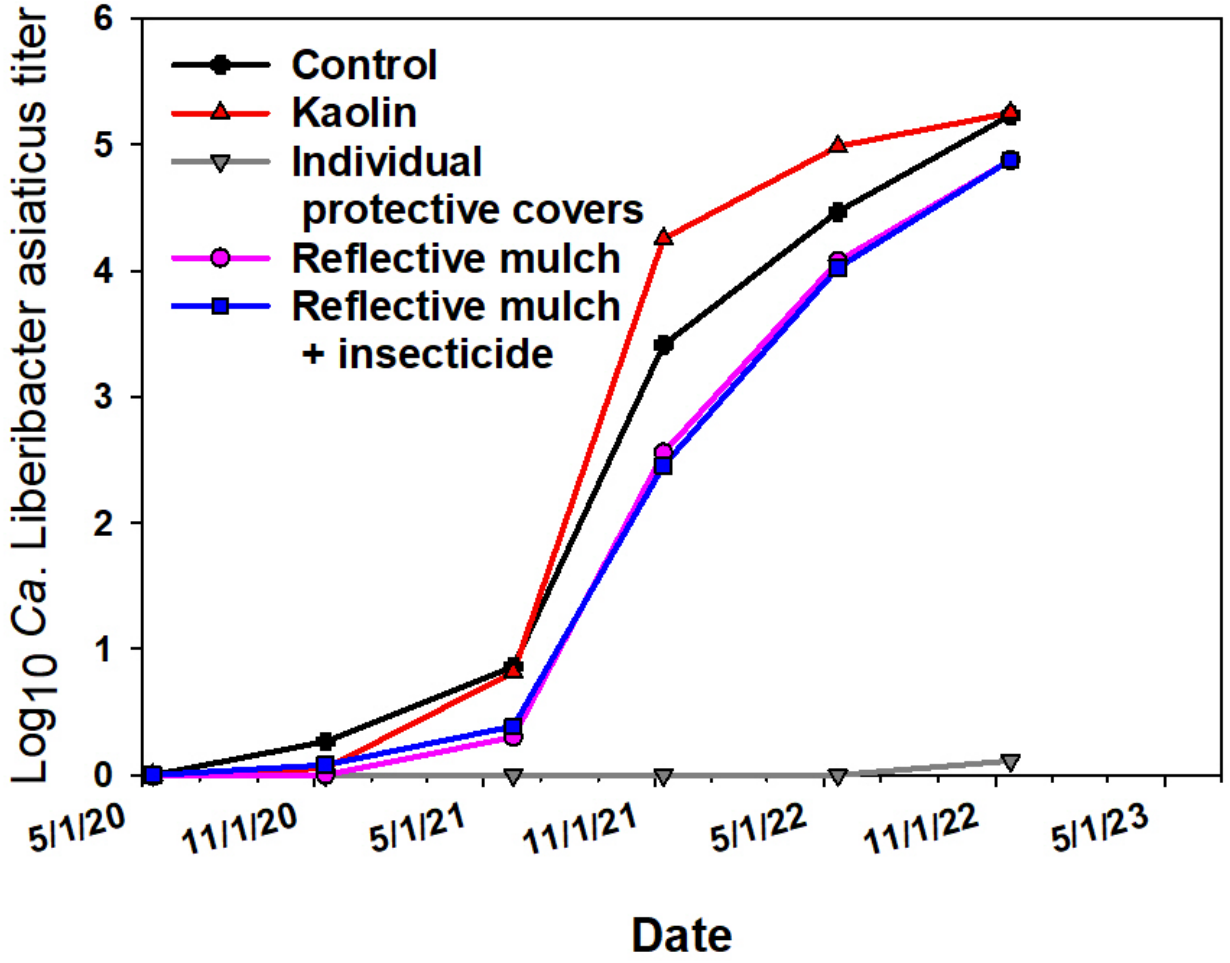
Trees with *Candidatus* Liberibacter asiaticus

- First PCR detection in December 2020
- Fewer detections in reflective mulch treatments initially
  - Approach control levels by June 2022
- First PCR detection in IPC
  - From very low ACP infestation



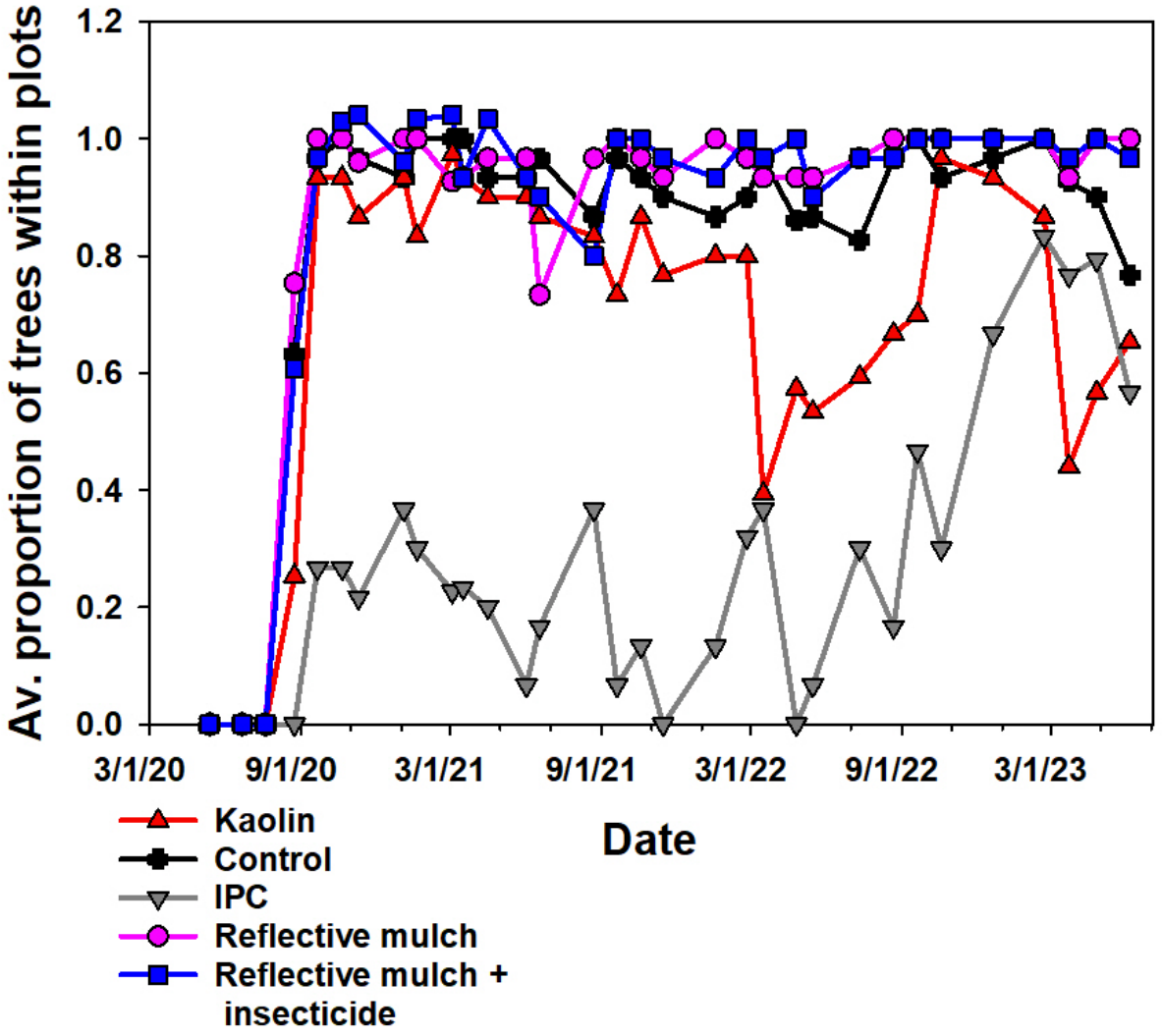
How much bacteria is in the trees?

- Titers start low initially
- Start to see separation of treatments by mid 2021
  - Control and Kaolin trees have the greatest titer
  - Reflective mulch reduced titer
- IPC delayed detection by 2.5 years
  - Very low even at this point with very few trees



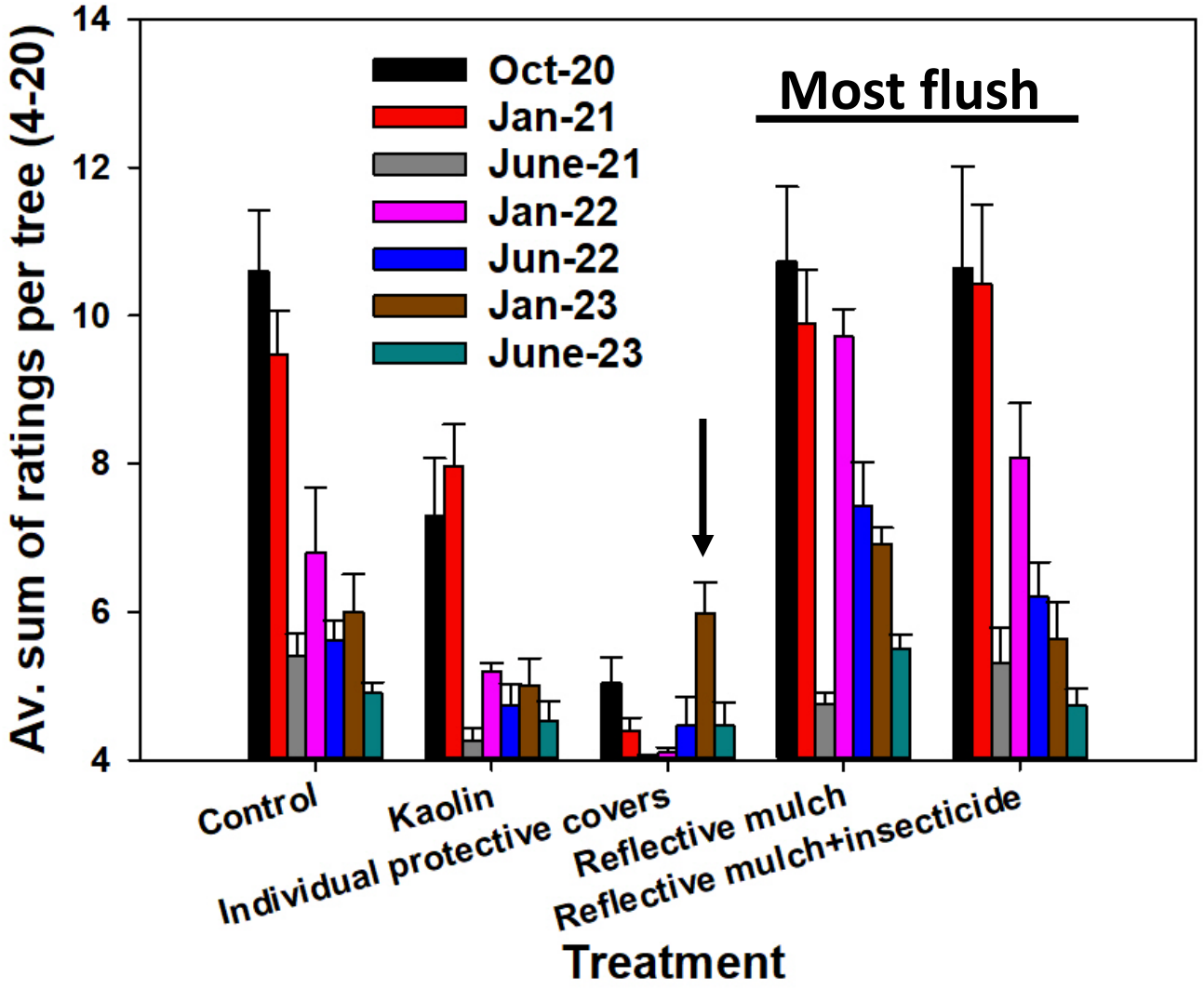
Canker presence or absence

- Canker arrived Summer 2020
- Nearly every tree affected
  - Exception within IPC
  - Slow windspeed; bacteria not blown in
- Kaolin
  - Uncertain why so low
- IPCs catch up in 2023
  - Still low disease intensity



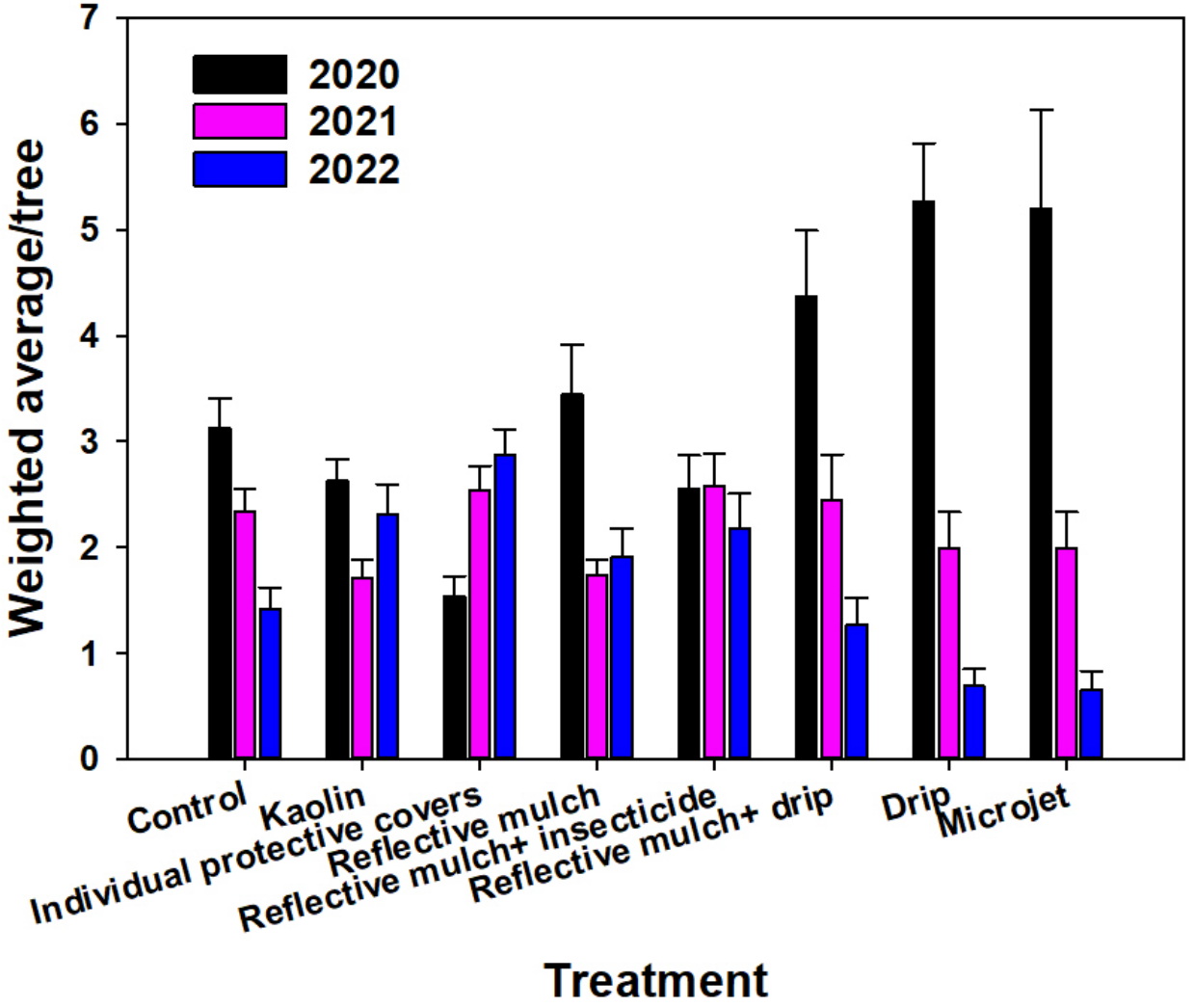
How much canker?

- Very few lesions in IPC
  - Even in 2023 when more trees infected
  - Tropical storms of 2022?
- Increased canker on reflective mulch in 2022
  - Corresponds to trees with greatest flush
  - Mostly at top
- All treatments benefited from dry 2023 spring



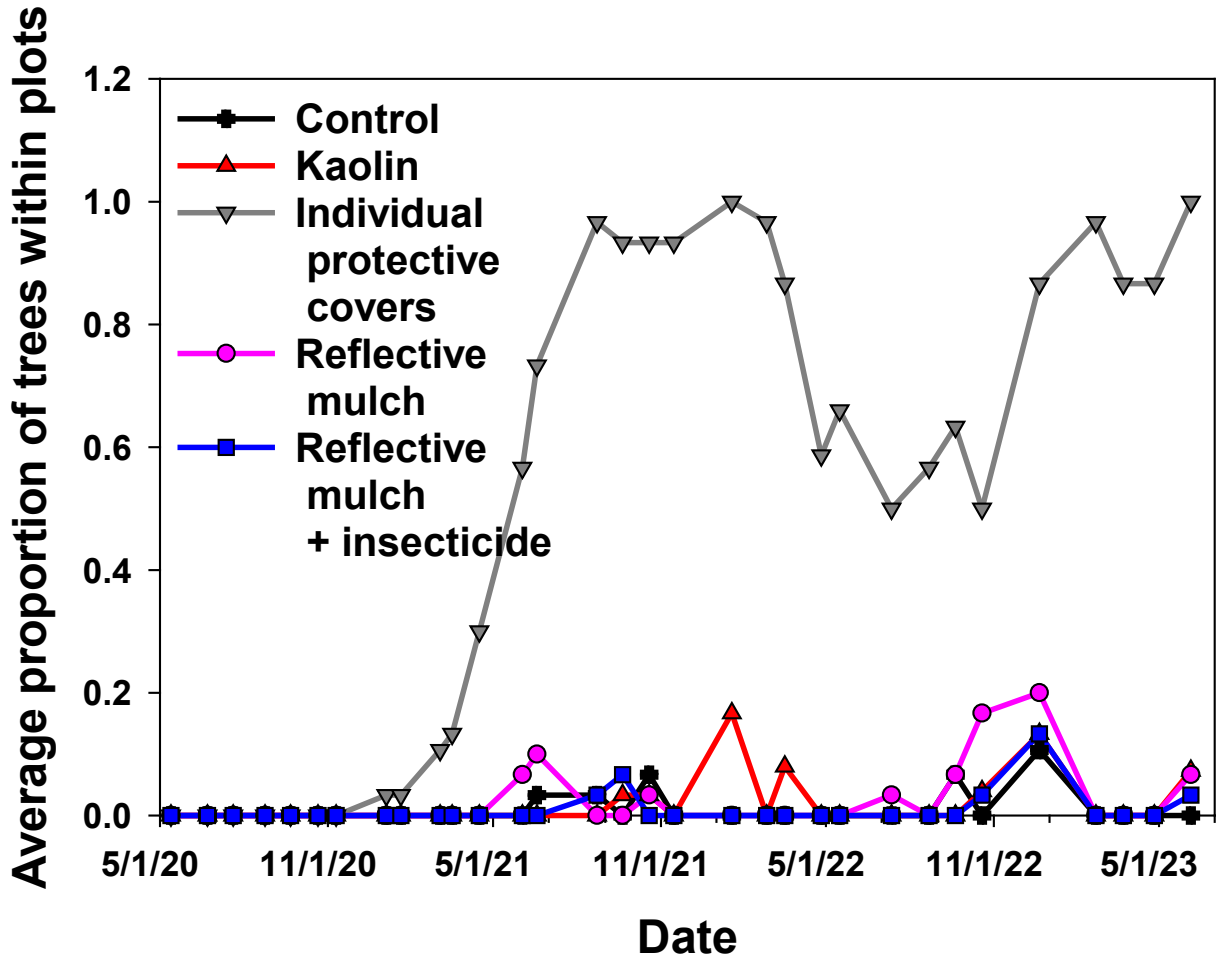
How much greasy spot?

- After Nov 2020, nearly all trees have greasy spot
- Most greasy spot in 2020
  - Residual from nurseries?
- IPCs tend to have most greasy spot after 1st year
  - Better environment?
  - In 2022, Ian took off many leaves in all other treatments



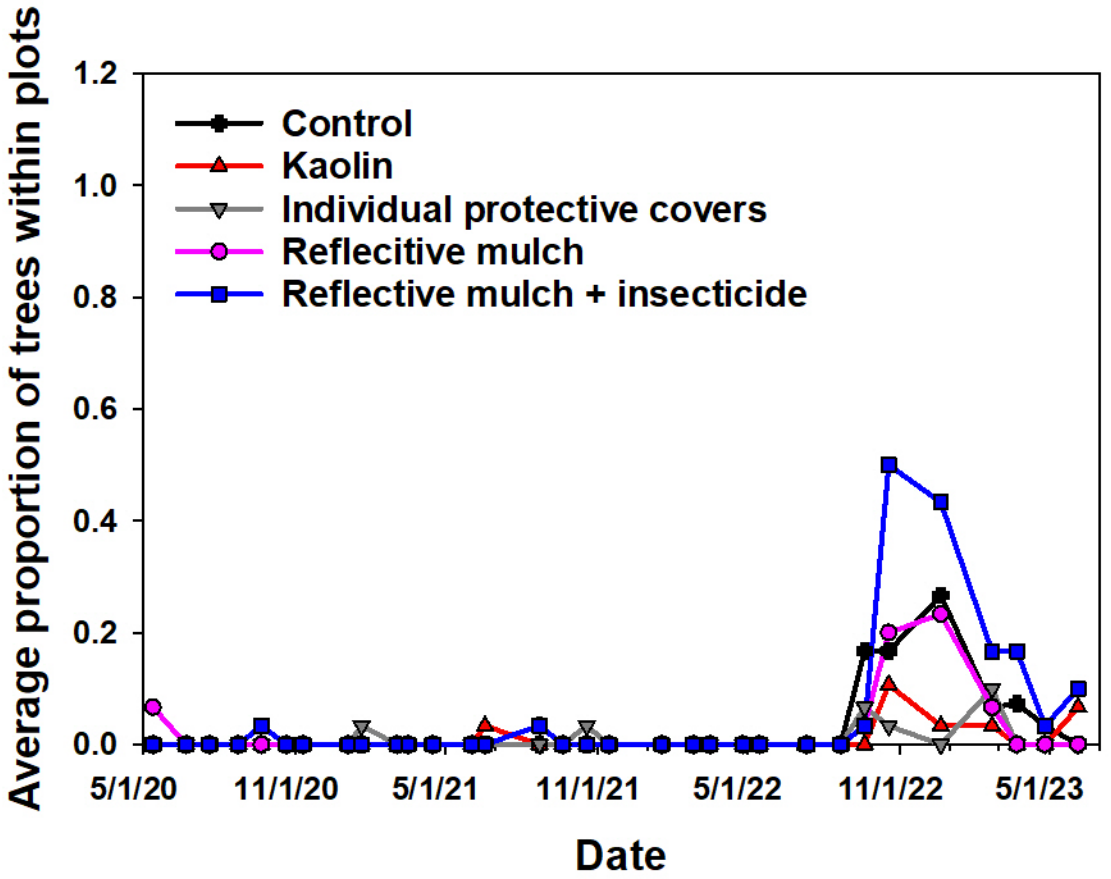
Sooty mold presence or absence

- Black fungus growing on insect honeydew
  - Particularly piercing sucking insects
  - Scales, mealybugs, aphids
- Every time sooty mold observed, there was an outbreak of insects
  - Great habitat for insects in IPCs



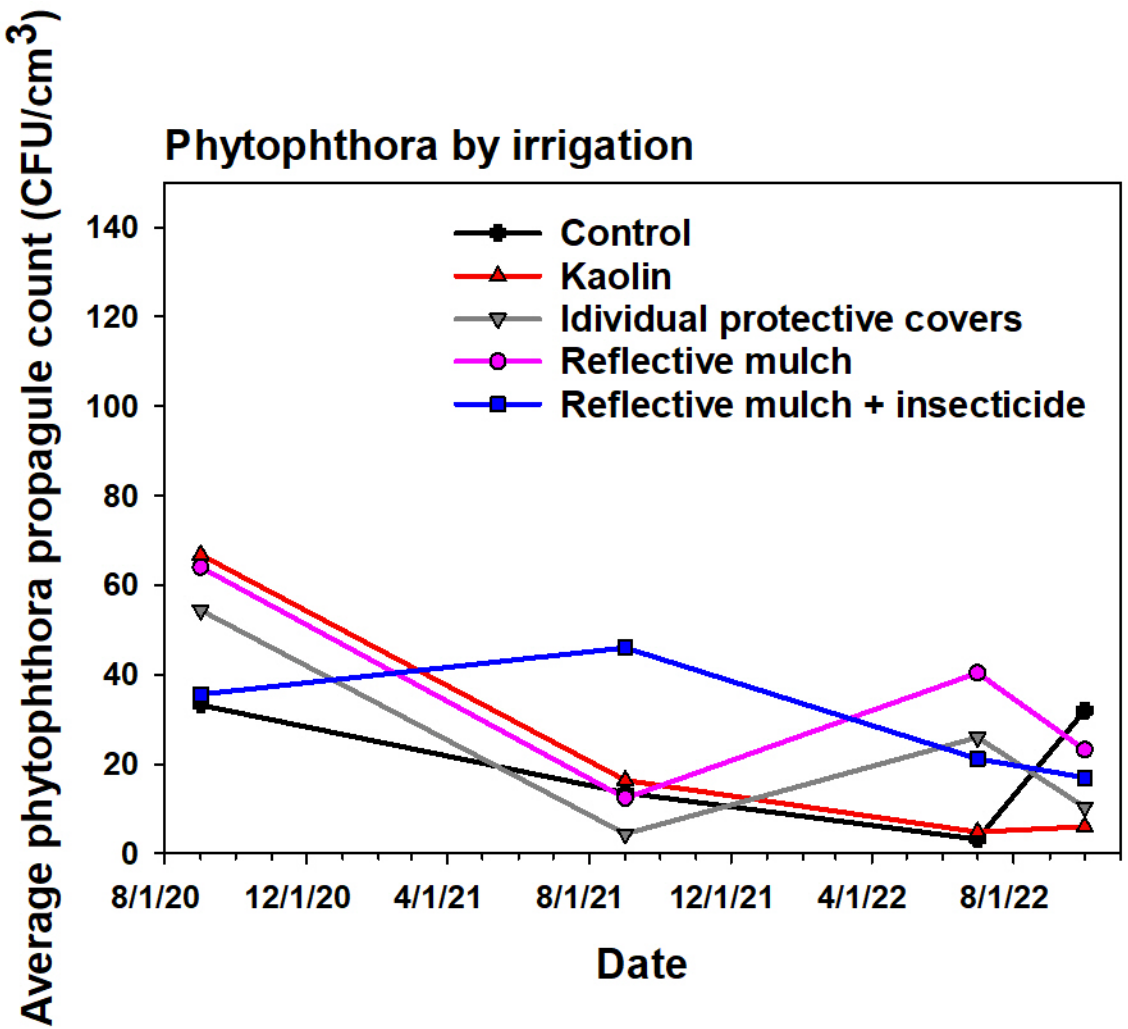
Melanose presence or absence

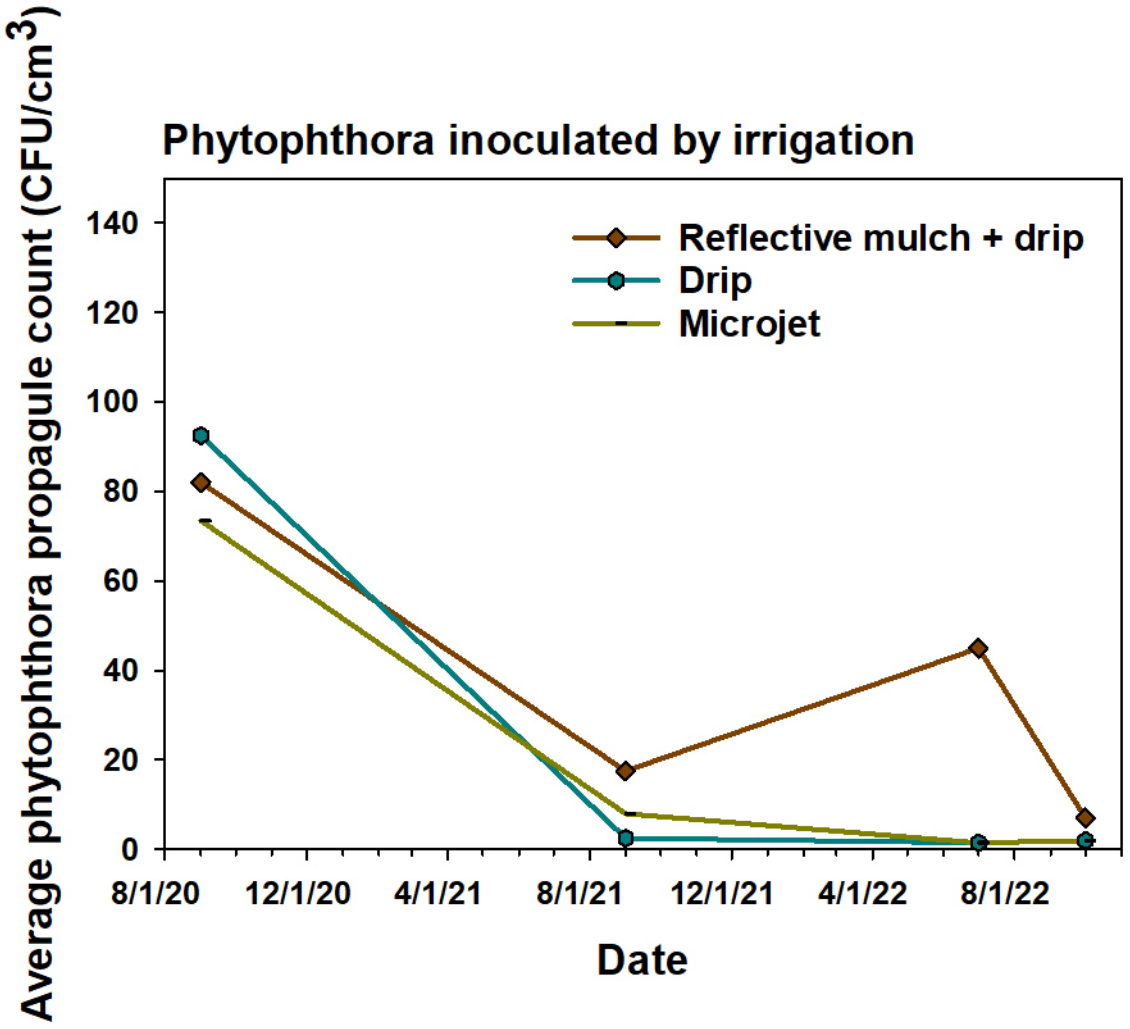
- Melanose has been absent until 2023
  - Not much dead twigs previously
  - Dead twigs increasing with HLB
- Lowest in the IPCS
  - Some dead twigs from Lebbek mealy bugs



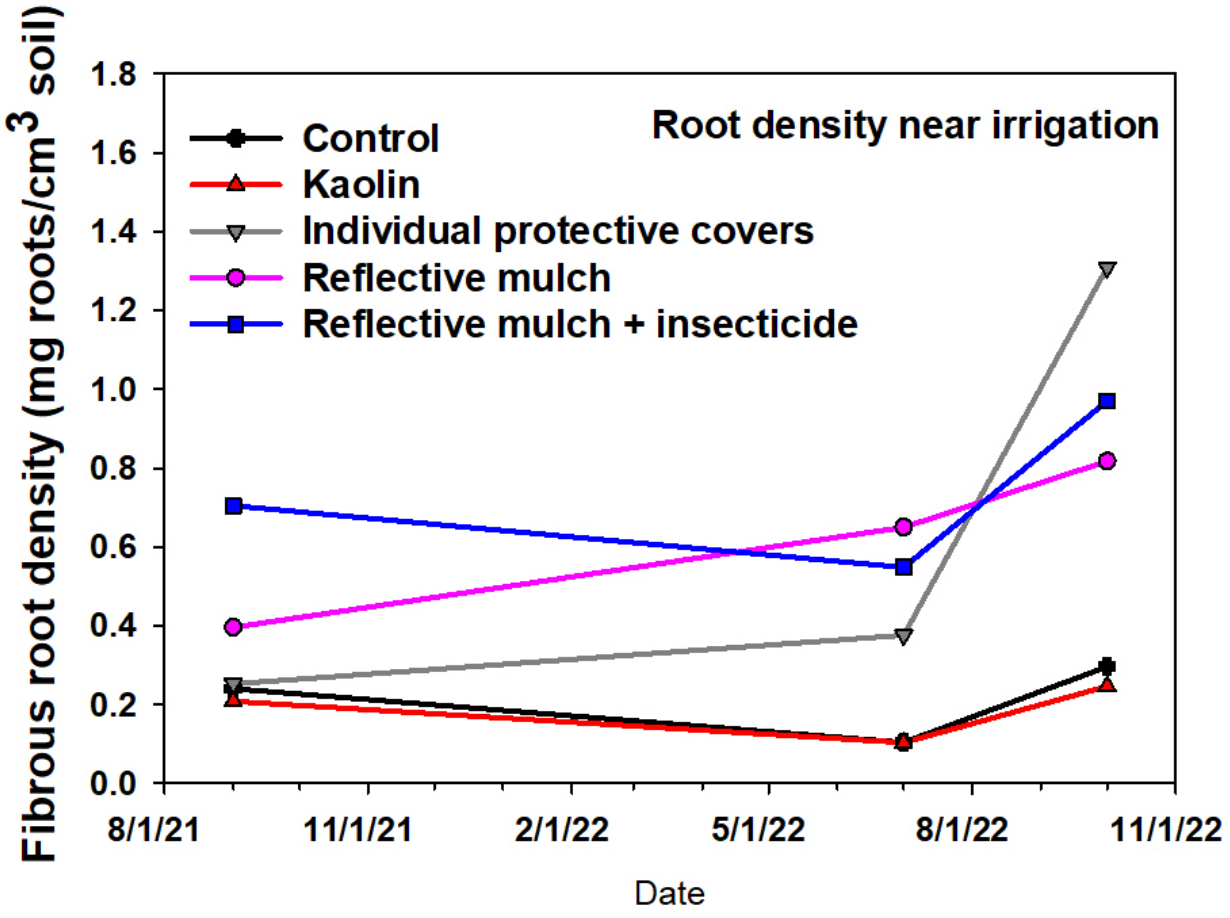
Dead twigs

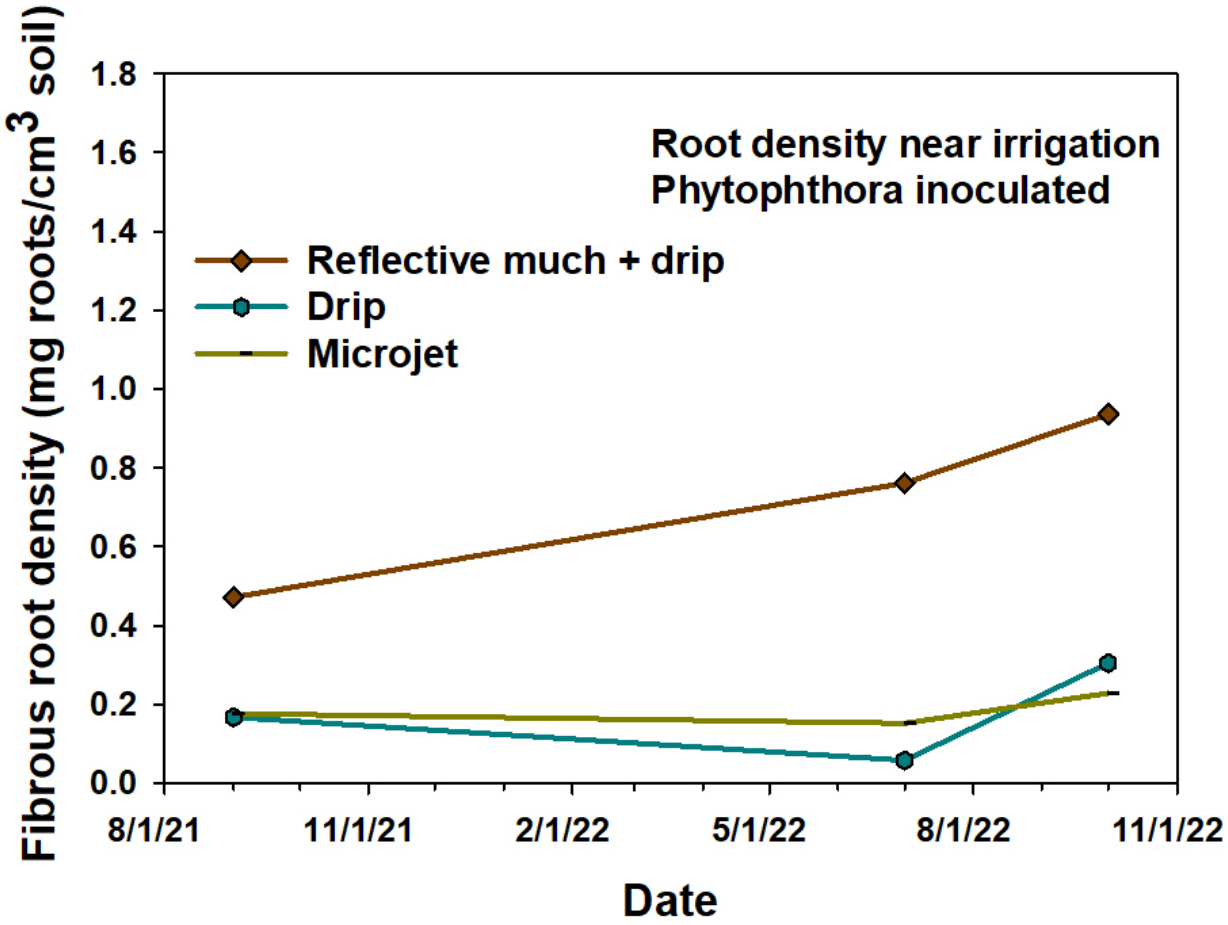
Phytophthora counts near irrigation





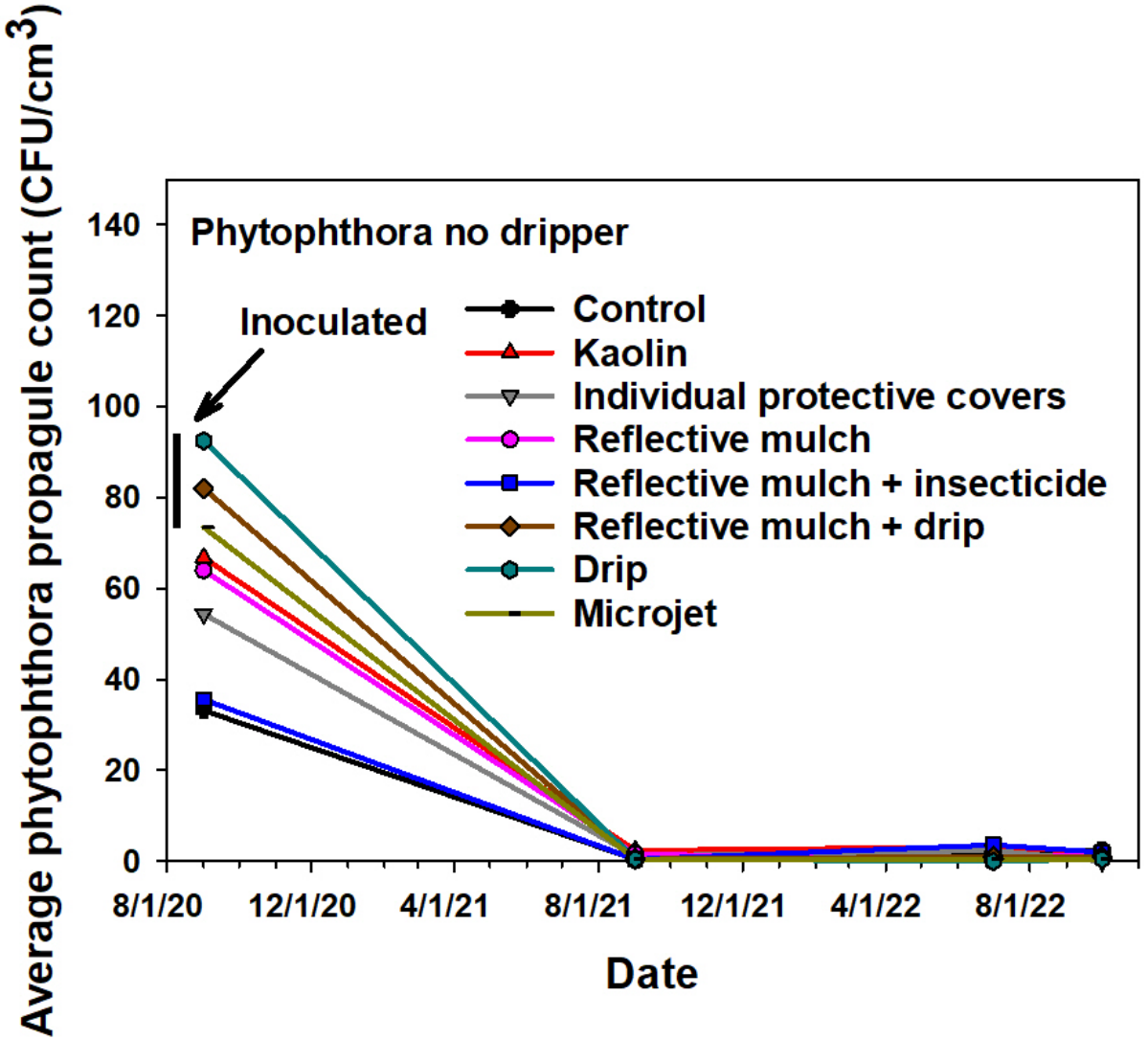
Root densities – No roots, No phytophthora





Irrigation matters for Phytophthora

- No irrigation, no phytophthora
- Near irrigation, treatments with good root growth, more phytophthora
  - Mulch helps root density
  - IPC have better canopies and roots



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Any questions?

Thank you!

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