UH-CTAHR Coffee Research and Extension Update 2022-2023

Andrea Kawabata

Extension Agent for Coffee and Orchard Crops

June 17, 2023

Hawaii Coffee Association Conference

Outline

1. IR-4 coffee pesticide registration
2. SCRI coffee pesticide research trial
3. CBB biocontrol
4. NRCS CIG soil health project
5. SCRI coffee tissue culture
6. Catimor hybrid project
7. CLR-resistant plant propagation

Funding and collaborations

United Kau Farmers Cooperative

Hawaii's Coffee Industry

Our Many Volunteers

IR-4 Pesticide Registration Program Update

Dr. Zhiqang Cheng, Julie Coughlin, James Kam, and Dr. Zhening Zhang

UH-CTAHR Dept. of Plant and Environmental Protection Sciences

1963-2023 60 YEARS IR-4

Fungicides for Coffee Leaf Rust

Priaxor® Xemium®	Section 3 registration expected this year
Alto® 100 SL	IR-4 petition ready to submit to EPA
Abound®	IR-4 petition ready to submit to EPA
Aproach® Prima	Field trials complete, laboratory analysis ongoing
Aprovia® Top	Field residue trials will be conducted this year
Excalia™	Field residue trials will be conducted this year

1963-2023 60 YEARS IR-4

Coffee Projects in the Pipeline

INSECTICIDES

Avaunt®: Petition submitted to EPA. CBB control.

Brigade® WSB: Final report in prep. at IR-4. CBB control.

Sivanto® Prime: EPA tolerance established. Waiting for Bayer to add coffee to label. Green scale, coffee leafminer control.

Velum® Prime: EPA tolerance established. Nematode control.

HERBICIDES

Amine 400: Field trials complete. Lab analysis ongoing. Broad spectrum weed control.

Liberty® 280 (Rely 280): Field trials complete. Lab analysis ongoing. Non-RUP paraquat replacement.

Loyant®: Efficacy and crop safety trials ongoing. Registrant requires 4, 2-year trials. Excellent applicator and environmental safety profile.

IR-4 Pesticide Registrations in Coffee

INSECTICIDES

Applaud® for green scale, mealybugs

Admire Pro® for green scale

Movento® for green scale, aphids

Exirel® for CBB

Pyrethrins + PBO products for CBB

Delegate® for CBB, coffee leafminer, banana moth

Altaco

HERBICIDES

Fusilade® DX, grass weeds

Alion®, pre-emergence

Goal® 2XL, pre/post emergence

Gramoxone® SL, broad spectrum

Systemic fungicides and biological control products

SCRI CLR field project (yr 1: 2022-2023)

Dr. Zhiqiang Cheng and MS student Lilly Buchholz
(with help from UH IR-4 team)
UH-CTAHR
Dept. of Plant and Environmental Protection Sciences

- Azoxystrobin - Systemic, interrupts electron transport chains (Abound)
- Picoxystrobin - Systemic, inhibits mitochondrial respiration (Aproach)
- Myclobutanil - Systemic, inhibits fungal membrane production (Rally)
- Extract of Reynoutria sachalinensis (Regalia)*
- Pseudomonas chlororaphis strain AFS009 - Bacterial biocontrol (Howler)*
- Untreated control

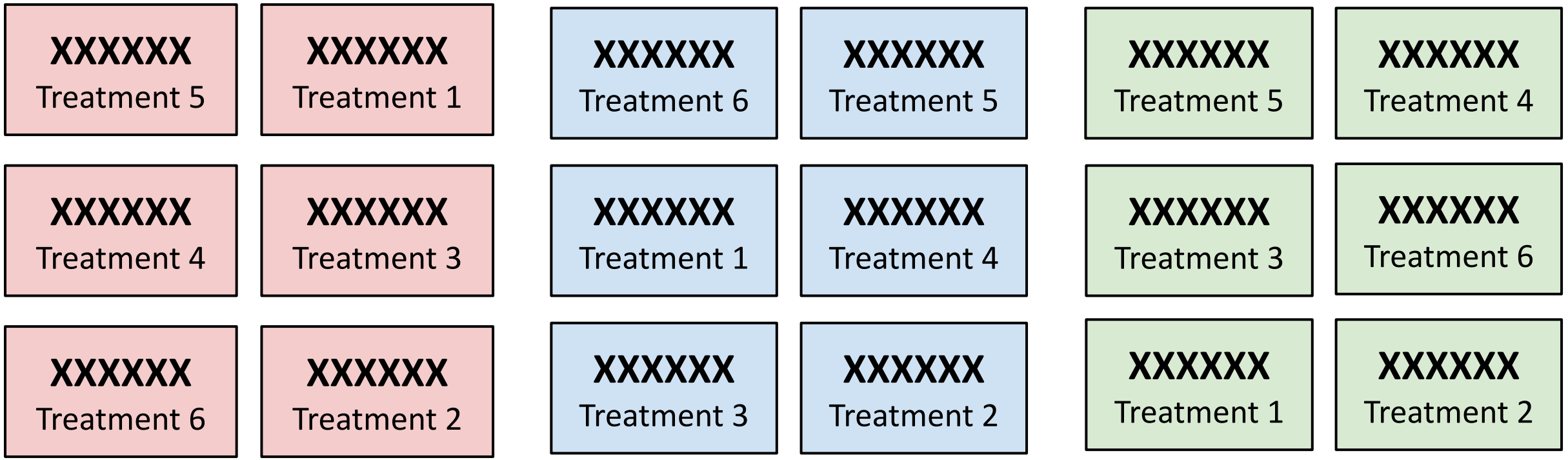
Kona Hills (concurrent with IR-4 trials, but different treatments).

*OMRI

Field layout

6 Treatments, 3 Reps, Organized in a randomized complete block design.

Each treatment plot consists of 6 trees, data is collected from the middle 4. trees.



Data Collection

In each rep, observing four (4) trees per treatment and four (4) branches per tree.

- Two (2) branches per side, high and low sections

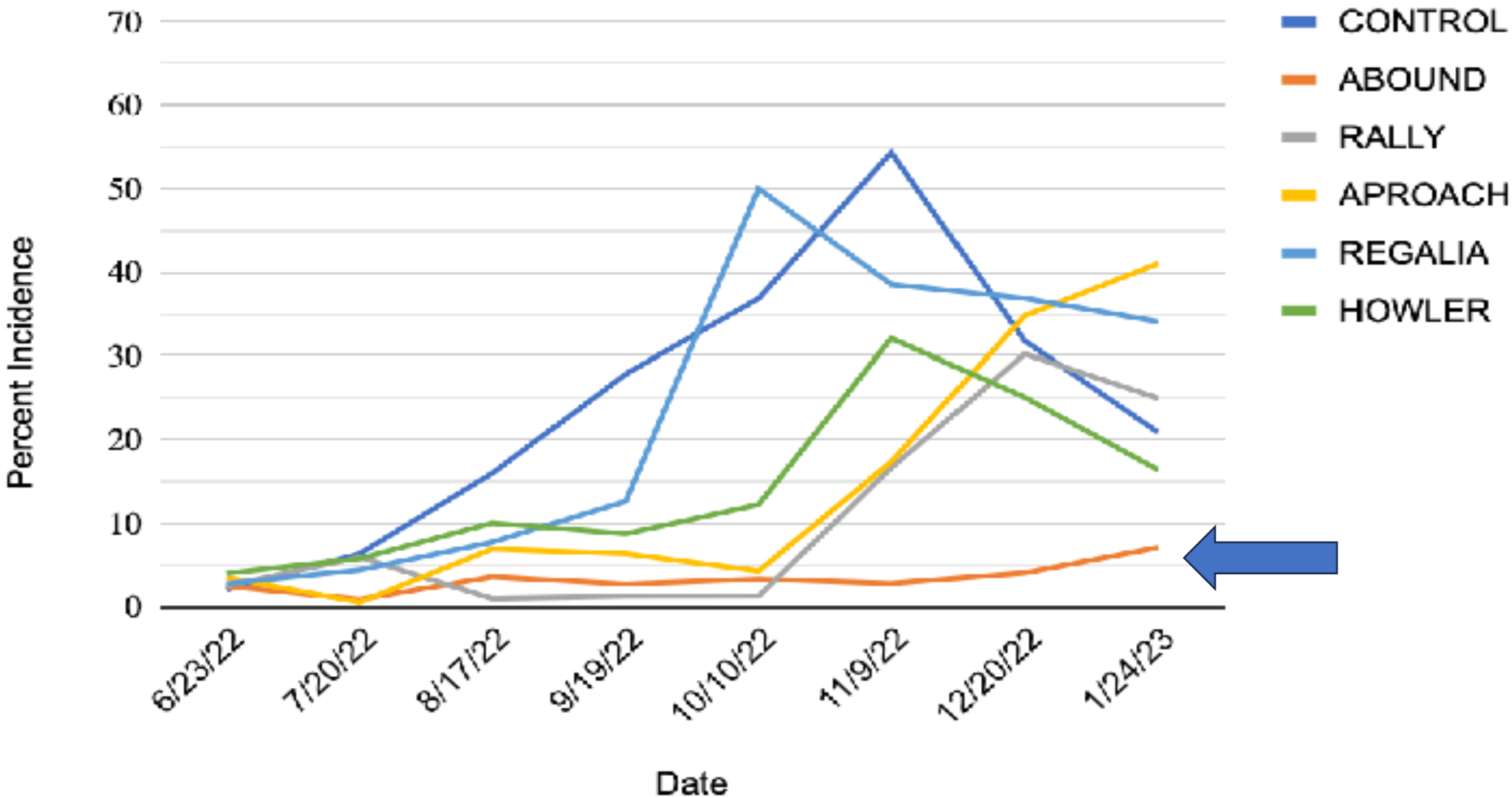
Each branch is individually evaluated for:

- Number of infected leaves per branch
- Incidence of disease
- Severity of the infection:

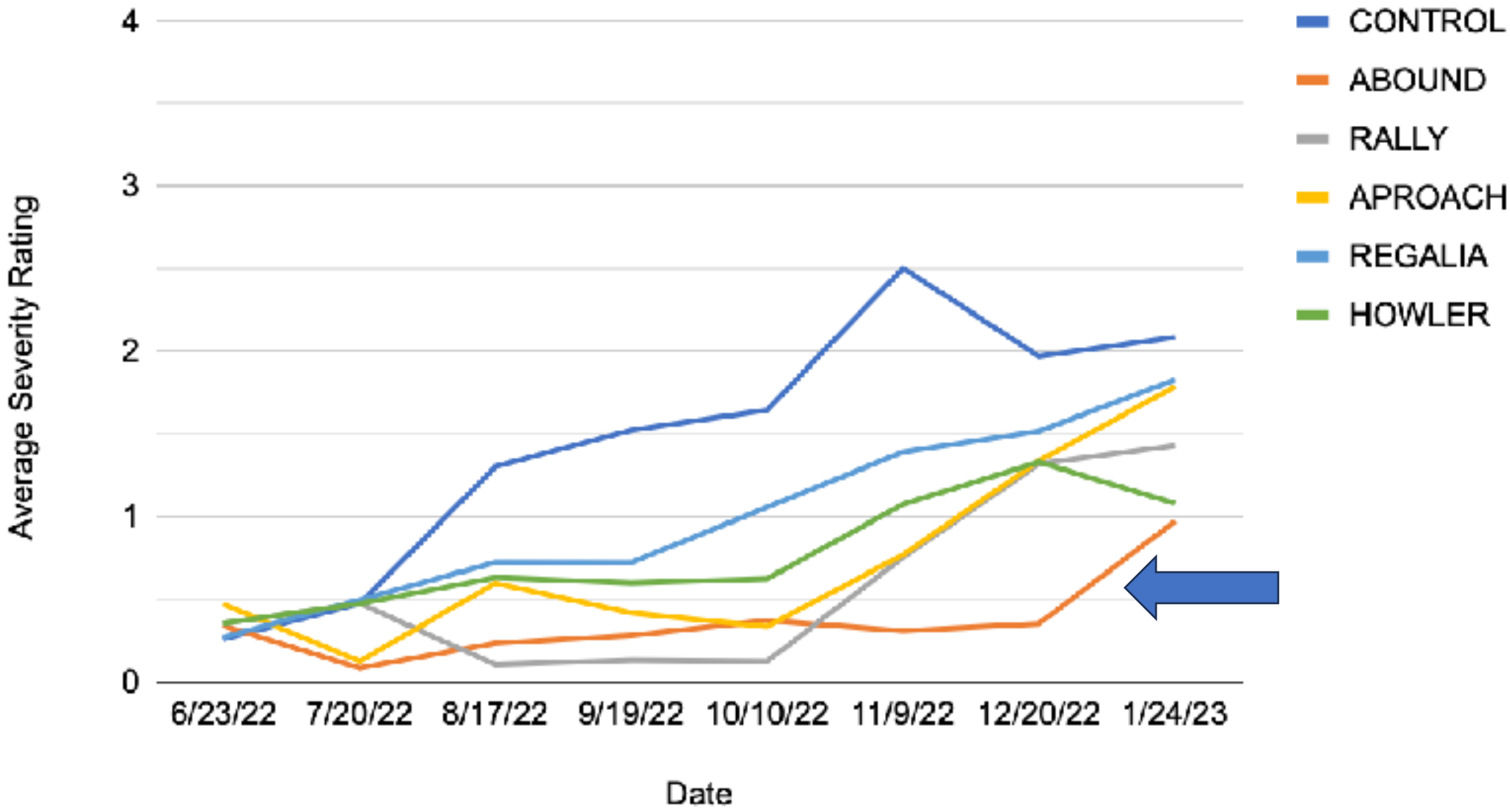
  0 = 0%, 1 = 0.5-1%, 2 = 1-5%, 3 = 6-20%, 4 = 21-50%, 5 = >50%

Any observable phytotoxicity effects on the trees is recorded as well (none).

Coffee Leaf Rust Incidence



Coffee Leaf Rust Severity



CBB biocontrol agent approved

Dr. Mark G. Wright

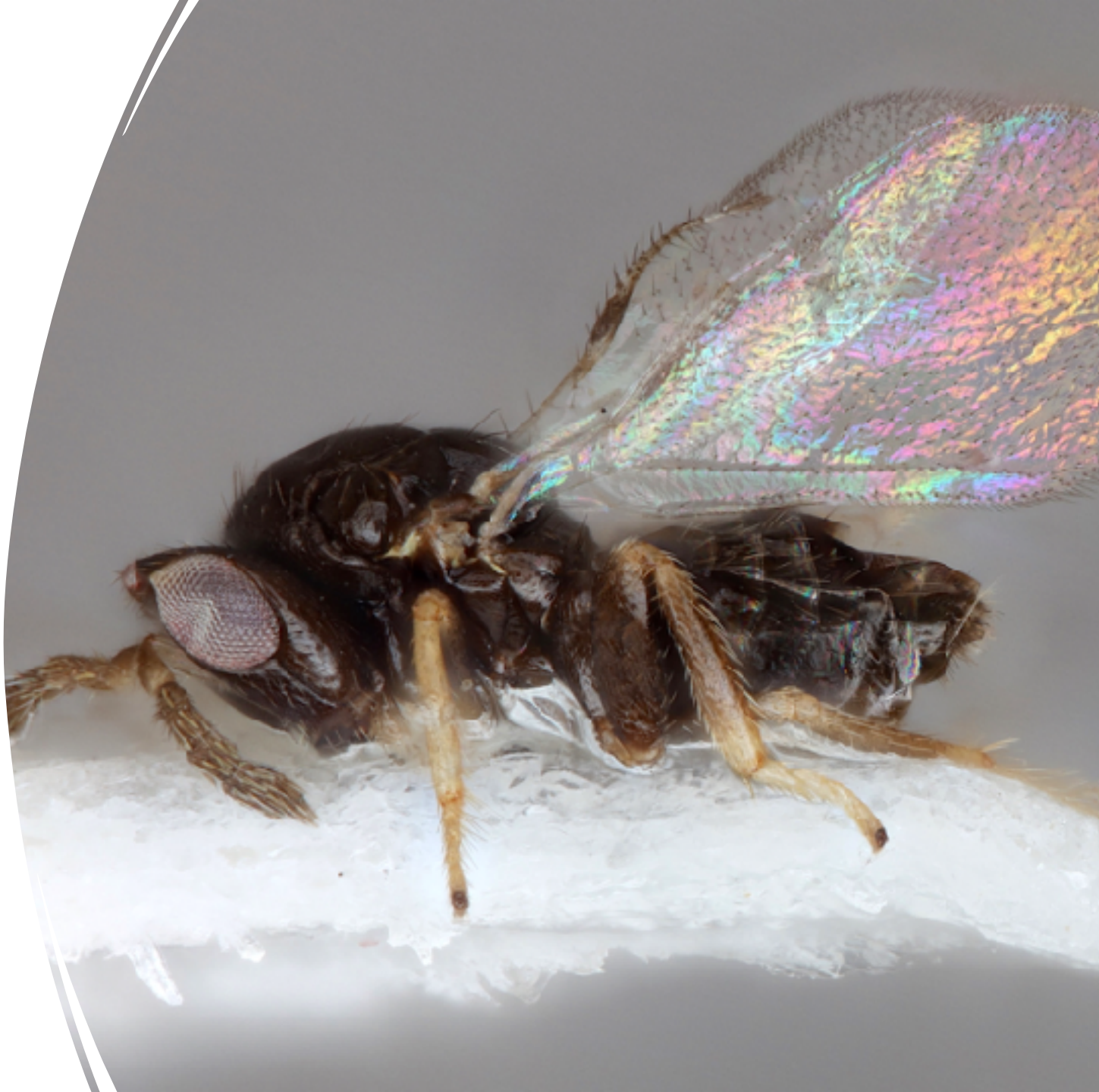
Plant and Environmental Protection Sciences

Dr. Peter Follett

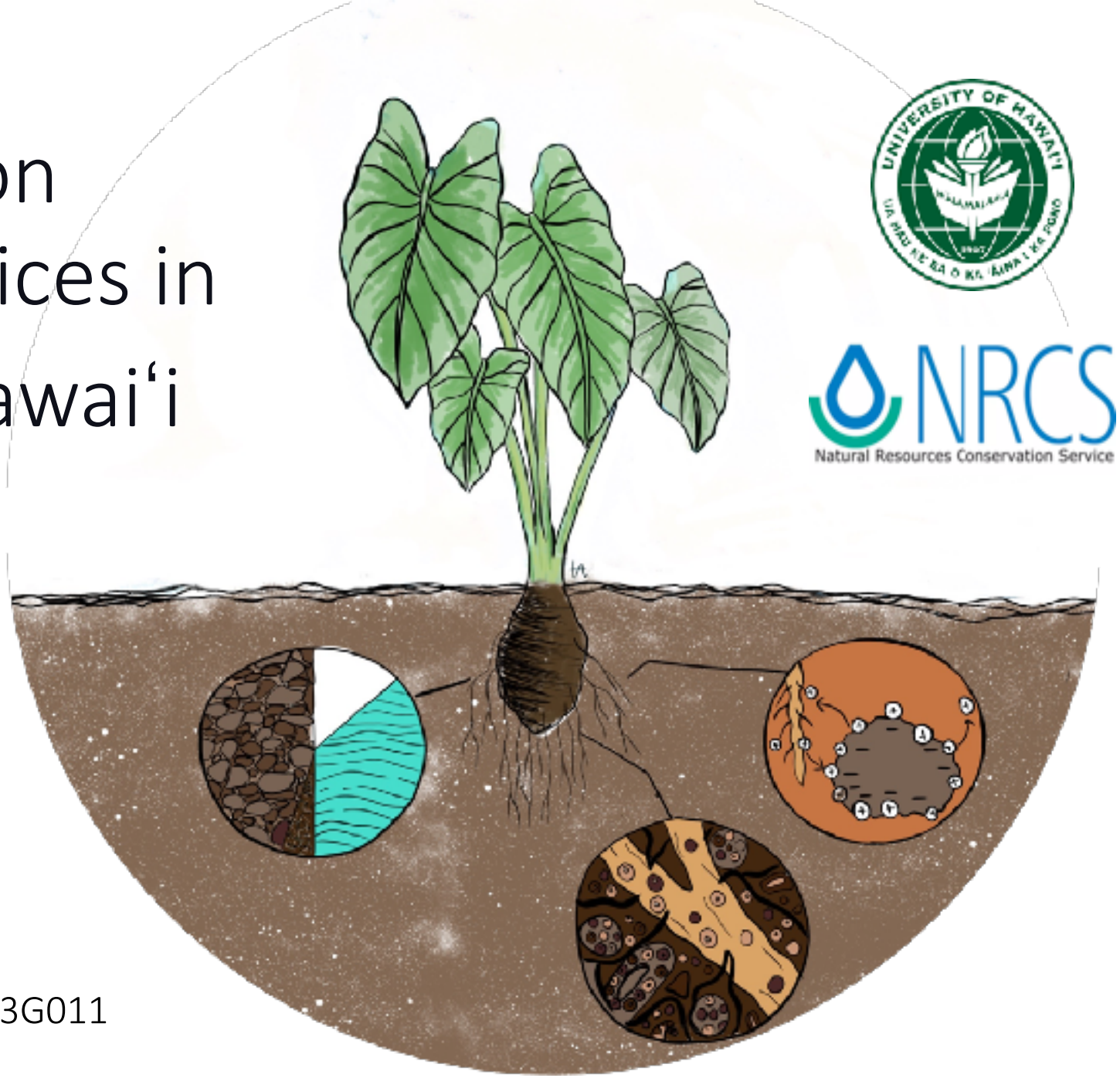
USDA-Agricultural Research Service DKI PBARC

Espinoza et al. 2009

- Phymastichus coffea, parasitoid of CBB was approved for release by HDOA and USDA-APHIS in May 2023.
- This tiny wasp, originally from E. Africa, is specific to CBB and may attack some other invasive Hypothenemus spp. such as tropical nut borer.
- Parasitizes adult CBB; Small (⩽ 1mm), 30 to 47-day life cycle, short adult longevity; 2 eggs per host.
- Currently rearing CBB in the lab for quarantine raising of two generations of the wasps, and then mass-rearing of wasps for field release.

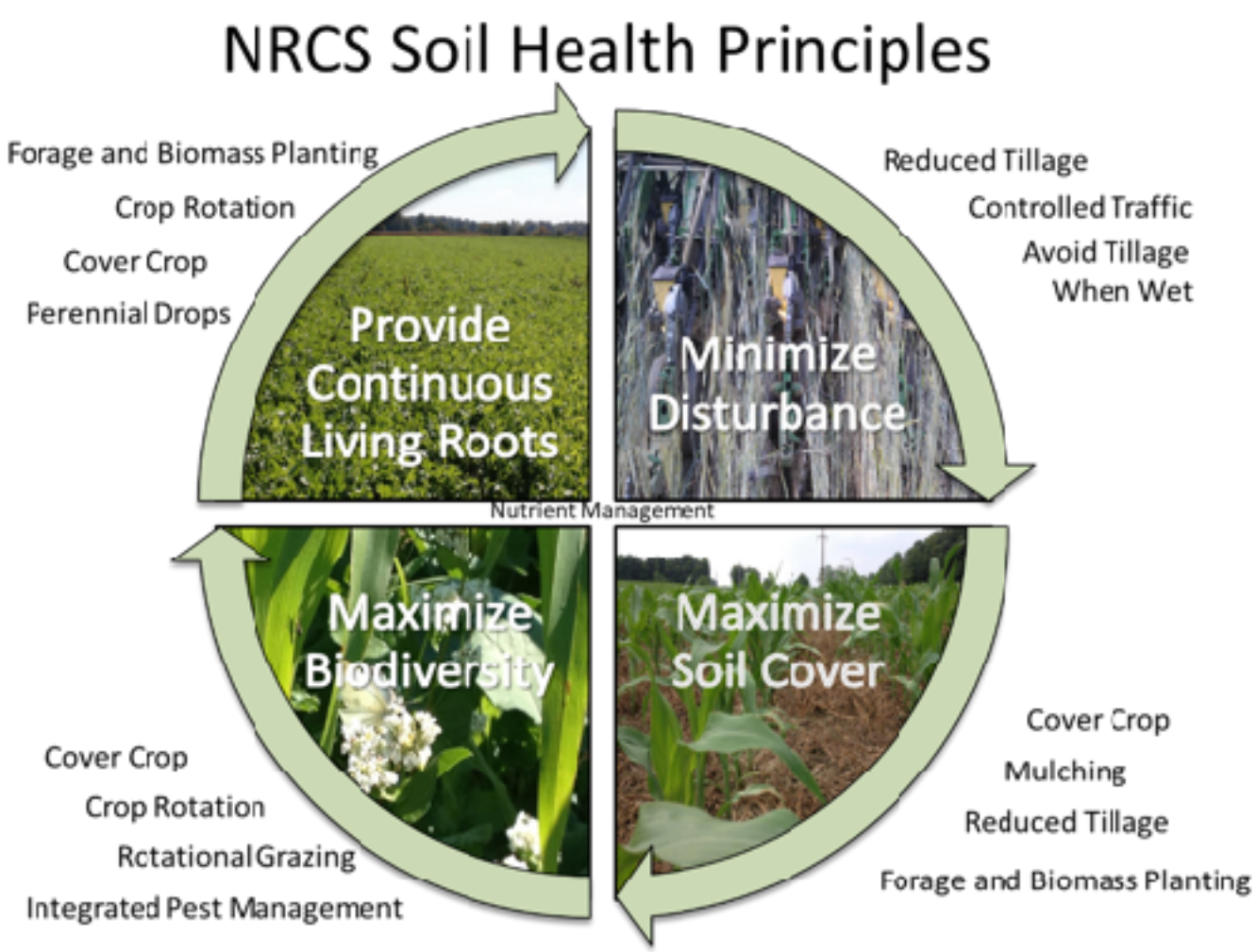


Implementation of soil health practices in coffee farms of Hawai‘i



Jonathan Deenik, Susan Crow, Tai Maaz, Johanie Rivera Zayas, Andrea Kawabata, Josh Silva, Jensen Uyeda, David Sotomayor, Christine Tallamy Glazer, Kenji Loo, Aleric Krenz, Ryan Ueunten, Kristina Estrada, Sebastian Church, Ken Kiehl, Kristy Lam

Conservation Innovation Grant NR213A750013G011



Soil Health Goals

- ☐ Build, maintain, or monitor soil health
- ☐ Improve plant health or yield
- ☐ Increase water infiltration and storage
- ☐ Prevent or reduce erosion
- ☐ Increase soil fertility (i.e. nutrient supply)
- ☐ Reduce off-farm inputs
- ☐ Conserve energy and water
- ☐ Reduce pests and diseases
- ☐ Increase system resilience
- ☐ Sequester carbon
- ☐ Other(s): _____

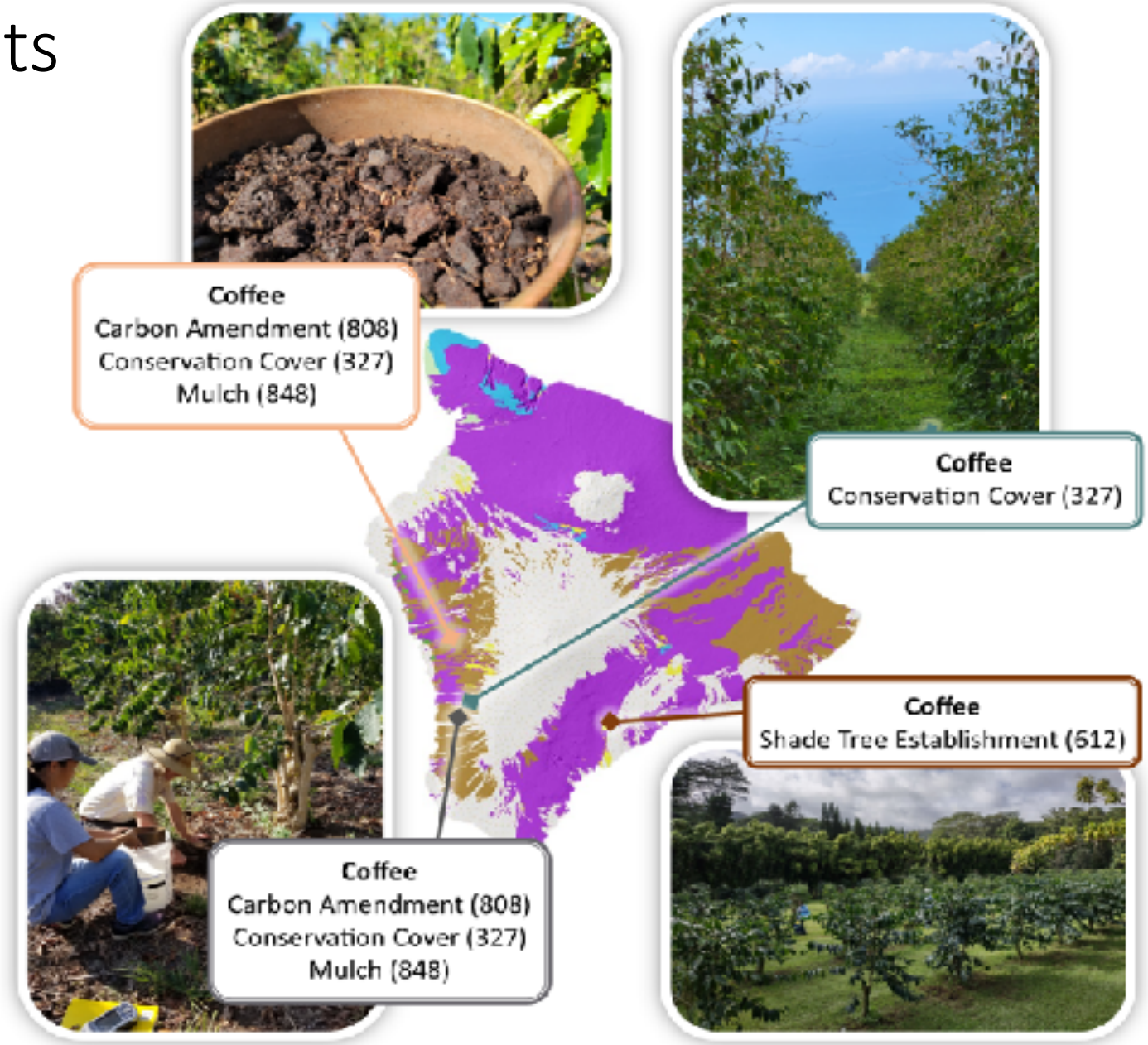
Coffee demonstration plots

Carbon Amendment (Compost)
2 Coffee Orchards

Carbon Amendment (Mulch)
2 Coffee Orchard

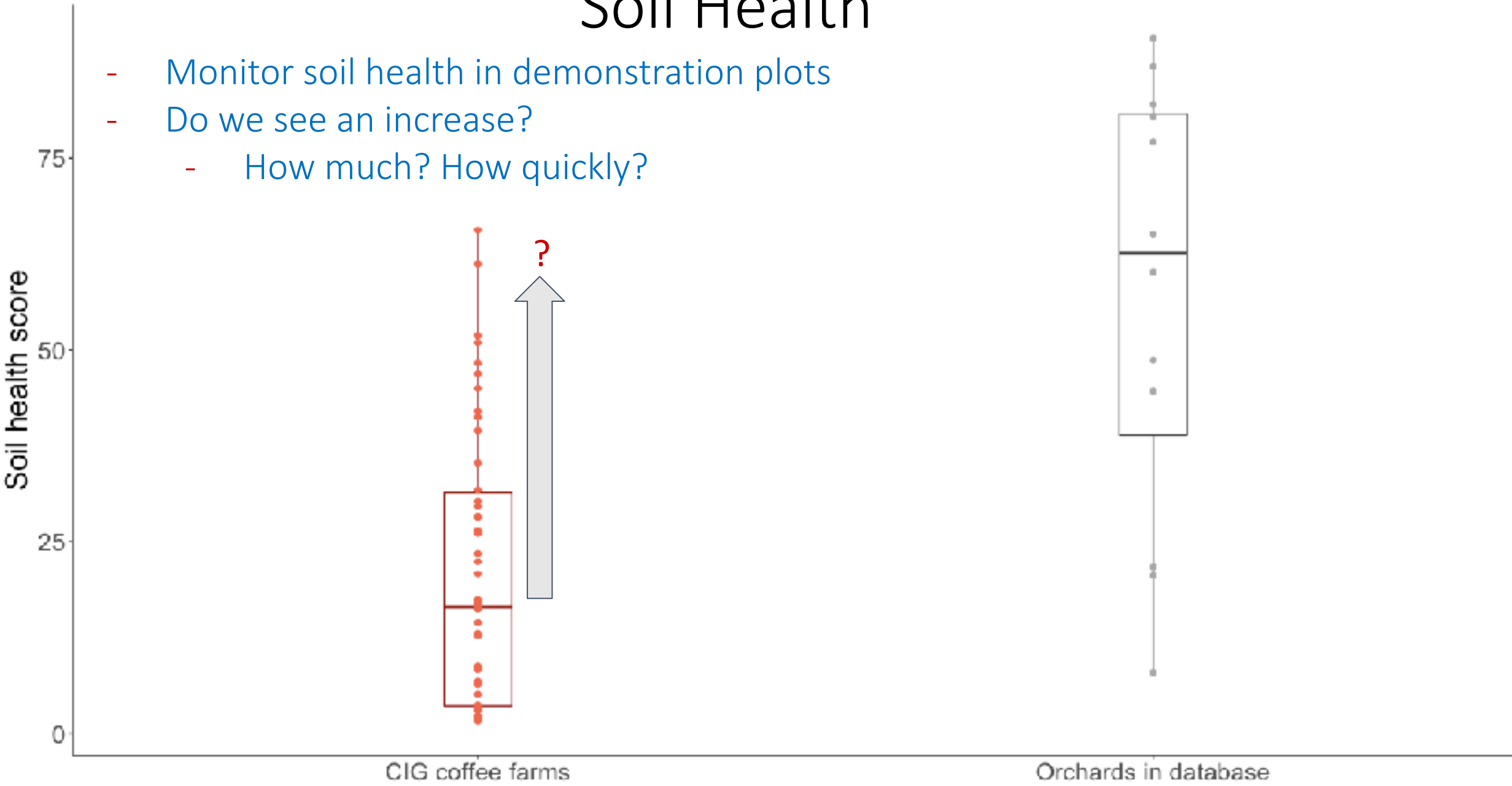
Conservation Cover (Perennial)
3 Coffee Orchards

Shade Tree Establishment
1 Coffee Orchard



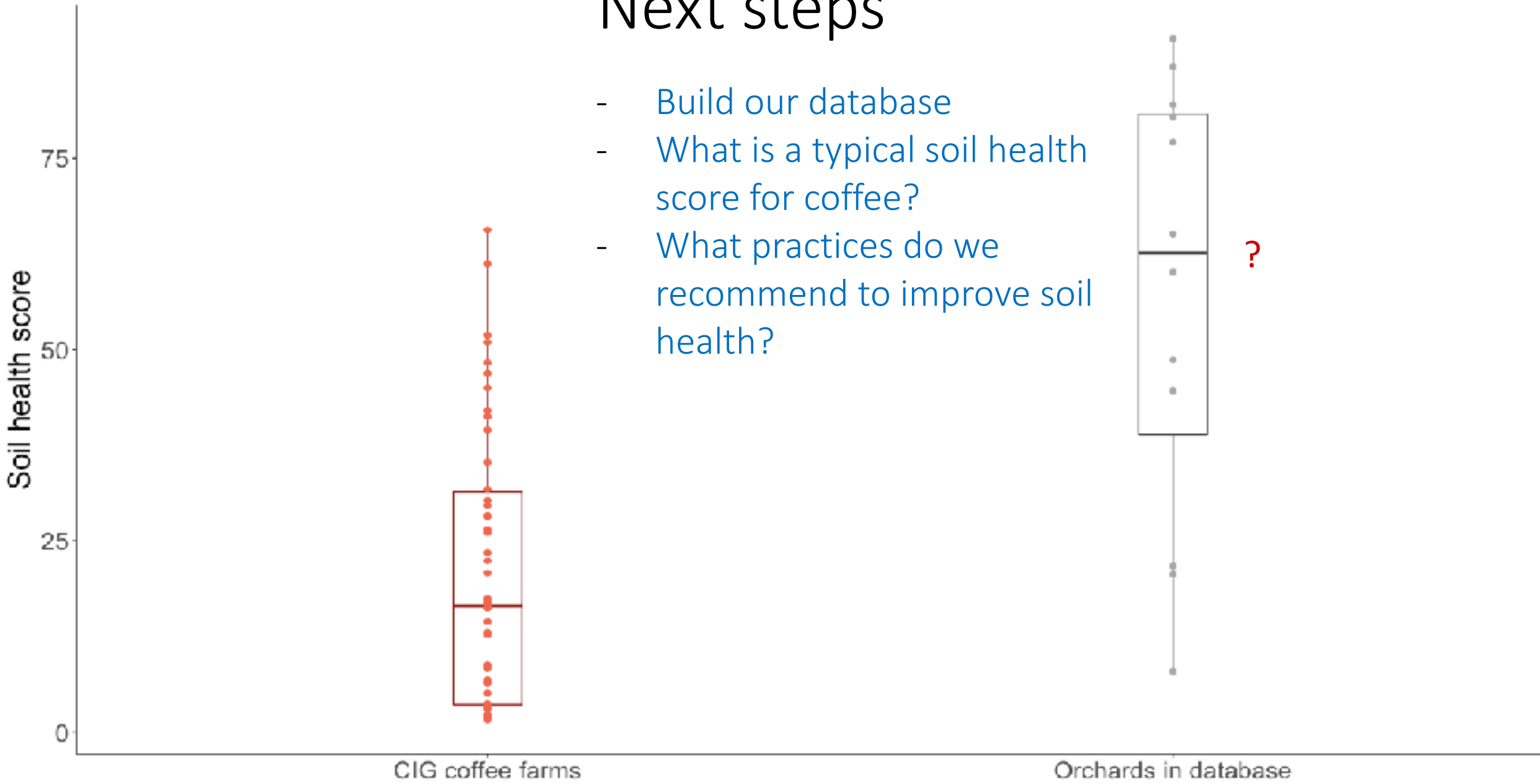
Soil Health

- Monitor soil health in demonstration plots
- Do we see an increase?
  - How much? How quickly?



Next steps

- Build our database
- What is a typical soil health score for coffee?
- What practices do we recommend to improve soil health?



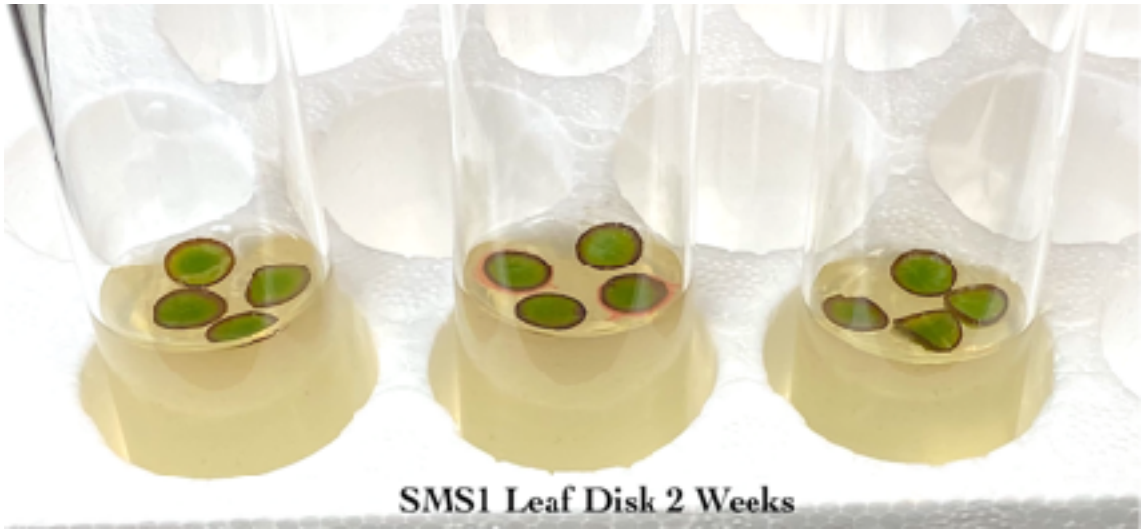
SCRI tissue culture of coffee

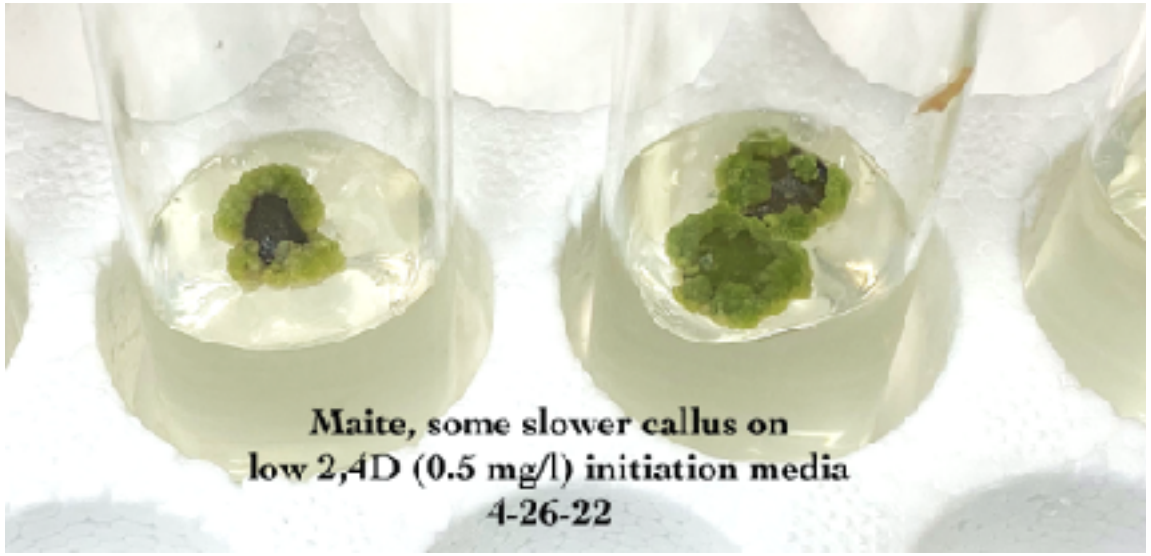
Goal 1	Goal 2	Goal 3
Establishing embryo culture in preparation for large scale micropropagation	Set-up of bioreactor facility	Plant production and acclimatization

Dr. Michael Shintaku
(retired 2022)

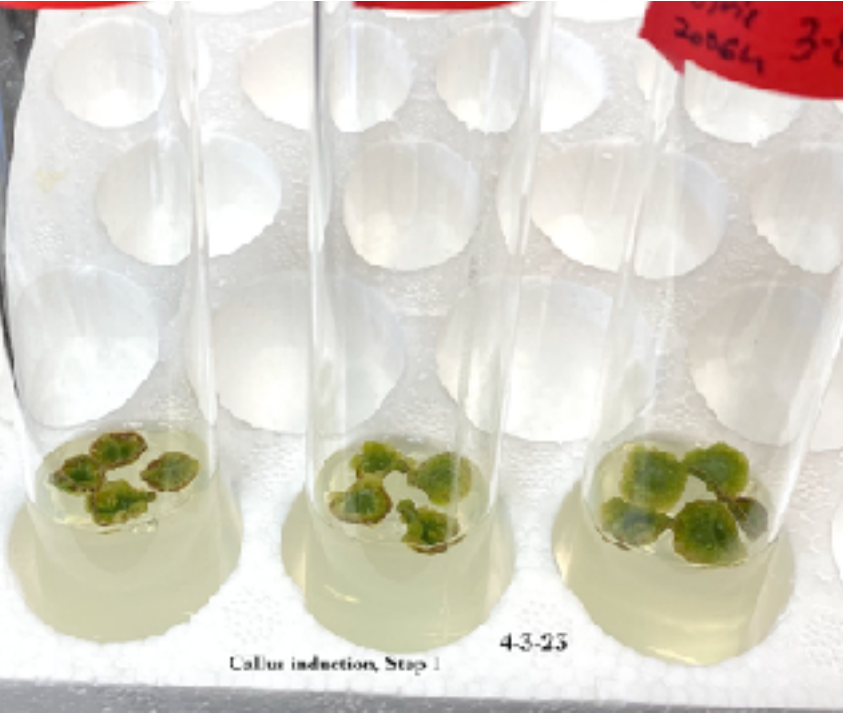
Dr. Bruce Mathews
UH-Hilo

Steve Starnes
UH-Hilo

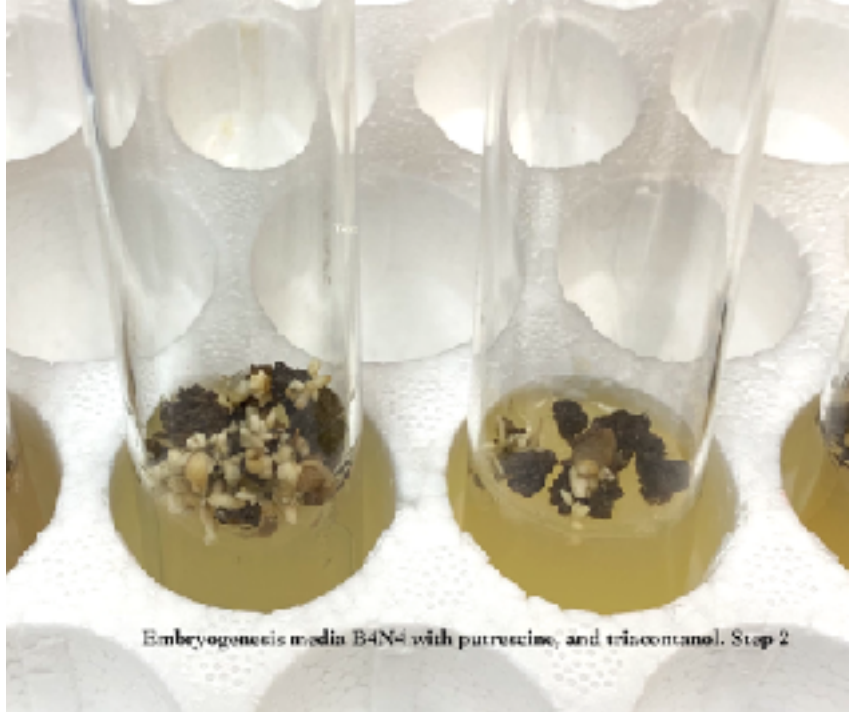


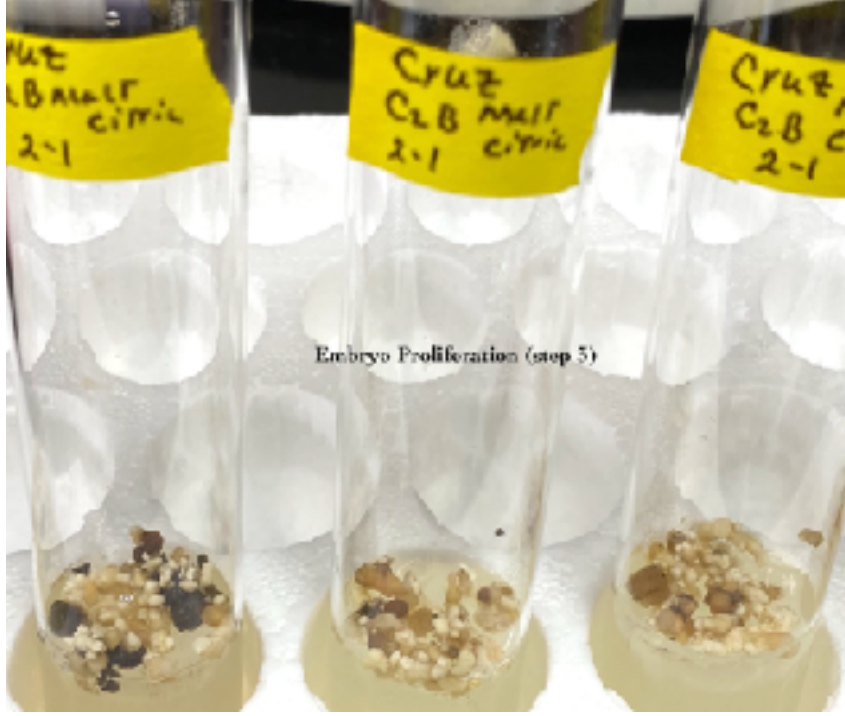


https://www.frontiersin.org/articles/10.3389/fpls.2018.01630/full

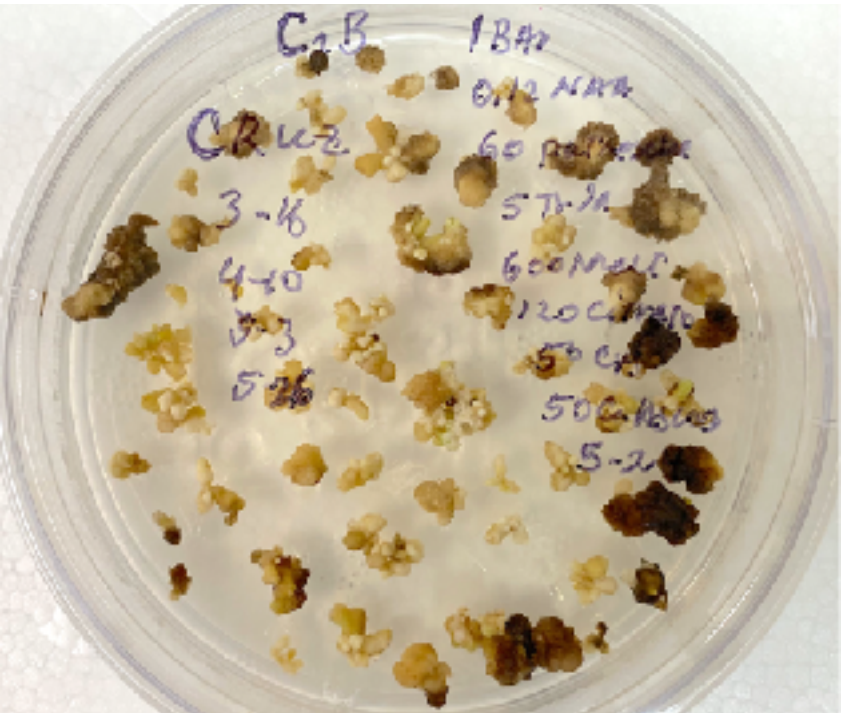


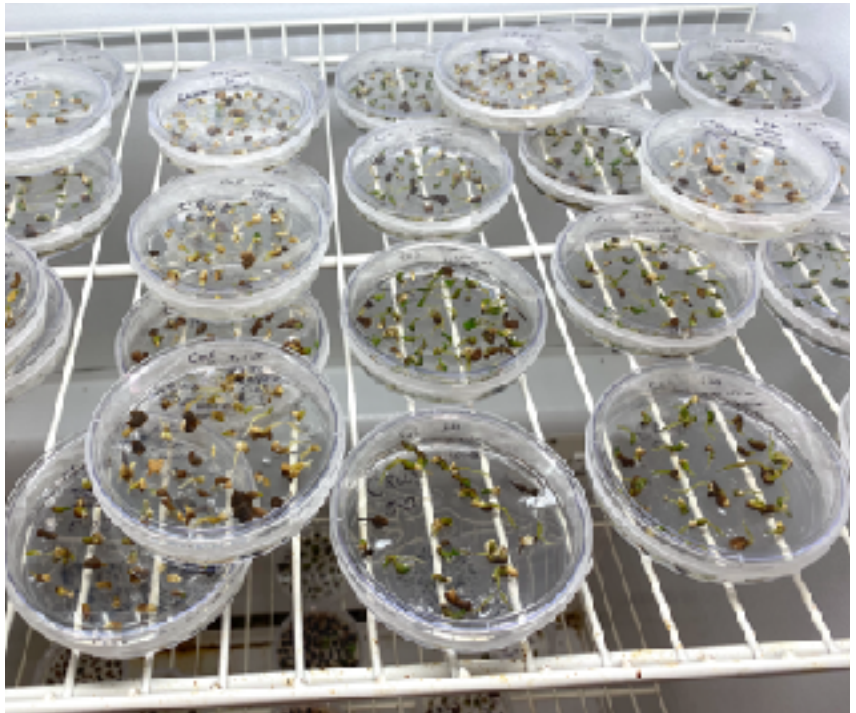
Callus induction, Step 1

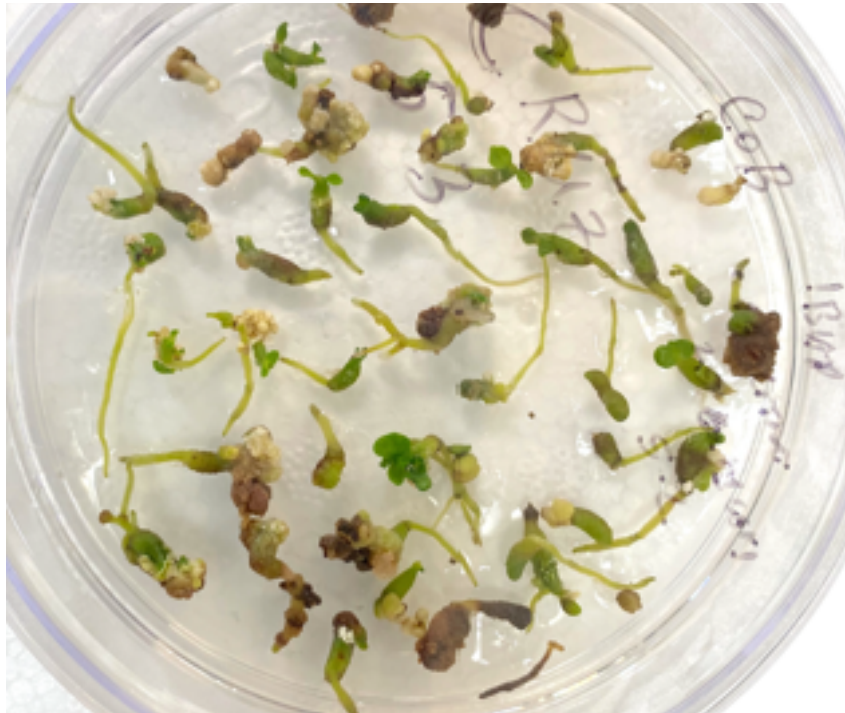

Embryogenesis media B4N6 with putrescine, and triacontanol. Step 2



Embryo Proliferation (step 3)









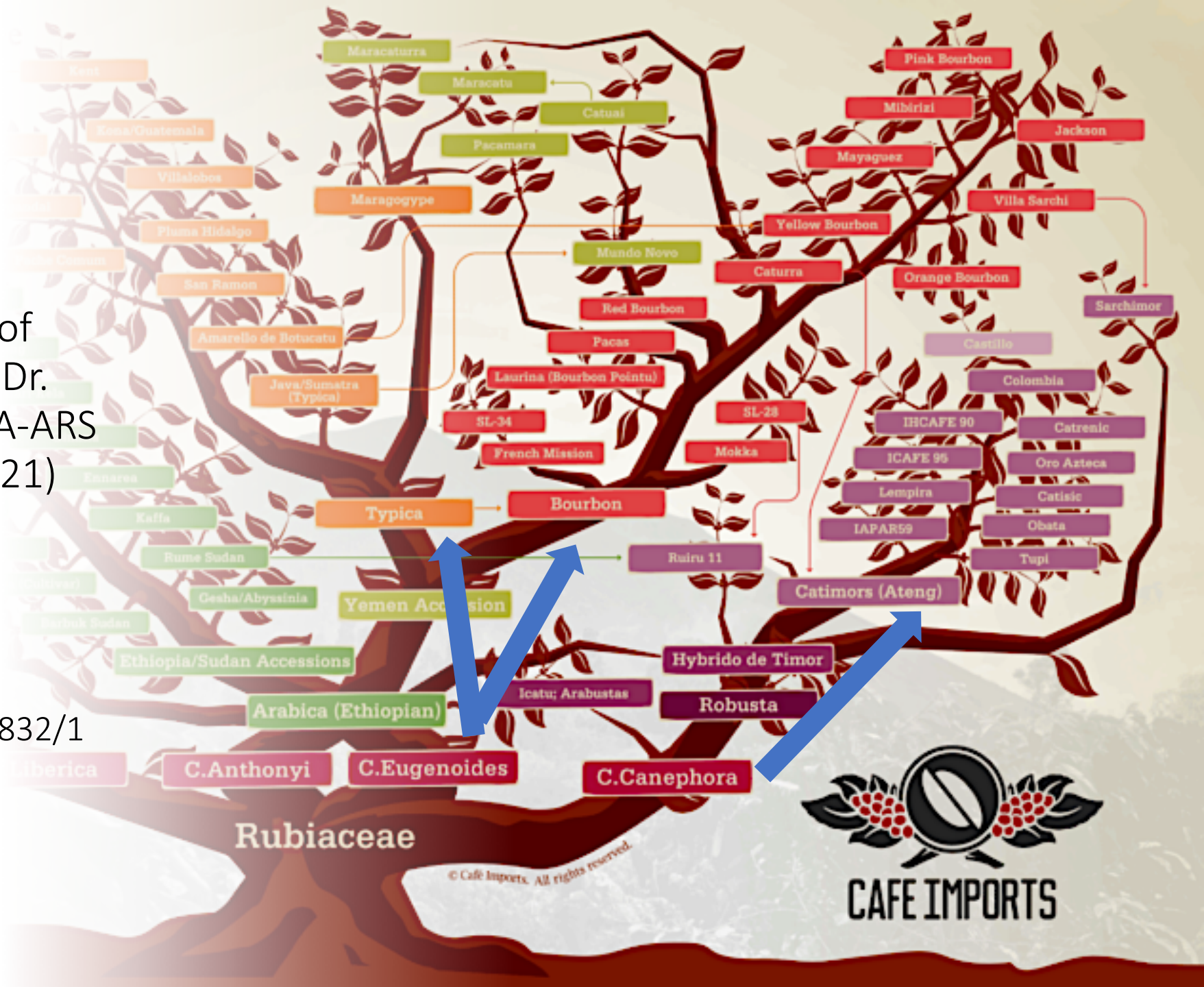

Project on Catimor hybrid trees with CLR resistance

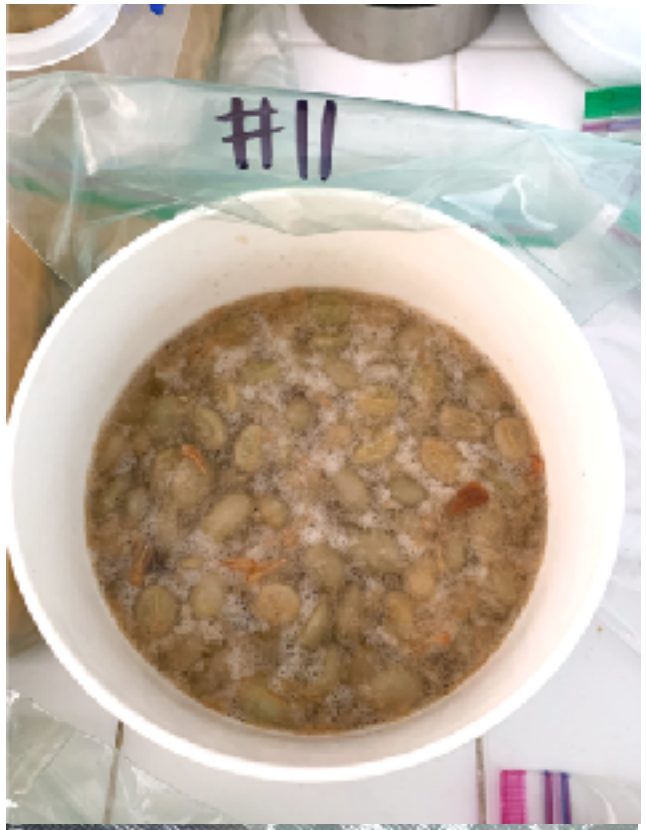
at the Kona Research Station in Kealakekua



Genotyping

- Dr. Tracie Matsumoto of USDA-ARS PBARC and Dr. Dapeng Zhang of USDA-ARS Beltsville, MD (Oct. 2021)
- Catimor hybrids (15)
- Sarchimor hybrids (2)
- T8667 (3)
  - cross of Timor Hybrid 832/1 and Caturra





2021/2022 harvest data

- 20 individual trees
- Tree by tree
  - Single then multiple producing verticals
  - Hand harvested ripe cherry
  - Weighed cherry
  - Pulped cherry
  - Fermented overnight and washed
  - Sun-dried and vacuum-sealed

2021/2022 single vertical data

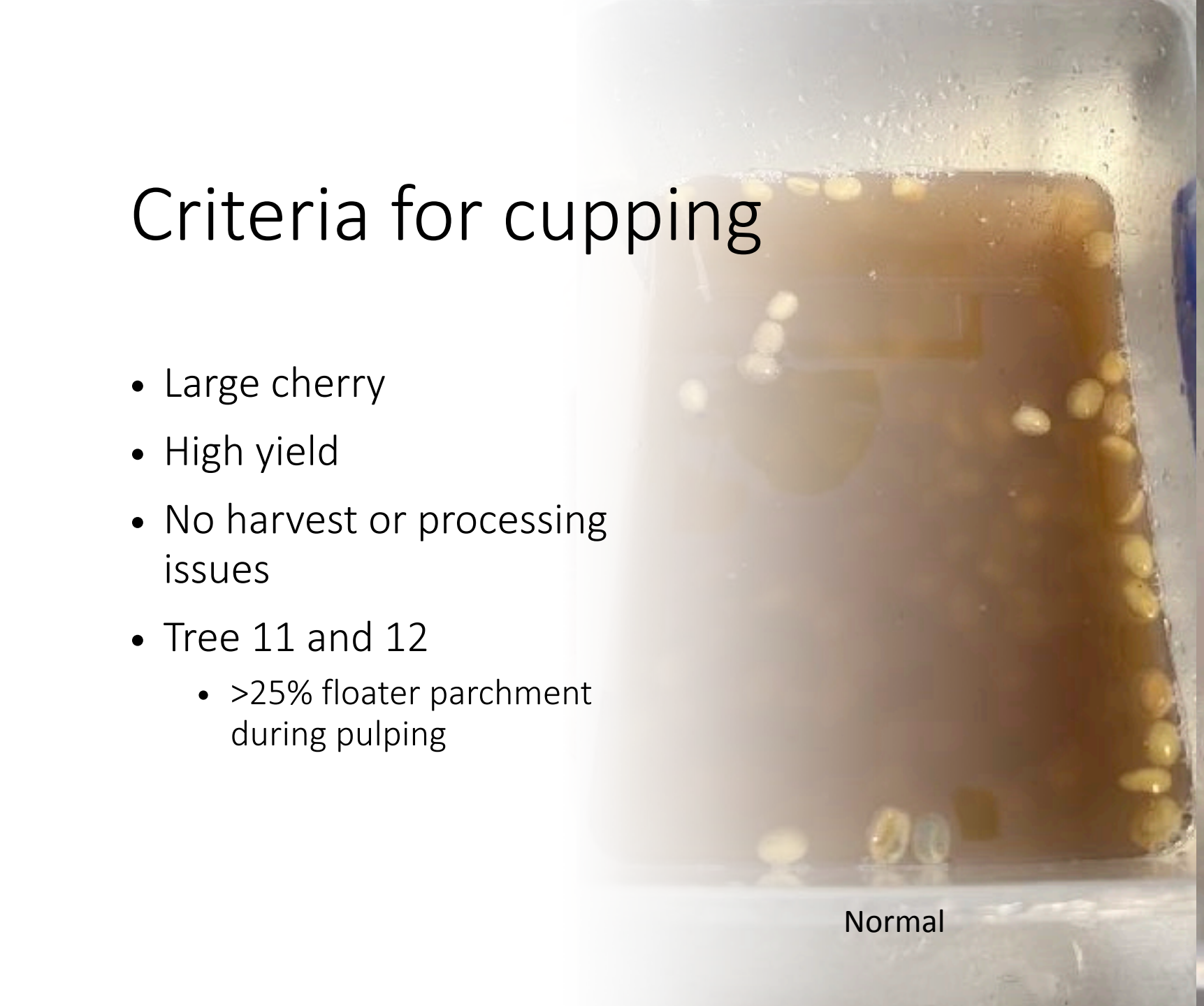
Tree No.	Ave. Cherry Wt. (g)	Total Yield (Cherry Plus Green) (lb)	Rank (Ave. Cherry Wt.)	Rank (Total Yield)
6	2.36	4.5	1	4
15	2.16	6.6	2	1
16	2.08	1.9	3	7
2	2.04	4.0	4	5
1	1.98	2.0	5	6
4	1.96	5.5	6	2
3	1.89	5.2	7	3

2022/2023 multiple vertical data

Tree No.	Ave. Cherry Wt. (g)	Cherry Plus Green Yield (lb)	Rank (Ave. Cherry Wt.)	Rank (Total Yield)
4	2.55 ★	24.9	1	6
6	2.45 ★	21.4	2	7
3	2.41	31.7	3	4
15	2.35	40.5 ★	4	1
2	2.23	38.5 ★	5	2
7	2.23	29.1	6	5
1	2.19	32.2	7	3

Criteria for cupping

- Large cherry
- High yield
- No harvest or processing issues
- Tree 11 and 12
  - >25% floater parchment during pulping



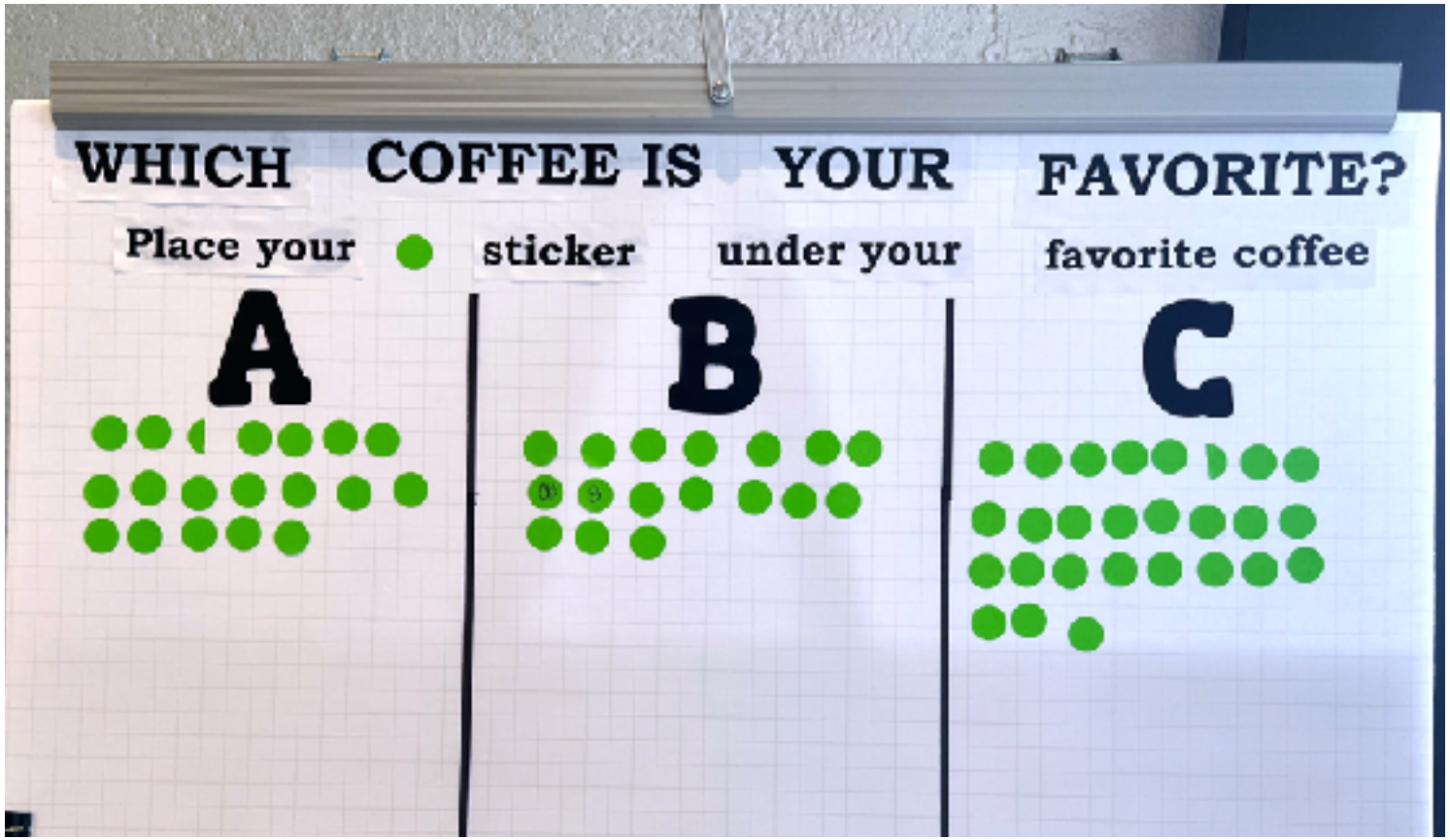
Normal

Tree 12

Cupping on 3/14/22 and 4/4/23

- Greenwell Farms
  - Tommy, Chai, & Jennifer of GFI
  - Brittany, Madeleine, Alex of Pacific Coffee Research
  - Tracie, Darsen, MaryAnn of USDA-PBARC
- Cupping of Tree 1, 2, 3, 4, 6, and 15 plus Kona Typica

Blind tasting



- 62 participants
- Coffee A - ripe cherry from Kona Typica grafted onto Coffee liberica rootstock.
- Coffee B - color break to ripe cherry from a mix of 15+ Catimor hybrid trees.
- Coffee C - ripe cherry from **Catimor hybrid** Trees 4 and 15.
- 26.5 (42.7%) people selected Coffee C
- 18.5 (29.8%) people selected Coffee A
- 17 (27.4%) people selected Coffee B

Top Catimor hybrid trees

Tree No.	1st and 2nd Year Total Wt. (lbs)	Year 1 Ave. Cherry Wt. (g)	Year 2 Ave. Cherry Wt. (g)	Ave. Cupping Score 2022	Ave. Cupping Score 2023
15	47.10	2.16	2.35	81.58	81.54
2	42.51	2.04	2.23	82.25	82.29
3	36.96	1.89	2.41	N/A	81.86
1	34.24	1.98	2.19	N/A	81.92
4	30.36	1.96	2.55	84.00	83.79
6	25.89	2.36	2.45	83.33	80.79

Average Kona Typica 2-year total yield per vertical = 30.2 lbs
Average Kona Typica cherry weight of 1st and 2nd year production = 1.85 g; 2.15 g
Kona Typica cupping = 81.92. (2022), 81.86 (2023)

Confirmation of CLR-resistance

- Dr. Lisa Keith and Blaine Luiz of USDA-ARS PBARC
- CLR resistance screening assay of 9 trees
- Catuai Rojo control from same field
- Tested 48 discs from 6 leaves
- Sporulation occurred after 4 weeks on the control
- Chlorotic spots developed on the leaf disc, but no sporulation on tested Catimor hybrids




CLR-resistant clonal plant propagation

Trialing grafting methods for mother-plant replication

In-field grafting

Oct. 2022

Oct. 2022

Dec. 2022

Feb. 2022

Next steps

- Harvest from Aug 2023 to Jan 2024
- Survey to determine interest from growers
  - n=35
  - Seeds, 6-12” seedlings, 6-12” grafted trees,
- Dr. Roxana Myers (USDA-ARS PBARC) to determine CRKN-tolerance or resistance of self-pollinated Catimor hybrid seedlings
- Continued grafting and establishment of demo field

www.HawaiiCoffeeEd.com

HOME | COFFEE LEAF RUST | CBB MANAGEMENT | EVENTS AND ANNOUNCEMENTS | MORE...

- Coffee Leaf Rust Photos
- HDOA CLR Pest Alert
- Sanitation and Disinfestation Info
- Surveying, Sampling and Monitoring of CLR
- Spraying for CLR and Spray Product Info
  - Spraying for CLR - English
  - Pulverización para CLR - Español
  - Spraying for CLR - Tagalog
  - Spraying for CLR - Ilocano
  - Sprayer Calibration and Pesticide Calculations
  - Prisaor Xemium Info
  - ProBlad Verde Info
  - Pestic de Use FAQs
- Pruning for CLR and CBB
- Coffee Leaf Rust Poster
- CLR Trifold Brochure
- CLR Presentations and Meetings
- CLR Publications
- CLR/CBB Subsidy Program Info
- Corlis BotaniGard and Mycotrol Compatibility Chart

Search

Select Language | Powered by Google Translate

vastatrix)

Confirmed to ..., Molokai and Hawaii Island.

Pruning Met... Coffee Leaf Rust and Coffee Berry ...

Published 8/22

The following publicatio... Hawaii coffee growers about pruning methods for the management of coffee leaf rust (CLR) and coffee berry borer (CBB). This article includes:

- Reasons for pruning
- Needs prior to pruning (strip-picking, spraying,


EXTENSION PUBLICATIONS

Pruning Methods for the Management of Coffee Leaf Rust and Coffee Berry Borer in Hawai'i

Coffee Leaf Rust-related Video Presentations

Speaker's pre-recorded CLR-related presentations have been uploaded to the Kona Extension's YouTube "Coffee Leaf Rust" playlist. Or, view them below.

Coffee Breeding for CLR - Resistance at HARC - Wang, HARC

Evaluation of Coffee Varieties for Hawaii - Matsumoto, USDA-ARS PBARC

Catimor Hybrid CLR-resistant Coffee Project at the Kona Research Station - Kawabata, UH-CTAHR

Managing CLR: A Research Update - Keith, USDA-ARS PBARC

Brief Update on Field Trials of Systemic and Biological Fungicides for the Management of CLR - Cheng and Buchholz, UH-CTAHR

IR-4 Pesticide Registration Program Update on CLR - Coughlin, UH-CTAHR

CLR on Hawaii Island: Trends Across Elevations and Management Types, with Some Insights on Cultural and Chemical Controls - Johnson, USDA-ARS PBARC

An Example of a Calendar-based CLR Management Schedule with Organic or Preventative Fungicides - Kawabata, UH-CTAHR

Management of Coffee Root-knot Nematode on CLR-infested Farms - Myers, USDA-ARS PBARC

The Basics of Grafting Coffee - Kawabata, UH-CTAHR

Use and Timing of Fruzor Xemium Applications for Coffee Leaf Rust Management in Hawaii - Kawabata, UH-CTAHR

CLR Biology and Race and How it Affects Management - Keith, USDA-ARS PBARC

Coffee Management in the Presence of CLR (and CBB) - Kawabata, UH-CTAHR

Monitoring CLR on Hawaii Island - Johnson, USDA-ARS PBARC

Fungicide Testing for Coffee Leaf Rust Control in Hawaii - Keith, USDA-ARS PBARC

Registration of Fungicides for Coffee Leaf Rust - Coughlin, UH-CTAHR

HDOA's CBB and CLR Pesticide Subsidy Program - Bondera, HDOA

The Worker Protection Standard (WPS) for Pesticide Safety - Westergard, HDOA

Fruzor Xemium and its Section 18 Requirements - MacClure, HDOA

Using Fruzor for CLR Management - Ravalo, BASF

Cafecal: Coffee Biostimulant Workshop/Presentation - Machado SAS

Project and extension contacts

Andrea Kawabata
andreak@hawaii.edu
808-322-4892
415-604-1511 (text)

Julie Coughlin
jcoughli@hawaii.edu
808-956-2003

Zhiqiang Cheng
cheng241@hawaii.edu
808-956-6906

Jonathan Deenik
jdeenik@hawaii.edu
808-956-6906

Mark Wright
markwrig@hawaii.edu
808-956-7670

Jensen Uyeda
juyeda@hawaii.edu
808-622-4185

Roshan Manandhar
roshanm@hawaii.edu
808-274-3477

Stuart T. Nakamoto
snakamo@hawaii.edu
808-956-8125

Matt Miyahira
mnmiyahi@hawaii.edu
808-322-0164

Rosemary Gutierrez-Coarite
gr6@hawaii.edu
808-244-3242 ext. 232

Thank you!

Andrea Kawabata
UH-CTAHR Extension Agent
andreak@hawaii.edu
808-322-4892
Text (415) 604-1511
79-7381 Mamalahoa Hwy
Kealakekua, HI 96750
https://www.HawaiiCoffeeEd.com

USDA National Institute of Food and Agriculture
U.S. DEPARTMENT OF AGRICULTURE

COOPERATIVE EXTENSION
UNIVERSITY OF HAWAI'I AT MĀNOA
COLLEGE OF TROPICAL AGRICULTURE AND HUMAN RESOURCES

WESTERN EXTENSION RISK MANAGEMENT EDUCATION