Natural compounds to help in the fight against HLB

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Roadmap

- Introduction
- Application of oak extracts
- Application of oak mulch
- Conclusion
- Future studies

Where are we today?

- Current Mitigation Methods
  - Aggressive Psyllid Control
    - Physical & Chemical
  - Bactericides (*CLas*)
  - Tree removal & destruction

- ~200% increase in grove maintenance costs since 2002-03

- No Cure of HLB exists
  - Challenges
    - Cannot be easily cultered
    - Limited mobility of compounds that kill Liberibacter
    - Correct management of the grove seems to help

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Observations and reflections

Current HLB mitigation strategy

- Challenges
  - Efficacy
  - Environmental/health concerns
  - Psyllid and/or CLas resistance
  - Cost
- Observation
  - Citrus under oak cover
  - Reduced CLas titer
  - Antibacterial effect of oak?

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Anecdotal reports started in 2013

Possible causes?

- -Resistant genotype
- -Environment
- -Soil
- -Growing in the shade
- -Wild plant proximity
- -Insect repellent VOCs
- -Mycorrhization

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Author | Topic: Citrus Greening Oak Tree Effect (Read 440 times)

phantomcrab
Hero Member
Posts: 544
USA, St. Petersburg, FL
Zone 10a

Citrus Greening Oak Tree Effect
« on: November 23, 2013, 04:16:38 PM »

Oak tree proximity may have an moderating effect on citrus greening infection. Has anyone noticed this with their trees?
https://groveshots.wpengine.com/oak-trees-protect-trees-from-citrus-greening-disease/

Logged

Richard

bangkok
Hero Member
Posts: 2823

Re: Citrus Greening Oak Tree Effect
« Reply #1 on: November 23, 2013, 07:53:39 PM »

Oak-tree's have very rare mycelium around them in the soil, that's why truffles only grow under old oaktree's, so maybe that protects the citrus?

Interesting.

Logged

http://forums.gardenweb.com/discussions/2181156/at-excalibur-today-poor-customer-service

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STEVE ROGERS PHOTOGRAPHY

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Experimental approach

Hypothesis

Could water extract of oak leaves (it rains allot in FL) be responsible for observation?

Experiment

DI Water vs. Aqueous oak (*Quercus hemisphaerica*) leaf extract

Application to HLB infected citrus trees

Spray and soil drenching

Bi-weekly application for 2 months

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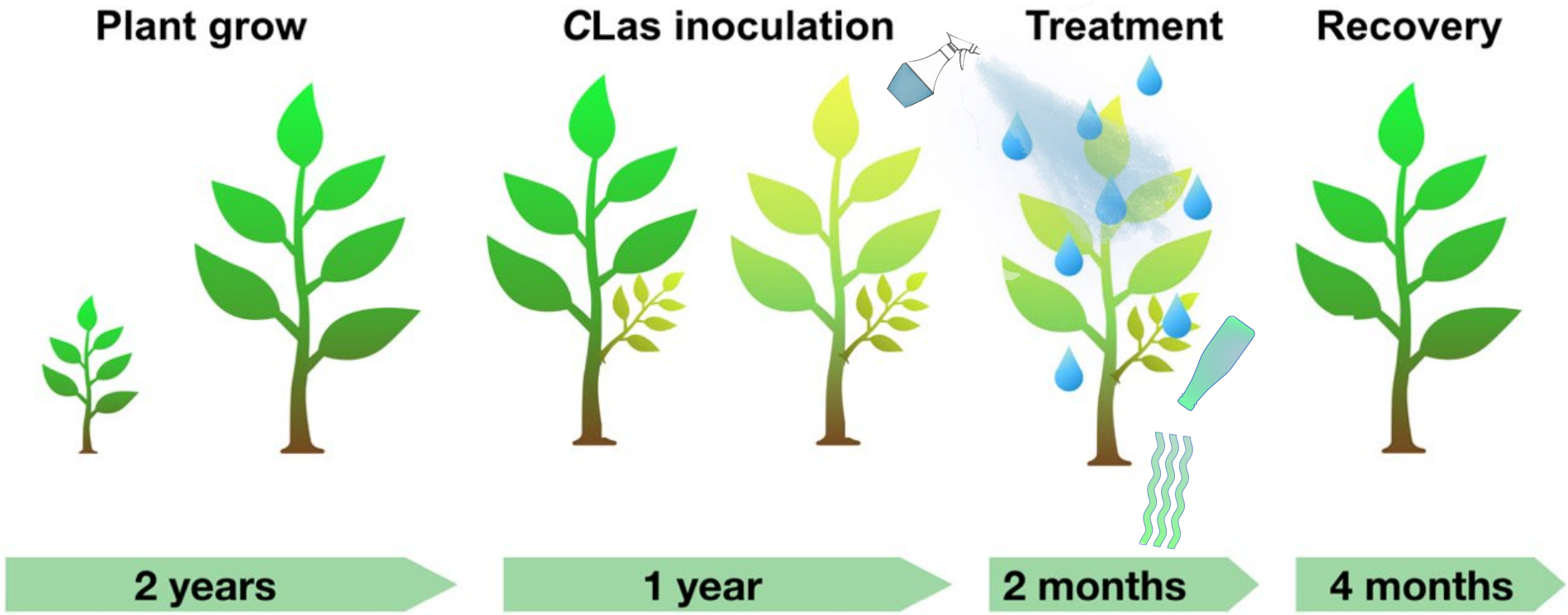
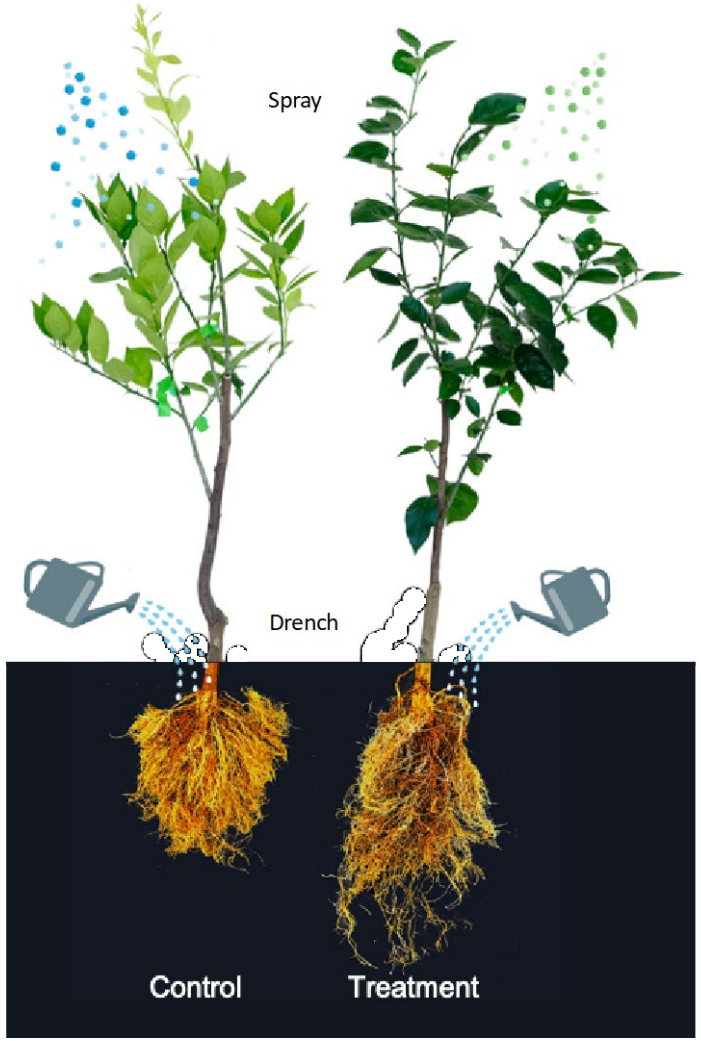
Experimental design



Oak leaves extracts decreased *C*Las Ct values



Ct values to *C*Las DNA

	CLas Ct value	CLas Ct value	delta Ct
C_water	25.9	25.9	0
C_water	30.1	30	0.1
C_water	30.8	24.7	6.1
C_oak	27.3	28.5	-1.2
C_oak	24	39.5	-15.5
C_oak	27.6	31.2	-3.6

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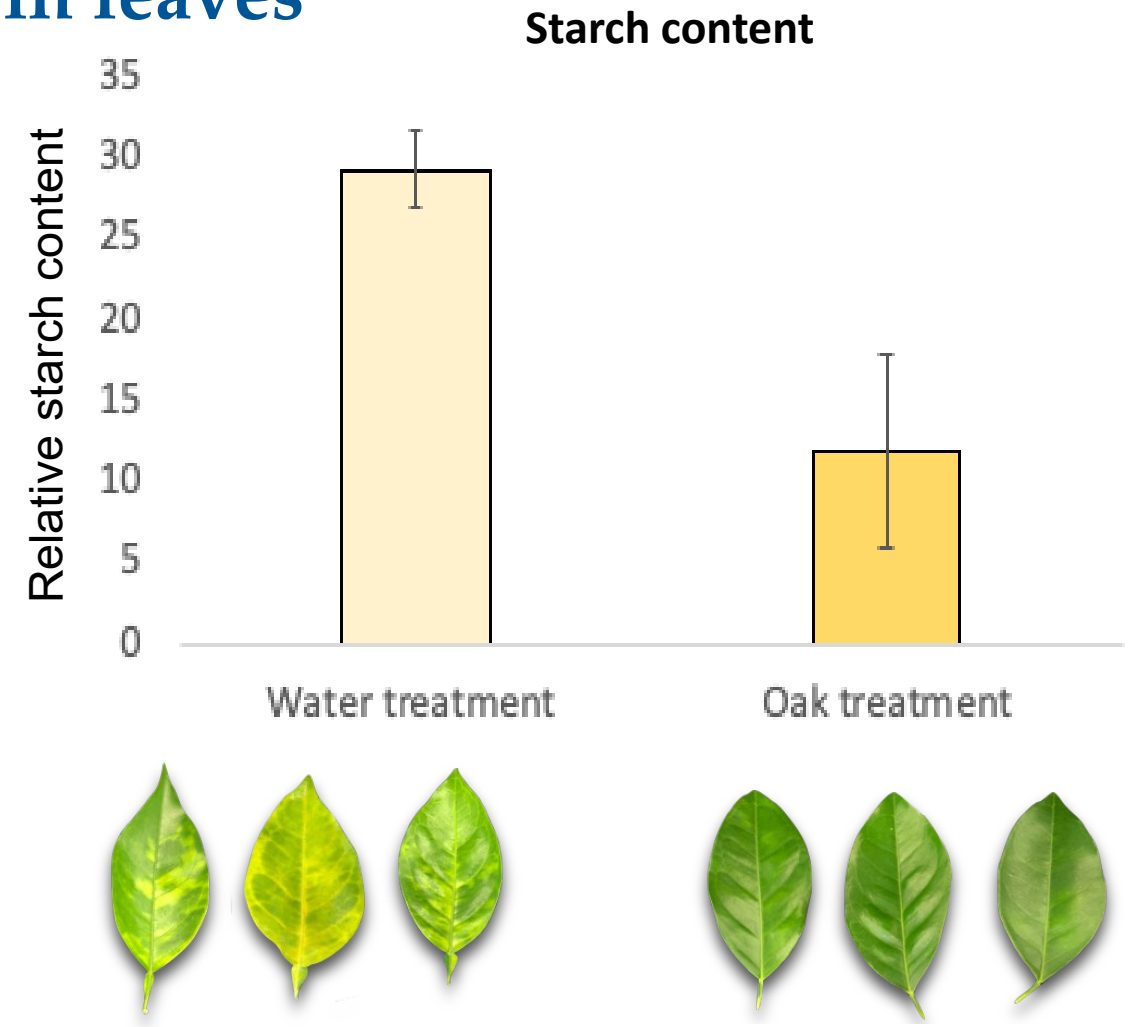
Oak leaf extracts lowered the starch content in leaves



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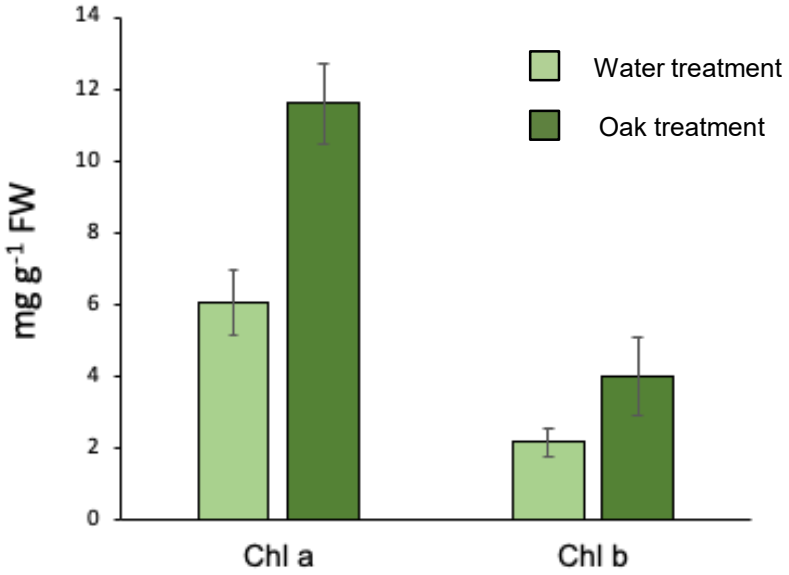
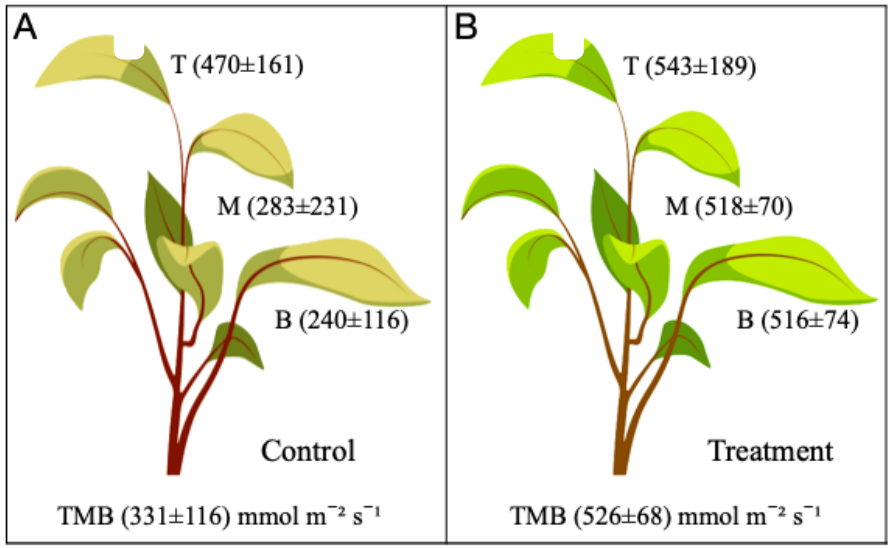
Oak leaf extracts restored citrus leaf physiology

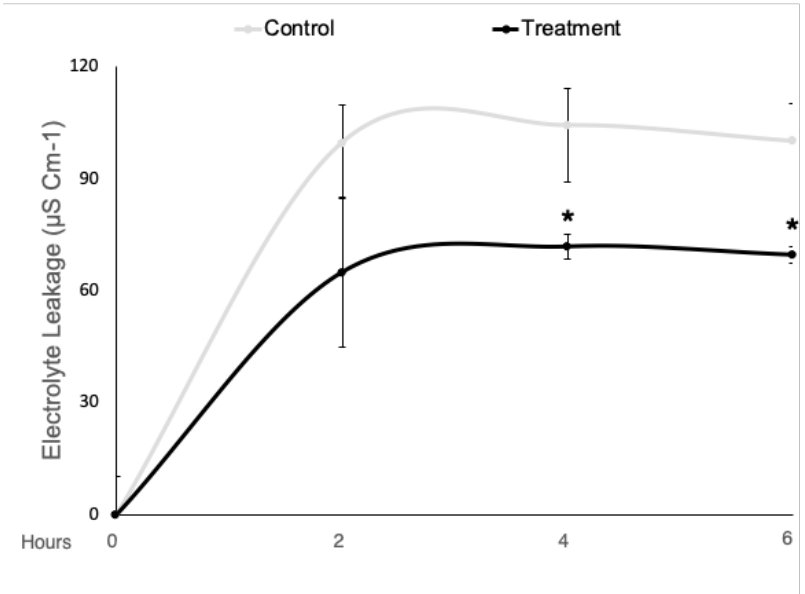
Chlorophylls a and b



Stomatal conductance -passage of carbon dioxide (CO_2)



Electrolyte leakage



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One reference (2004) on the application of *Quercus ilex* L. leaf methanol extract on plant pathogens

No literature could be found on antibacterial properties of *Quercus laurifolia* (Laurel Oak – Native to SE US)

No literature could be found on the application of oak against HLB

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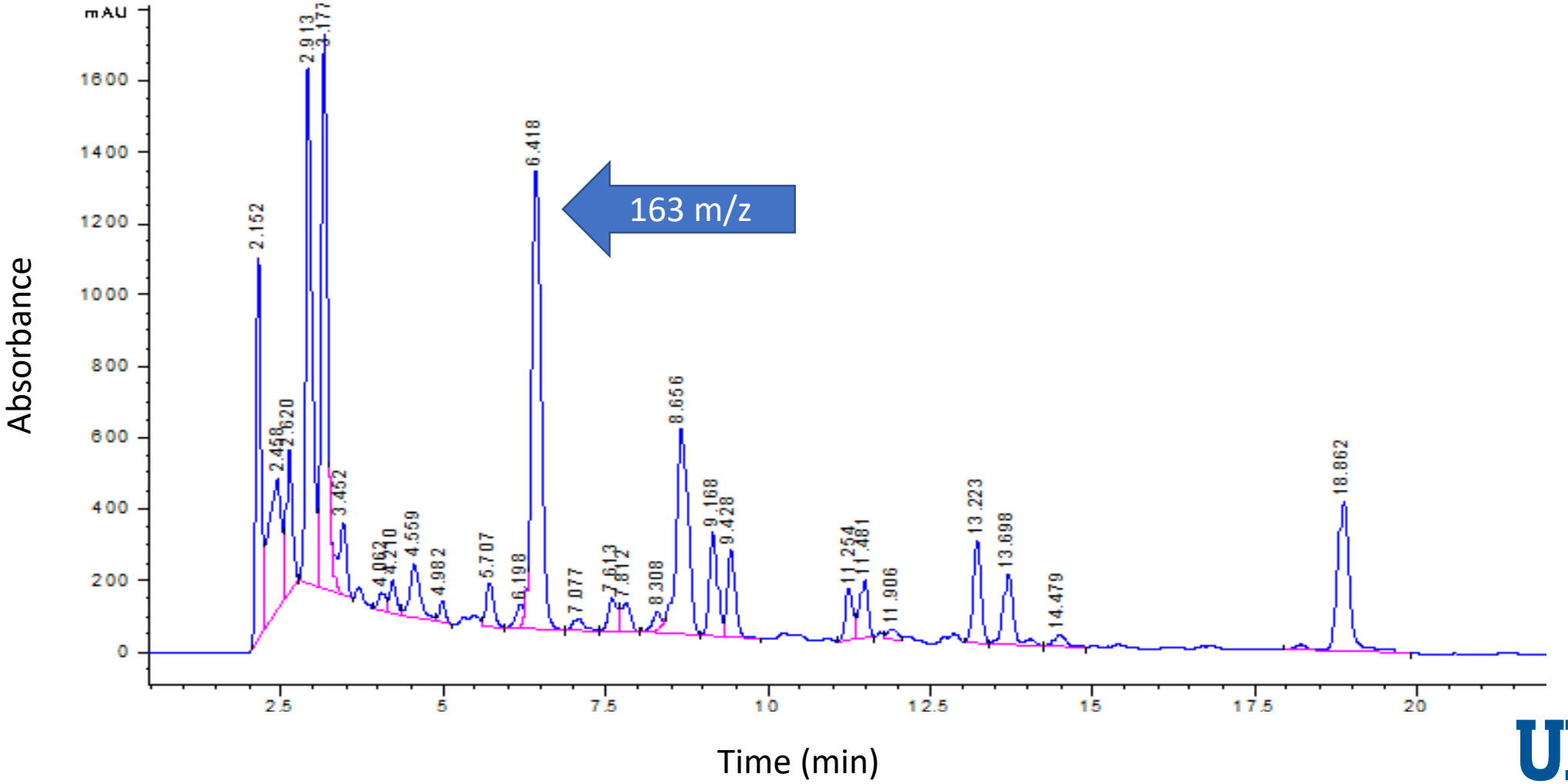
Experimental



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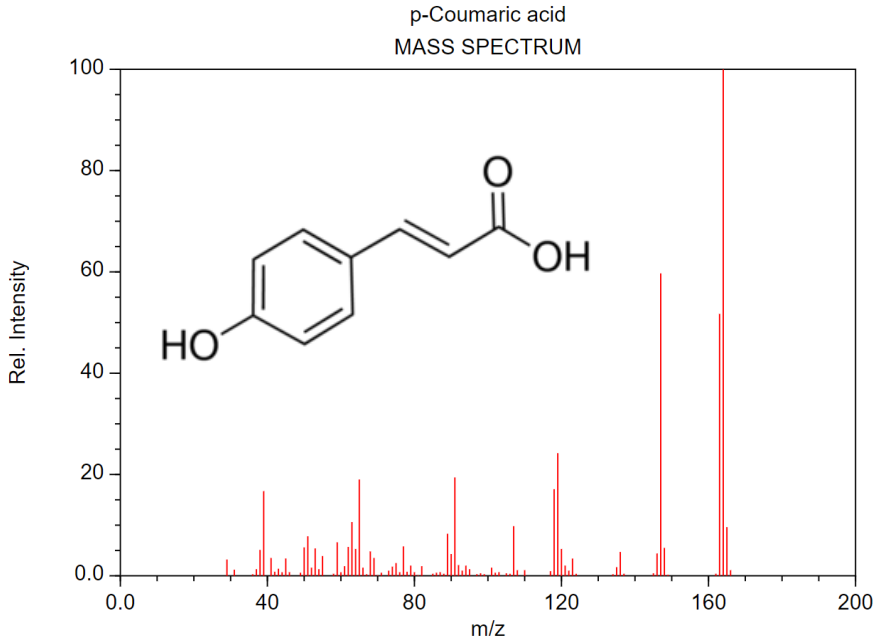
Results

- Possible hydroxycinnamate idenitity
- *p*-coumaric acid (4-hydroxycinnamic acid) 164 g/mol
- Relative intensity of fragments from most abundant to least
- 164 >147 >163



NIST Chemistry WebBook (https://webbook.nist.gov/chemistry)

p-coumaric acid structure, SIGMA-ALDRICH

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journal homepage: www.elsevier.com/locate/plaphy

Research article

Quercus leaf extracts display curative effects against *Candidatus* Liberibacter asiaticus that restore leaf physiological parameters in HLB-affected citrus trees

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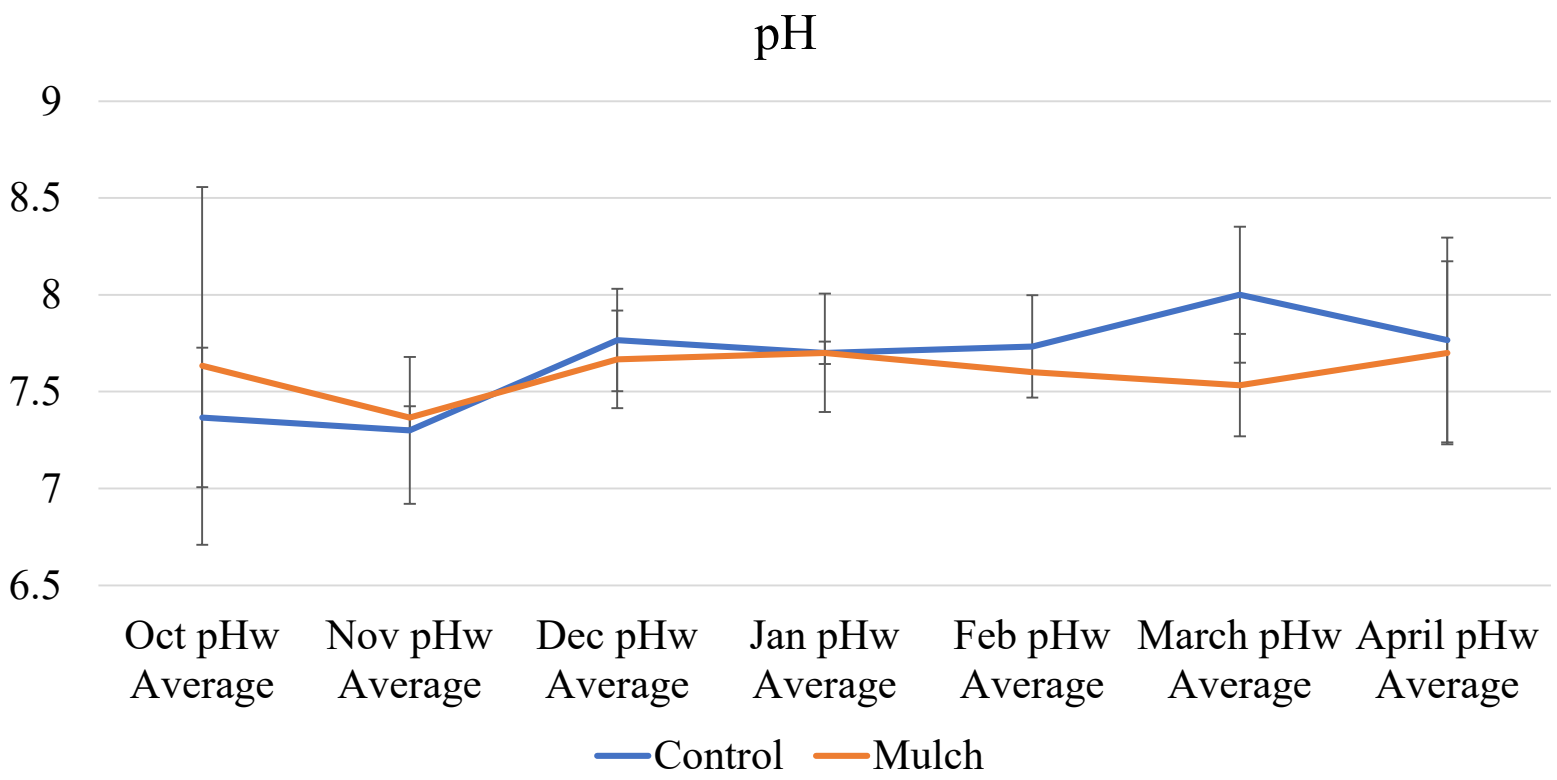
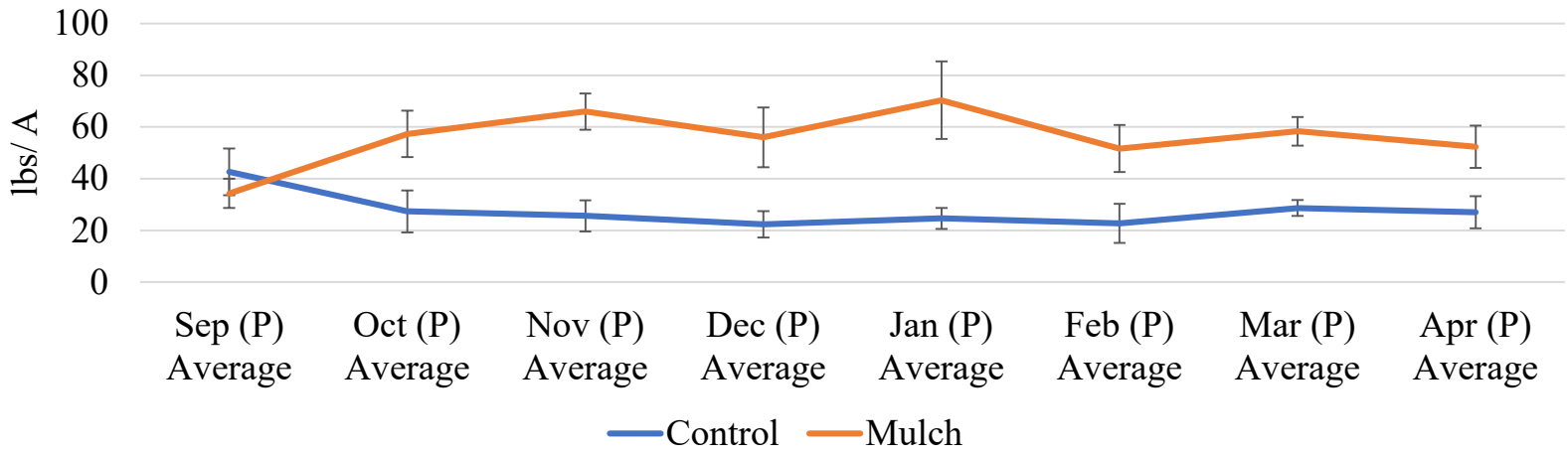
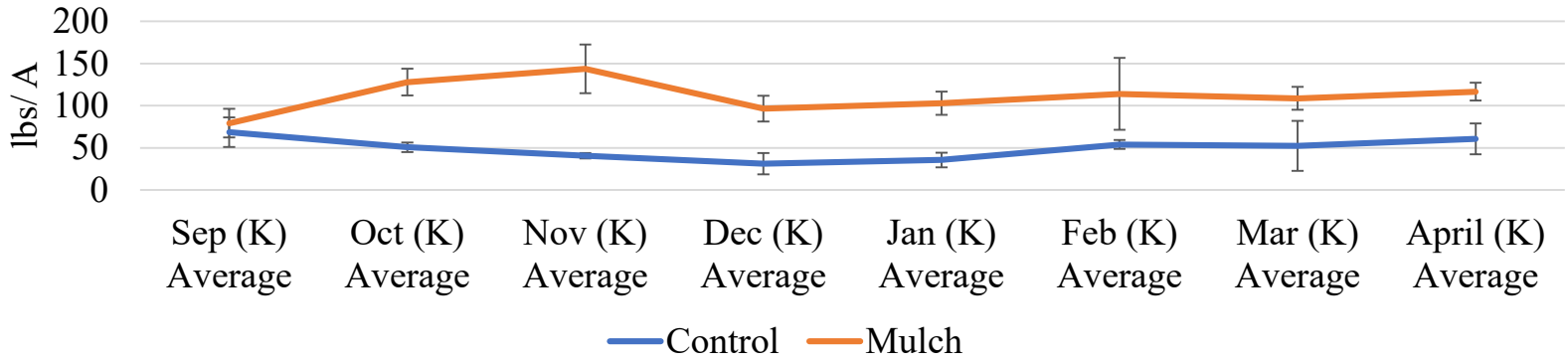
After 6 months…



Phosphorus



Potassium



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After 6 months…

- Major changes in soil macronutrients

- Changes in soil diversity: more fungi, humidity

- So far, NO significant changes in HLB titer

- We still have 18 months to go…

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Conclusions

- Use of natural compounds can help but it's not the "cure"

- Soil health is an important component of citrus cultivation

- Experiments with citrus roots and soil are long

Future plans

- Study the changes in soil microorganisms when oak mulch and oak extracts are applied

- Pilot study for cover crops on the River

- Possible experiments with compost

Acknowledgments:

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Thank you!

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