## 2019-2020 CTAHR Research and Extension Update

Andrea Kawabata

Associate Extension Agent for Coffee and Orchard Crops

Shannon Sand Assistant Extension Agent for Agricultural Finance

June 24, 2020

HCA Webinar

## Outline:

- 1. CBB IPM Update
- 2. Nematodes, mulching and CBB
- 3. Repellent and biocontrol
- 4. Coffee pesticide registrations
- 5. Delegate<sup>®</sup> WG field test
- 6. CRKN management
- 7. Extension's COVID-19 Ag Survey



## Funding and collaborations



#### Thank you!!!

USDA Roxana Myers Cathy Mello Darsen Aoki Briette Corpuz Tsuyoshi Tsumura Maryann Villalun Charmaine Sylva Lionel Sugiyama Marilyn Tagalicod <u>CTAHR</u> Nick Yamauchi Marc Meisner Stuart T. Nakamoto Jen Burt Gina Bagarino Randy Hamasaki Kylie Wong-Tavares Julie Coughlin Marla Fergerstrom Lori Hasegawa Max Breen Robin Shimabuku Alton Arakaki Matt Miyahira Alyssa Cho Colin Hart Russell Galanti Javier Mollinedo Ticona Joanne Imamura James Kam Sonny Arruda Nolan Johnson Sarah Rehkamp

Roy Ishizu Makoa Dasalla Dylan Cunningham Shannon Sand

<u>Volunteers</u> Howard Kawabata Ann Kawabata Shane Barnes Allan Yokoyama Cora Yokoyama Ian Hamasaki <u>Industry</u>

Greenwell Farms Mountain House Kona Coffee Nutrien

#### HDOA

Gwen Hicks Gabe LeMay Rob Curtiss Melanie Bondera



## CBB IPM recommendations

- 2020 CBB IPM document (draft)
  - <u>HawaiiCoffeeEd.com</u>
- New: impact of feral and unmanaged coffee sites
- *New:* importance of starting the season with as low an infestation as is feasible
- CBB and coffee-related webinars Thank you presenters and participants!
  - Sat., April 17, 2021 CBB Conference



## Managing Coffee Berry Borer by Enhancing Indigenous Entomopathogenic Nematodes & Lucaena Mulch to Enhance EPN Biological

## Lucaena Mulch to Enhance EPN Biologica Control in the Field

Koon-Hui Wang, Christina Martiney, Takdanai (Tae) Ruxthawonwong, Brent S. Sipes, Travis Idol, Adel Youkhana











## Entomopathogenic Nematodes

- EPN isolated from Poamoho
  - Heterorhabditis sp. SGgj 18S
  - Heterorhabditis sp. H1
  - Oscheius sp. (tipulae)
- EPN isolated from Dole
  - Oscheius sp. (tipulae)
- Target on CBB on the ground

# *Leucaena*-KX2 or KX4 used as surface organic mulch

- Increase soil C and N,
- Increase water holding capacity,
- Reduces UV exposure to the soil,
- Reducing soil temperature
  - Improve soil habitat for indigenous EPNs
  - Enhance soil health for coffee growth



## Conclusions

- 1. Heterorhabditis and Osheius spp. are commonly isolated from coffee orchards on Oahu but are not as virulent as Steinernema feltiae on CBB.
- 2. CBB larvae are more susceptible to EPN than adults.
- 3. Conservation biological control of CBB by mulching with *Leuceana* is promising but needs improvement, augmentative release of the EPN tested is not effective.
- 4. Leuceana mulch improved soil health (abundance of bacterivores, fungivores, omnivores and predatory nematodes).
- 5. Future research on how to improve infectivity of indigenous EPNs into CBB inside the coffee cherries are needed.



Fungal infection



## Repellents and biocontrol

Mark G. Wright

**Plant and Environmental Protection Sciences** 







## Verbenone as a CBB repellant

- Anti-aggregation / repellent pheromone used in southern pine beetle management
- ISCA Tech developed \*SPLAT Verb<sup>®</sup>trials on CBB in Brazil, Colombia, Hawaii
- Conducted at Dole's Waialua Coffee, Oahu in 2018-2020.

\*Use of the trade name does not imply UH endorsement.





Figure 2. Following application, the SPLAT® emulsion dries and becomes rainfast within 3 hours, then releases active ingredients at a controlled rate for 2 weeks to 6 months.

## Results: 2019



- Verbenone may have potential to reduce CBB infestation by about half.
- Push-pull strategy with traps
- Reduced infestation can give biocontrol agents a boost (in terms of reducing economic damage); maybe need less *Beauveria* sprays.

# Potential for augmentative releases of *Phymastichus coffea* LaSalle (Eulophidae)

With USDA's Drs. Peter Follett and Fazila Yousuf

- Originally from Africa; introduced broadly in Latin America
- Parasite of adult beetle; Small (\$\overline\$ 1mm), long life cycle, short adult longevity; 2 eggs per host.
- >95% parasitism in experimental work; reported to reduce damage and number of CBB progeny produced.
- Not an excellent candidate for classical biocontrol but potential for augmentative use in Hawaii



Fig. 5. An adult female of *Phymastichus coffea* emerging from a coffee berry borer.



1.0mm

## Project results:

- *P. coffea* has high specificity to *Hypothenemus hampei*.
- Zero or low (on *H. obscurus* and other pest sp.) parasitism of 'other' Scolytinae species exposed to *P. coffea* including native and exotic species.
- Environmental impact assessment drafted and submitted. Hopefully release permits can be obtained reasonably soon.
- Searches continue for other biocontrol agents.

Andrew J. Johnson

http://www.ambrosiasymbiosis.org/wp-content/uploads/2016/08/Identification\_of\_CBB\_from\_similar\_beetles\_v0p1\_.pdf





Dr. Zhiqiang Cheng, PI Julie Coughlin, IR-4 State Liaison Rep. James Kam, Field Research Director







- Sivanto 200 SL for green scale. Not registered yet, but close. Reduced risk classification.
- Exirel for CBB. Registered. Classified as a State RUP.
- Brigade WSB for CBB. Residue trials completed. Still in the registration pipeline.
- Avaunt for CBB. Final report complete. Ready to submit to EPA.





- Quadris Xtra for Coffee Rust. Residue trials completed. Still in the registration process. May have some activity on Cercospora.
- Working on identifying fungicide products that may have activity on Anthracnose and Cercospora.
  Coordinating efforts with IR-4 team in Puerto Rico.



#### NEMATICIDES

- Velum One. Will nominate as IR-4 research priority for funding in 2021.
- Salibro. Registrant requires efficacy and crop safety data before allowing residue trials.
- Both products are non-fumigant nematicides that have the potential to control coffee nematodes.

#### HERBICIDES

- Weedar 64: Residue trials will be conducted this year. For vine control and RoundUp resistant broadleaf weeds.
- Liberty 280 (Rely 280): Residue trials completed. 2-year crop safety trials have started recently. Broad spectrum, non-RUP paraquat alternative.



## Delegate<sup>®</sup> WG field test for CBB control

Andrea Kawabata, Stuart T. Nakamoto, Matt Miyahira and Nick Yamauchi









### Treatments

- Control water
- Delegate<sup>®</sup> WG spinetoram
  - 5 oz per A
- BotaniGard<sup>®</sup>ES *Beauveria bassiana* 
  - 32 oz per A plus surfactant
- EverGreen<sup>®</sup> Crop Protection EC 60-6 pyrethrins + PBO
  - 16 oz per 100 gal water



## Preliminary results

- Results after about 2 weeks
- Delegate WG kills CBB in the A/B position
- ~2x more A/B dead and absent CBB 2WAT
- ~1.5 to 2x greater control of CBB than other treatments



Preliminary discussions

#### • Spinosyn resistance

- Label warning avoid using...on consecutive generations of insects
- Apply once early in the season and rotate to BotaniGard<sup>®</sup>, Pyronyl, etc.



## Management of coffee root-knot nematode

#### S.T. Nakamoto, A. Kawabata and Roxana Myers





## Importance of CRKN for industry

- Not a new problem early 90's
  - Replant problems
  - Reduced tree lifespan
- Declining yields pre-CBB
- No nematicides





#### Solution: graft onto tolerant rootstocks

Long-term study 2006-2019

- Coffea liberica rootstock
- 'Arnoldiana'



## Current activities

- CRKN and grafting education Tues. July 7
- Address bottlenecks for management
  - Clonal rootstock of mother-trees & availability of seed
- Replant strategies
  - Next to declining or dying tree
  - Between trees
  - With compost
  - With original soil
- Bionematicides & chemical nematicide trials





College of Tropical Agriculture and Human Resources University of Hawai'i at Mānoa

## COVID-19 Ag Needs Assessment Coffee Industry

#### Shannon Sand

with A. Ahmad, J. Bloese, R. Galanti, R. Gutierrez-Coarite, R. Hamasaki, J. Hawkins, S. Katulski, A. Kawabata, E. Kirk, H. Lutgen, S.T. Nakamoto, J. Silva and K. Tavares



#### **COOPERATIVE EXTENSION**

UNIVERSITY OF HAWAI'I AT MĀNOA College of Tropical Agriculture and Human Resources

#### How has the Covid-19 pandemic affected your operation?



## Once the COVID-19 pandemic is over, what do you believe will be the priority needs for recovery of your operation(s)?





## Thank you!

Andrea Kawabata andreak@hawaii.edu 808-322-4892 415-604-1511 (text) Shannon Sand srsand@hawaii.edu 808-969-8217 Julie Coughlin (IR-4) jcoughli@hawaii.edu 808-956-2003

EA

Mark Wright <u>markwrig@hawaii.edu</u> 808-956-7670 Koon-hui Wang <u>koonhui@hawaii.edu</u> 808-956-2455