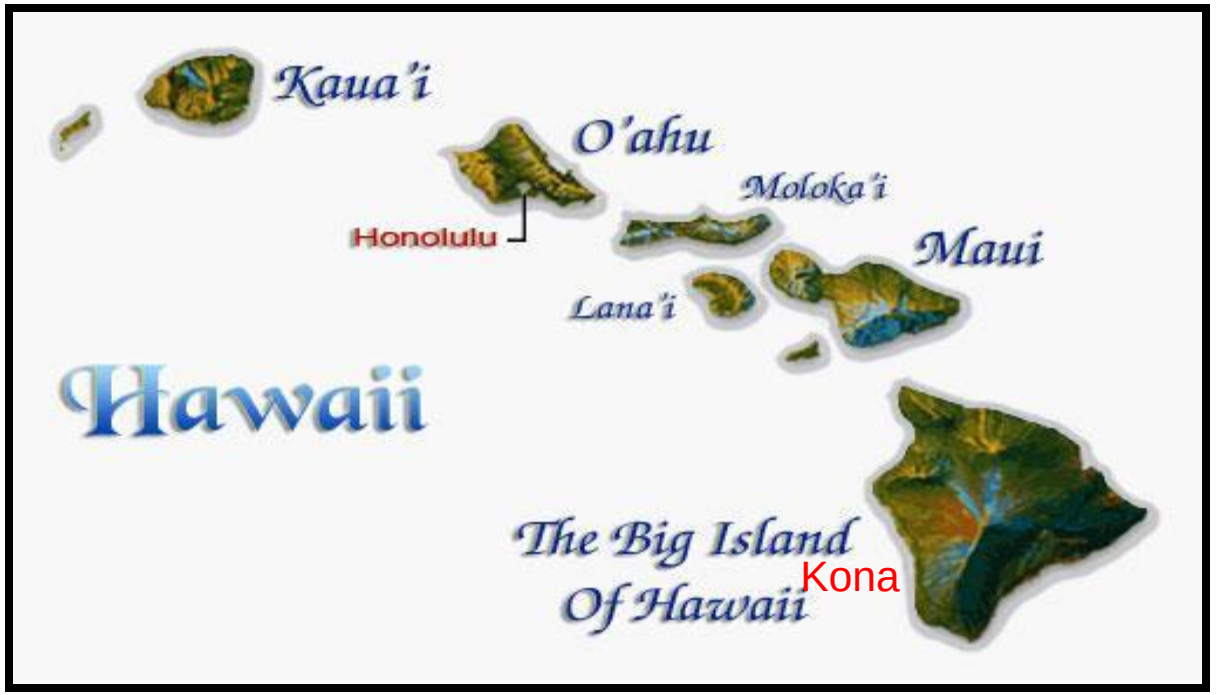
Scolytines attacking coffee berries in Hawai‘i

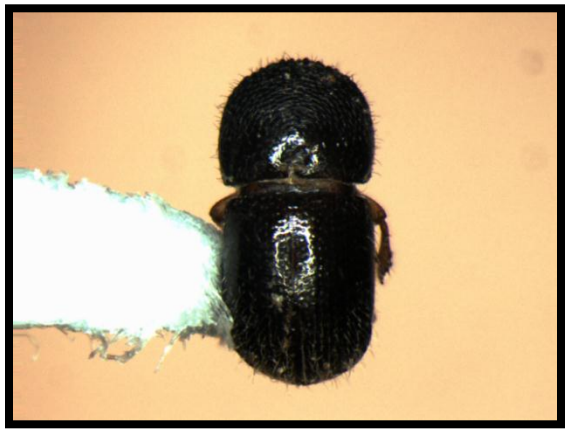
Elsie Burbano and Mark Wright

Department of Plant and Environmental Protection Sciences
University of Hawai’i at Manoa

Coffee in Hawai‘i



Presence of two scolytines attacking coffee berries



Black Twig Borer (BTB)
Xylosandrus compactus

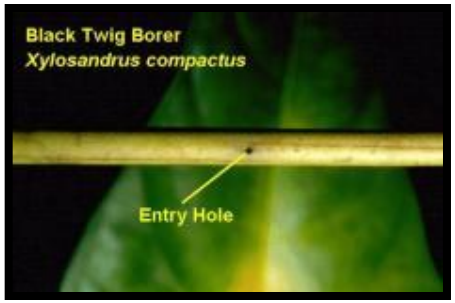
Coffee Berry Borer (CBB)
Hypothenemus hampei

Black twig borer (BTB) *Xylosandrus compactus* (Coleoptera: Curculionidae)

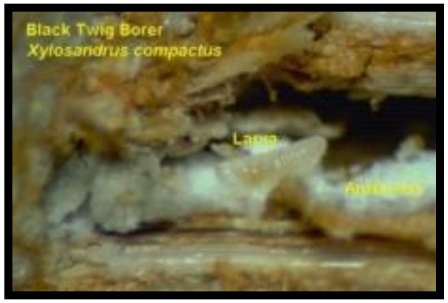
Photograph by: Lyle J. Buss, University of Florida

- Native to Asia and found in Honolulu in 1960 attacking pink tecoma (*Tabebuia pallida*).
- BTB is an ambrosia beetle which infects the plant with the fungus *Fusarium solani,* which kills the twig.
- BTB is highly polyphagous, reported from >200 hosts, including native plants such as the valuable timber species *Acacia koa*.

Life cycle and damage of BTB



Ambrosia fungus: resource of food for BTB



Eggs (3-5 d)
Larvae (7 d)
Pupae (6 d)

Brood chamber up to 70 BTB

The wilted leaves and bark beyond the affected area turn brown or black

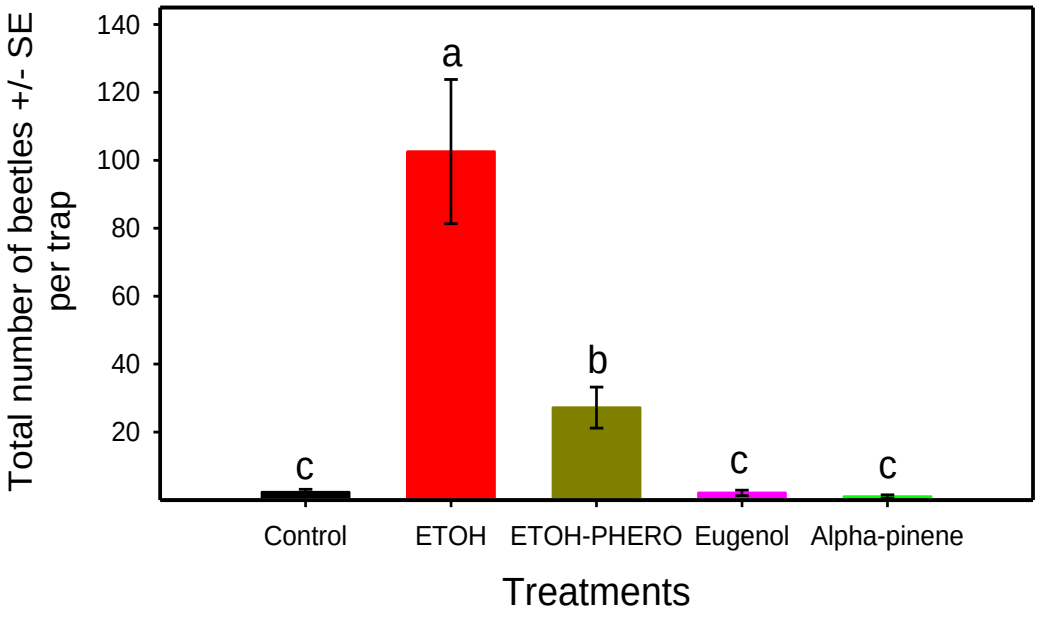
Coffee berries new host for BTB

Black Twig Borer
Inside coffee branch

Black Twig Borer
Attacking coffee berry

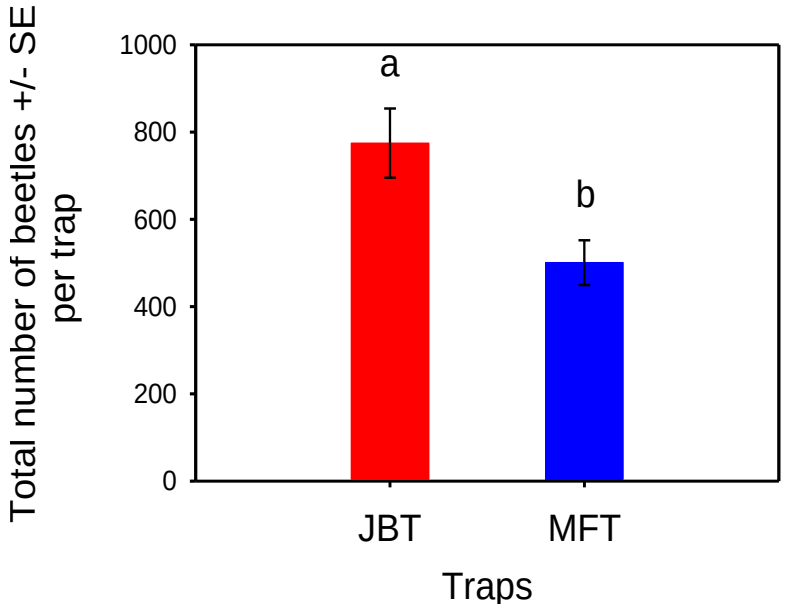
Black Twig Borer
Damage to coffee seed

Use of traps and lures for BTB

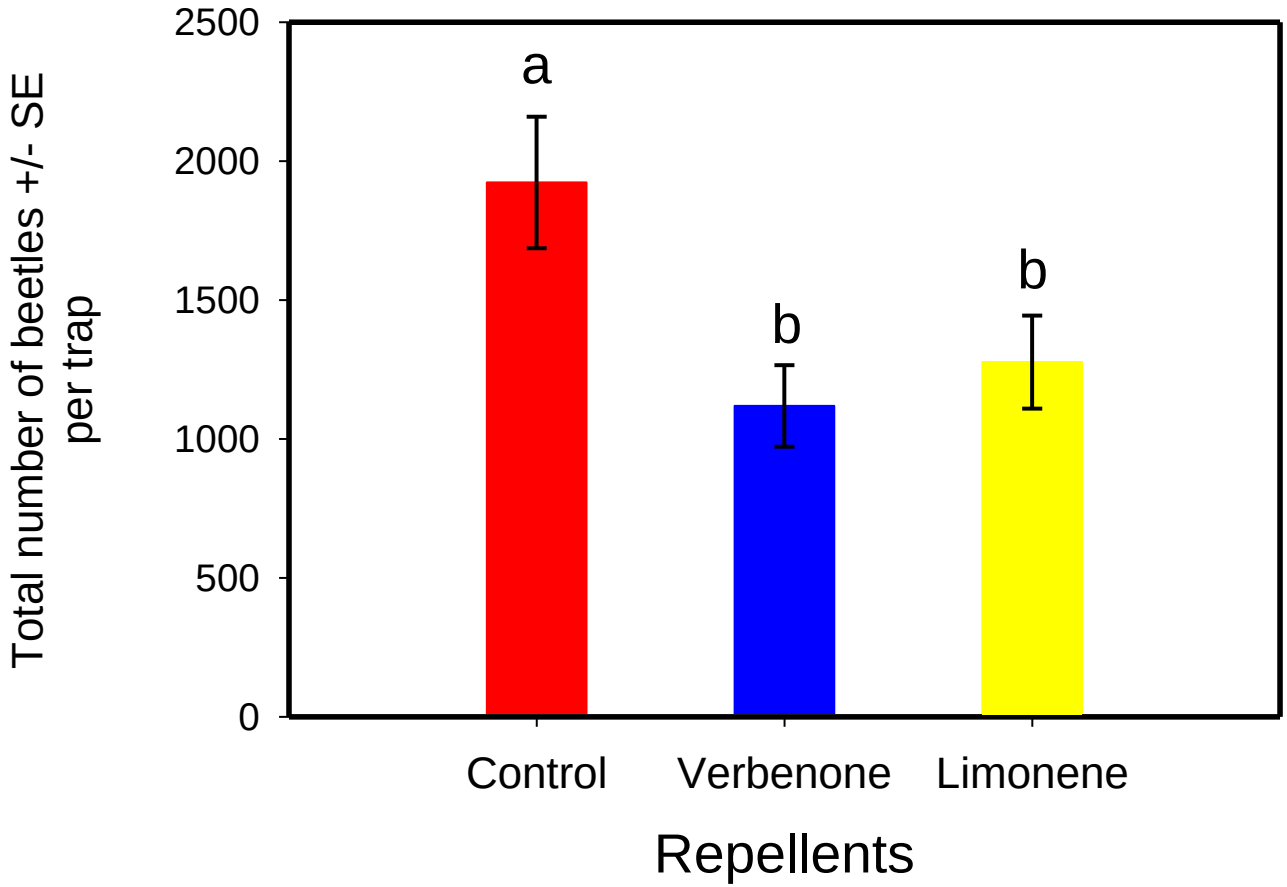


Japanese Beetle Trap

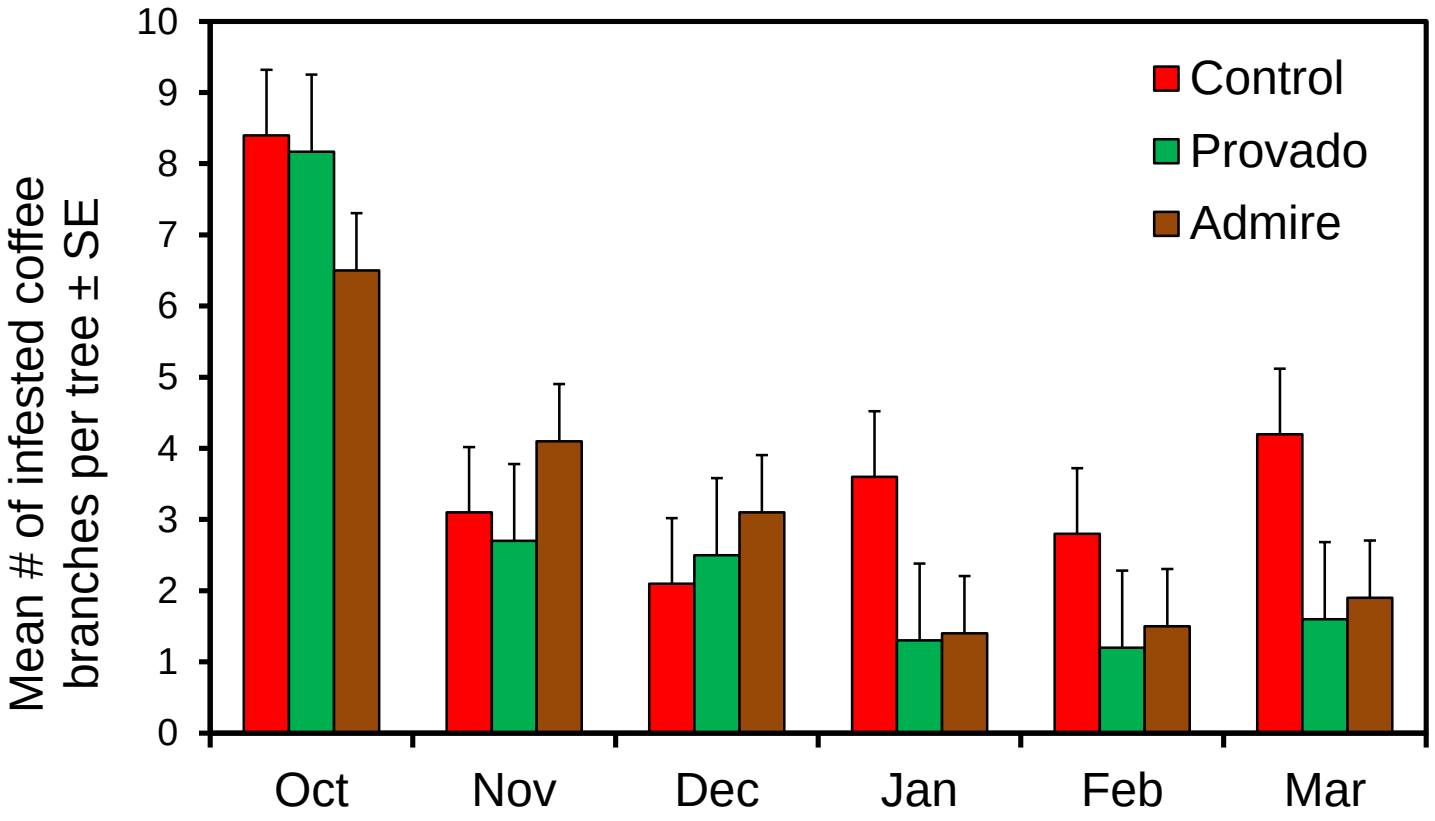
Multiple Funnel Trap



Use of repellents for BTB



Effect of Imidacloprid on BTB

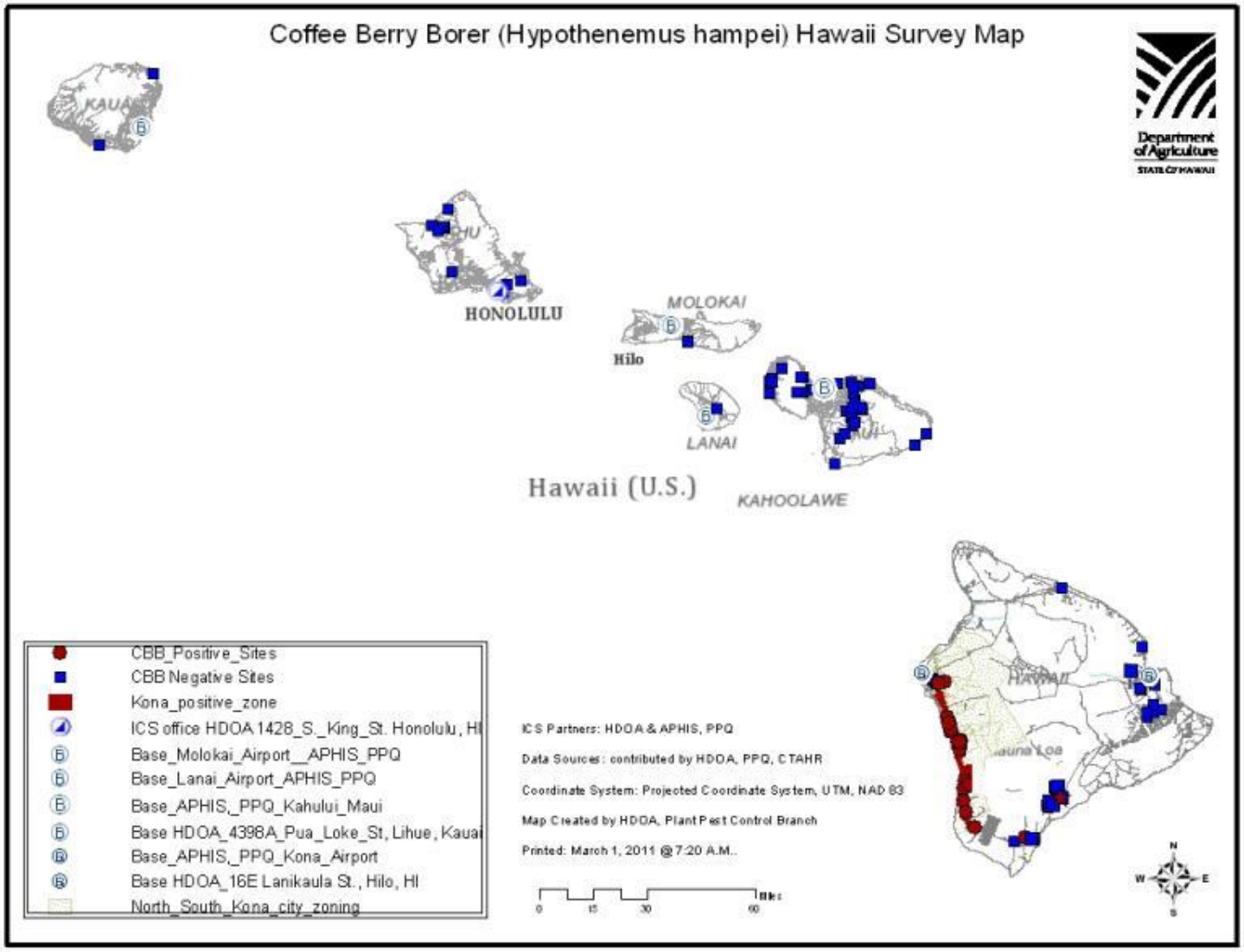


Coffee Berry Borer (CBB) *Hypothenemus hampei* (Coleoptera: Curculionidae)

~ 1.7 mm

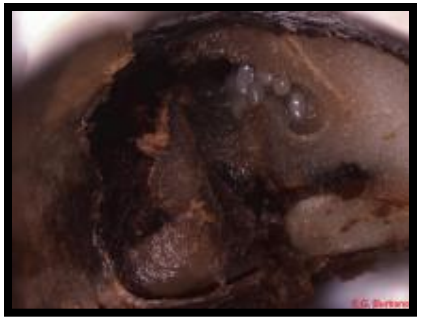
- CBB is the most economically important coffee pest worldwide.
- Endemic to Central Africa and now distributed throughout all coffee producing countries in the world, with the exception Papua New Guinea,
- CBB was reported in South Kona, HI in August 2010.

Presence of CBB in Hawai‘i



Biology and damage of CBB

- The female lays an average of 30 to 70 eggs
- Life cycle: ~25 to 35 days
- Fertilized females stay on the berries for 3 or 4 days then leave the coffee bean for another.
- The female can live up to 282 days.



Use of lures and traps for CBB

Brocap® trap

Plastic bottle

- Attractant: methanol : ethanol 3:1
- 8 traps are recommended in 1 acre
- The traps can catch around 12,000 CBB per day per acre when coffee berry density is high.

Potential natural enemies of CBB in Hawai‘i

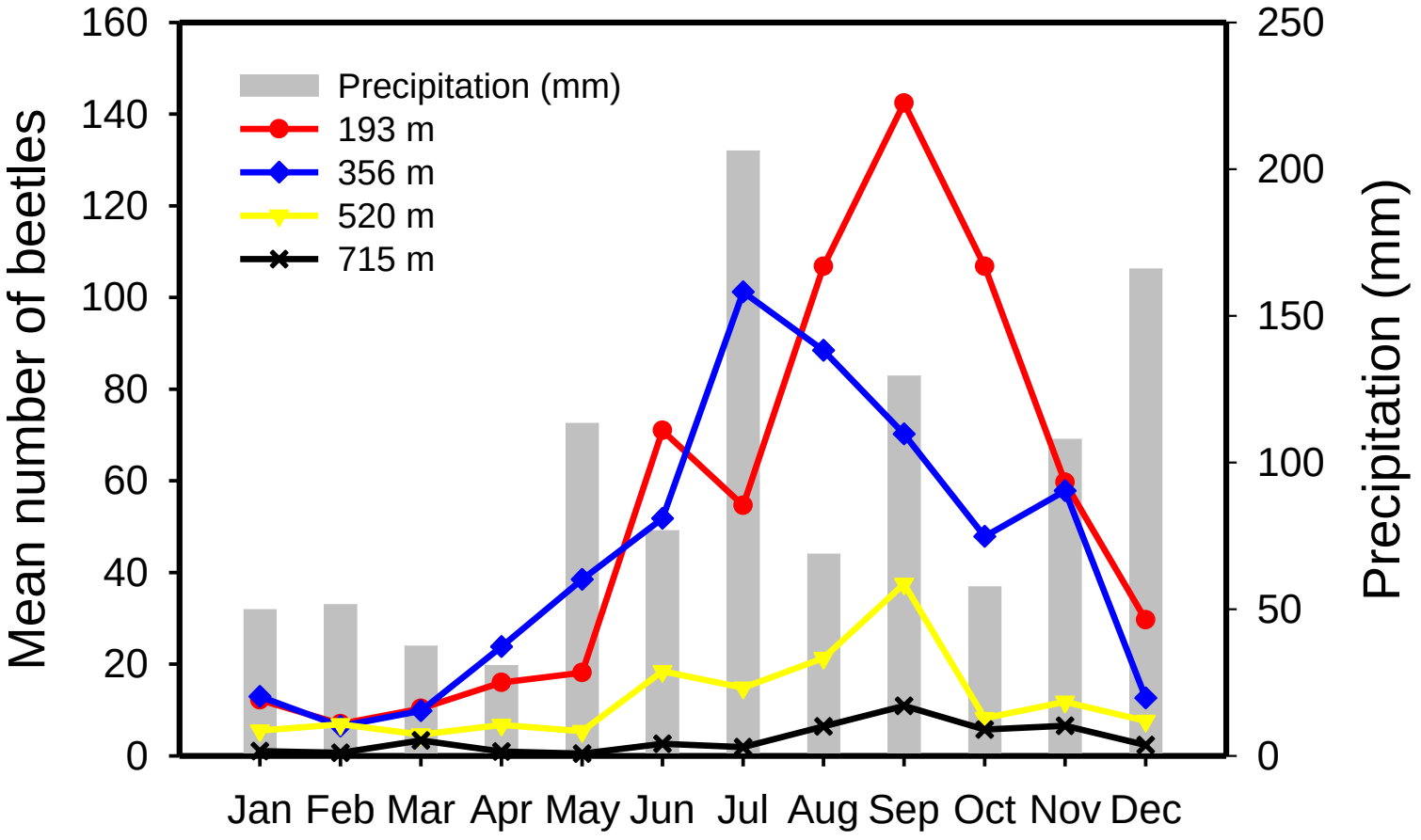
Cathartus sp.

Cryptamorpha desjardinsi

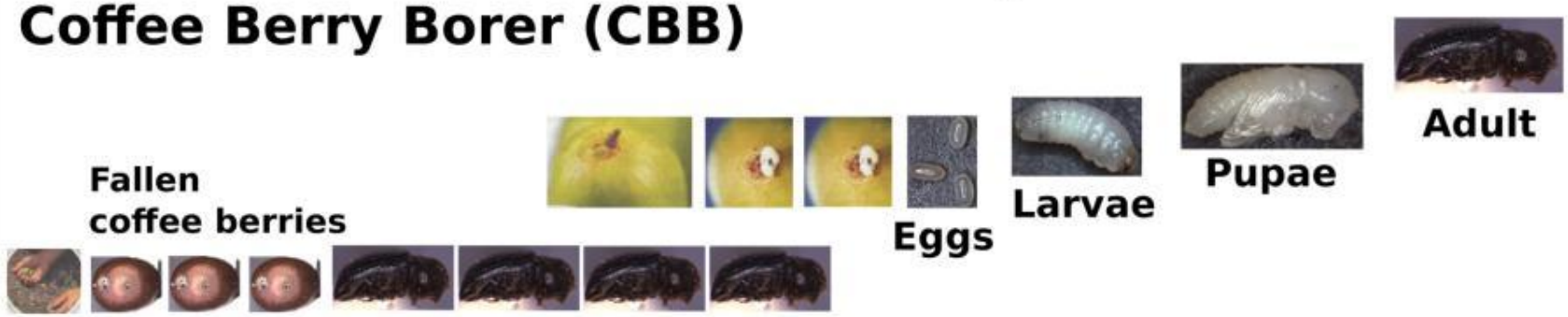
Bigheaded ant
Pheidole megacephala

Beauveria bassiana

Seasonal fluctuation of *Hypothenemus birmanus* and implications for IPM of CBB



Practices for an integrated management for the Coffee Berry Borer (CBB)



JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Pruning

Beauveria bassiana

Trapping

Dormancy Flowering Fruit Development Harvesting

Summary

- BTB typically lives inside branches and feeds on ambrosia fungus and this is the first report of the coffee berry as feeding habit for this species.

- The shift to attack coffee berries as alternative host tissue for BTB might be explained as a response of high beetle populations and high temperatures during summer.

- JBT baited with 95% ETOH is an effective attractant of BTB.

- Verbenone is an effective repellent of BTB. It does not remove insects from the system but it could potentially be part of a management system that reduces dispersal into coffee by beetles.

Summary

- Baited traps can be used as a monitoring tool for BTB and CBB and might work as a mass trapping tool.

- Potential natural enemies for BTB and CBB are *Chryptamorpha* desjardinsi, *Pheidole megacephala*, *Canthartus* sp. and *Beauveria bassiana*.

Future research

- Study the seasonal fluctuation of CBB - a key factor in an IPM program.
- Determine level of infestation and yield losses of CBB at different elevations.
- Determine the efficacy of *B. bassiana* on CBB present in fallen berries and berries on the trees.
- Search for more natural enemies and determine their effectiveness on BTB and CBB.

Acknowledgements

- Nancy E. Gillette, Silvia Mori (USDA Forest Service- PSRS).
- Virginia Easton Smith (CTAHR).
- Fernando E. Vega (USDA-ARS), Al Samuelson (Bishop Museum), Donald Bright (Colorado State University), Juan Barrera (ECOSUR), Peter Baker (CABI), Adan Hernandez (PROCAFE), Kai Sonder (CIMMYT), Pablo Benavides (CENICAFE), Juliana Jaramillo (ICIPE).
- Neil J Reimer, Bernarr R. Kumashiro (HDOA).
- Nick Dudley, Tyler Jones and Michael Kaufman (HARC).
- Coffee farms from Kona: Greenwell farms, Lehuula farm, Kona Mountain, Heavenly Hawaiian, Captain Cook, Nancy Pisicchio, Bay view, Koa coffee, True Ohana, Kona farms, Braun farm, Kanalani Ohana, Ohia forest, Sweet spirit, Kuaiwi farm, Kona Le'a, Canopy coffee, Island sun coffee, Buddha's cup, Imagine estate.
- Special assistance: Raven Bolas, Pepe Miranda, Bob Nelson, Melvin Nishina, Glenn Taniguchi, Robert Beck, Angel Cancino, Darcy Lucas, Shawn Steiman, Mark Meisner, Volker Schwarzer
- Student help: Mari Kahara, Rebecca Parker, Tyler Ito and Kimberly Halls.
- Funded by USDA T-STAR, USDA-ARS-PBARC, HCA and HCGA.