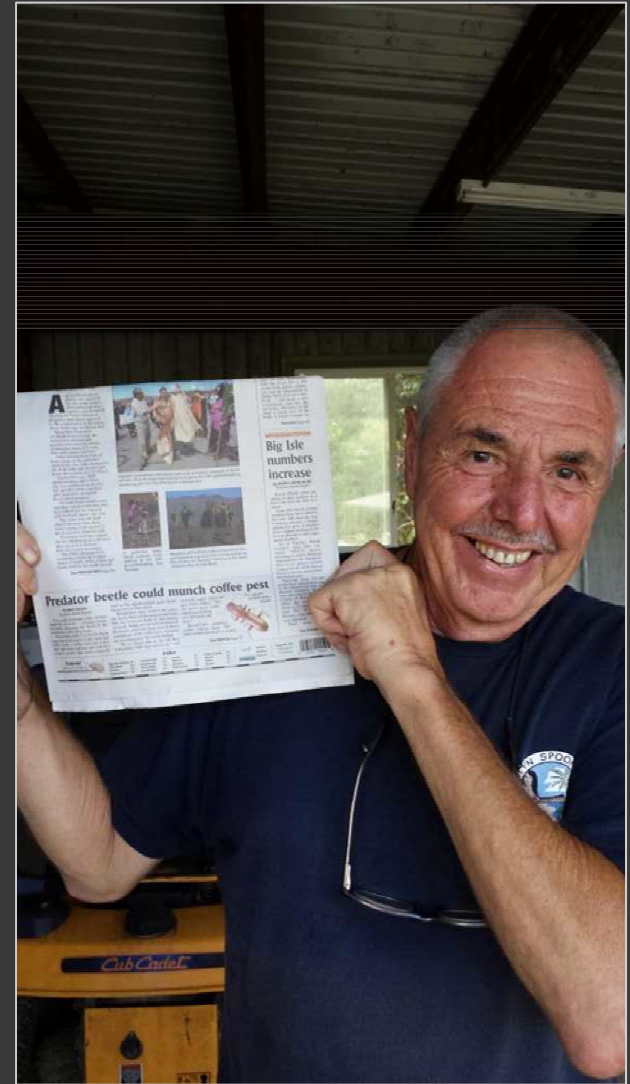


Flat Bark Beetle Predators Research Update



Peter Follett, Eva Brill, Bob Nelson, Andrea Kawabata
USDA –ARS Hilo, Hawaii

Predatory flat bark beetles

- Feed on small insects, mites and fungi under bark
- Often attack bark beetles like CBB

In Hawaii:

- Earlier found in macadamia 'sticktight' nuts
- Primarily 2 species in Kona coffee berries
 - *Leptophloeus* sp. (Laemophloeidae) – ~70%
 - *Cathartus quadricollis* (Silvanidae) – ~30%
- Can be stored grain pests





Cathartus



Leptophloeus



CBB

Objectives

- Proof of predation
- Geographical distribution
- Ecology
 - Coffee maturity effect
 - Alternate hosts and prey
 - Hyper-predation
- IPM - augmentation
 - Mass rearing and release
 - Breeding stations



Cathartus quadricollis

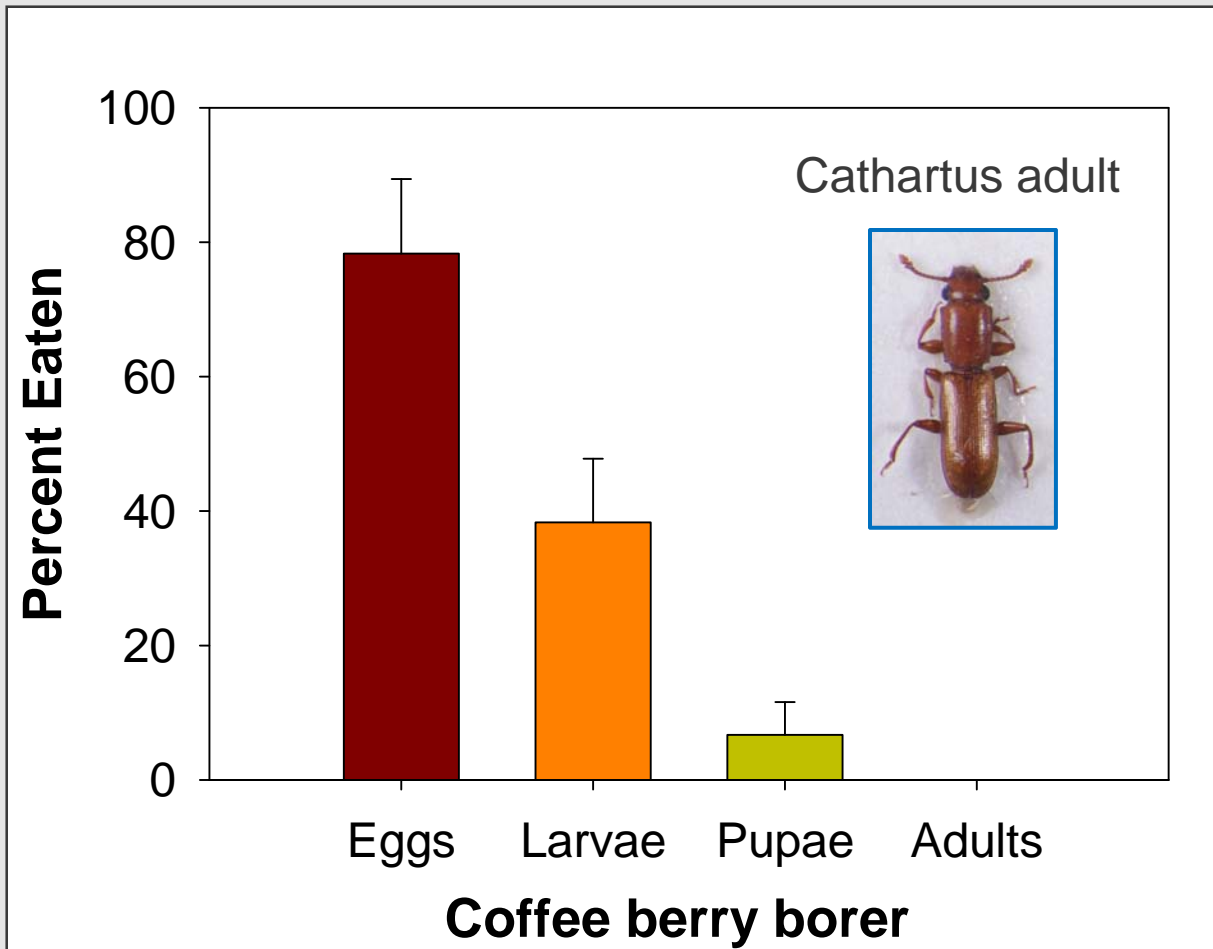
Video: *Cathartus* adult chewing on
Coffee Berry Borer in coffee bean



Lab bioassay: *Cathartus choice test*



- 40 prey items -10 each life stage
- Petri dish
- 3 *Cathartus* adults or larvae
- 24 h in dark



Field predation

Can we find CBB DNA in predators?



24 total:

11

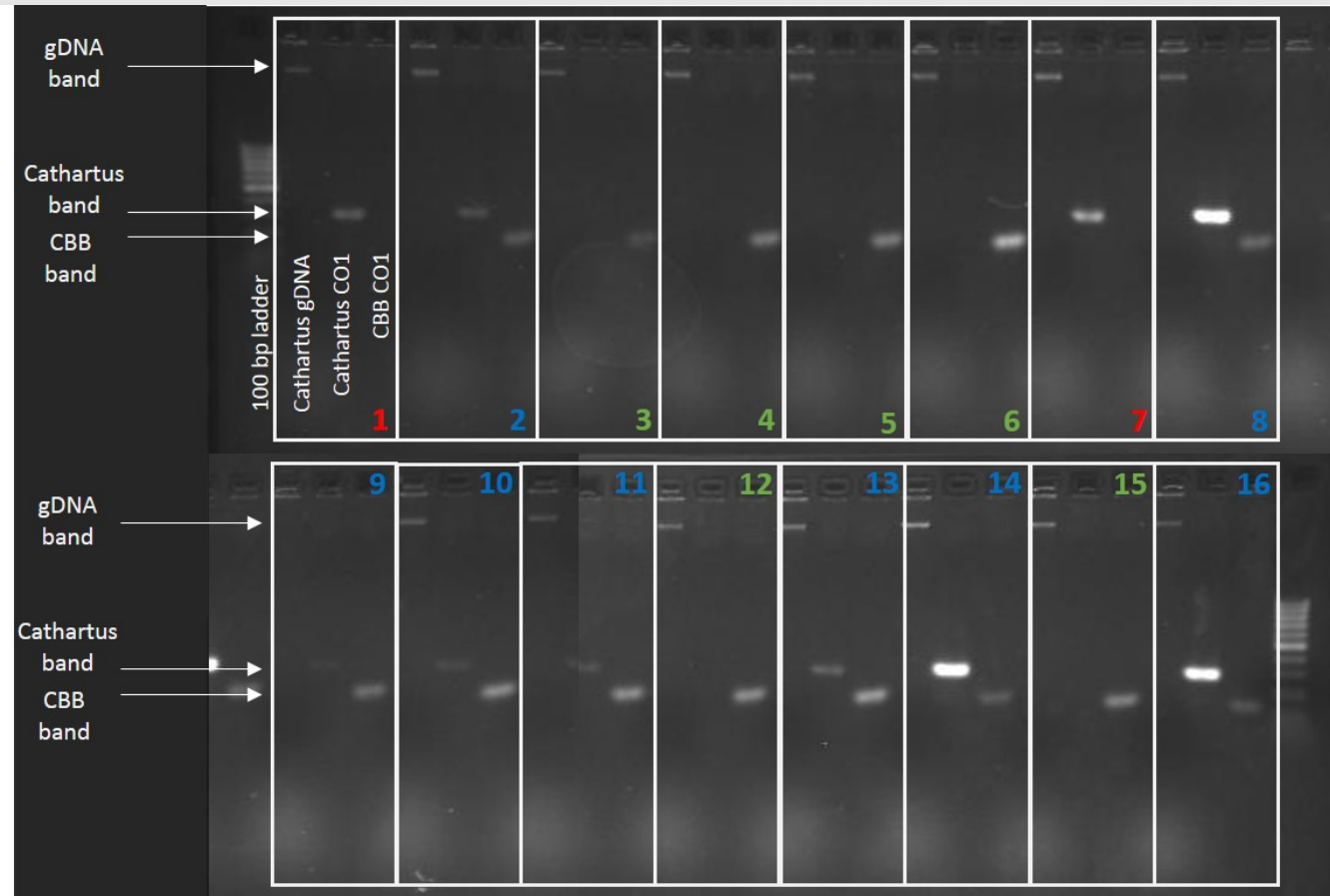
Cathartus +
CBB

10

Leptophl.+
CBB

3

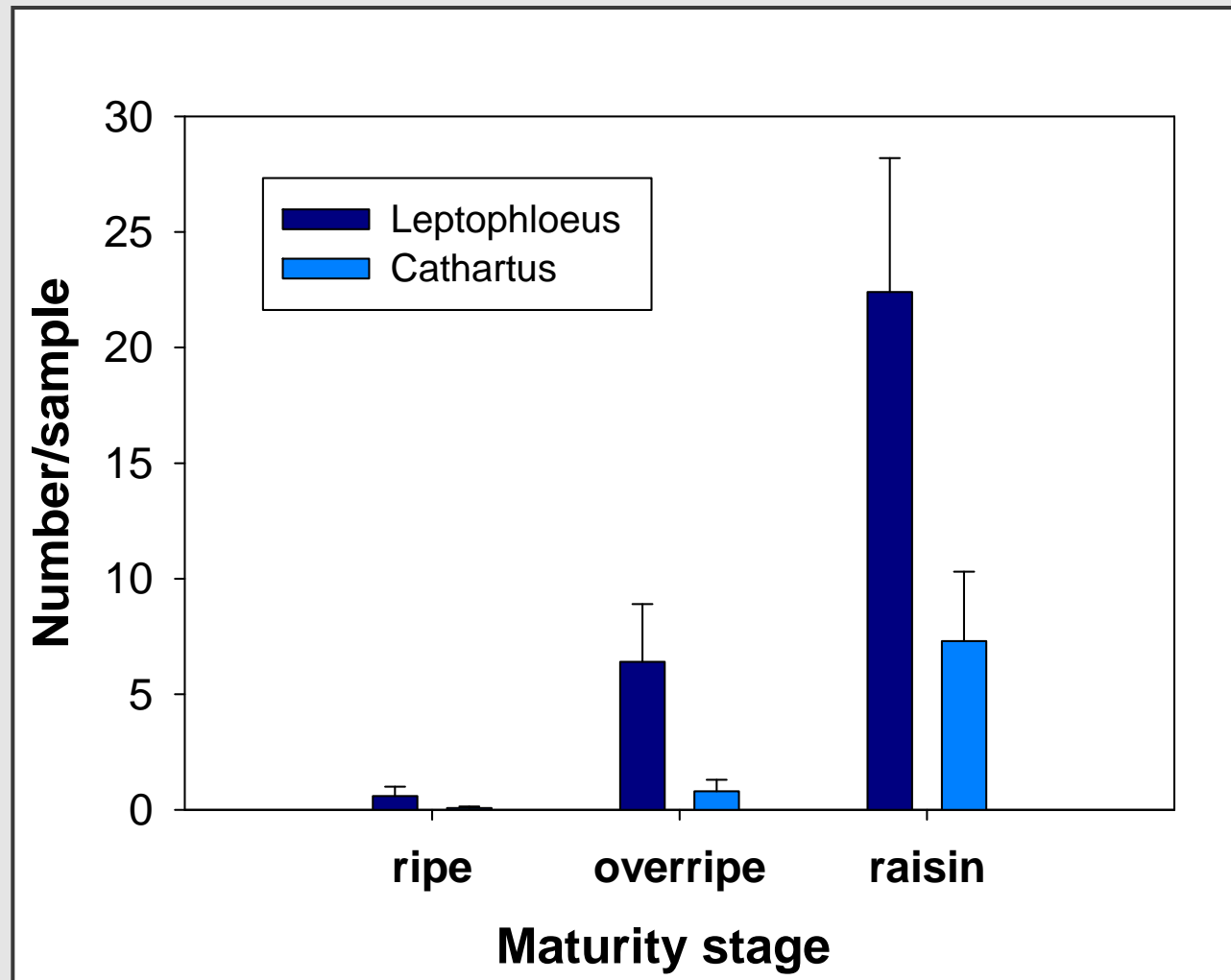
Cathartus,
no CBB

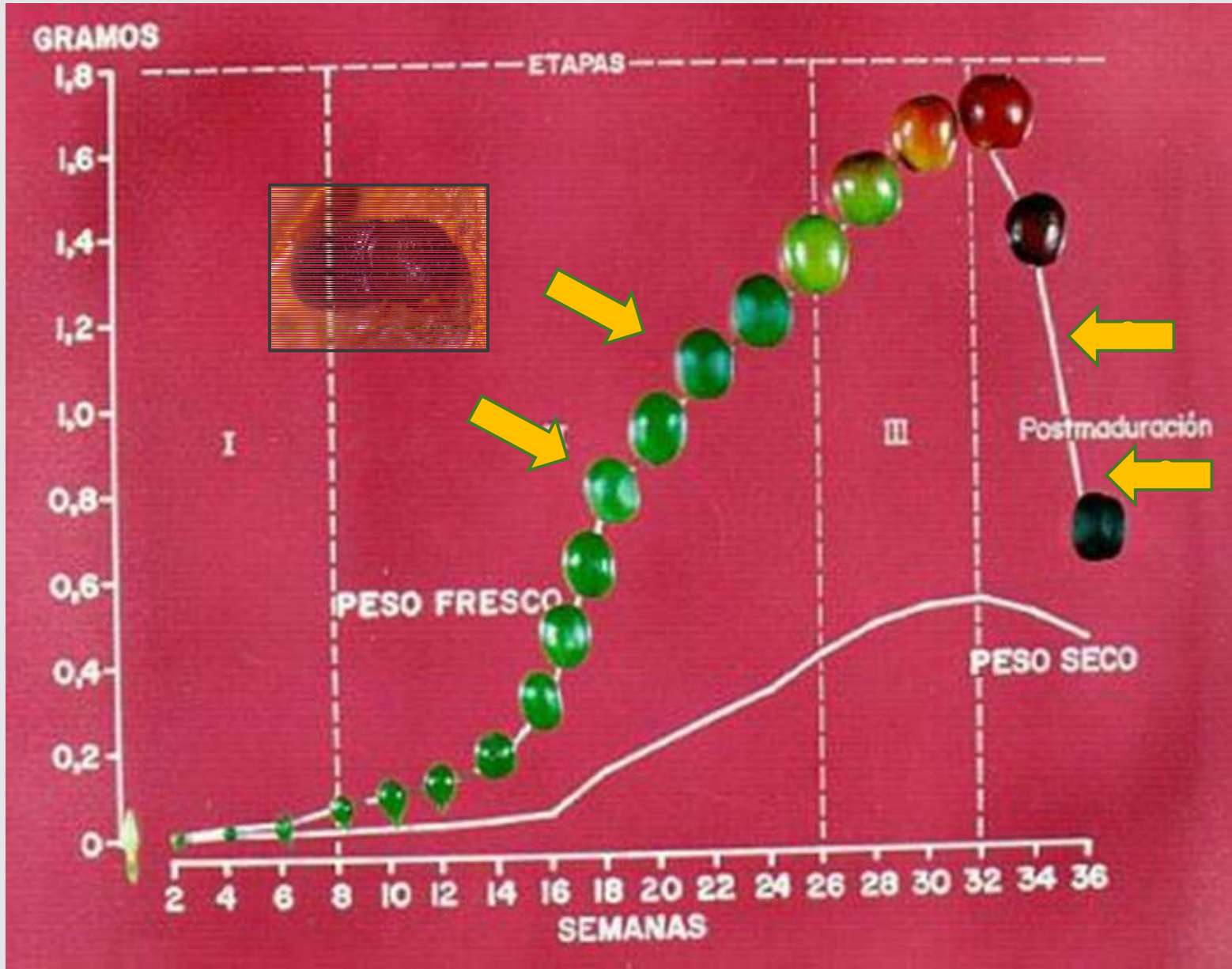


Predator ecology

What kind of cherries do they like?

- 6 farms
- 3 maturity stages
- Berlese funnel
- Count





Alternative host plants



- Macadamia nut – both FBB species found
- Reproduction occurs in ‘sticktights’, all life stages
- Also found in seed pods of: koa haole, ice cream bean, scrambled egg plant, and monkeypod



Hyperpredation bioassay

- Do predators eat each other?
- Larvae and adults paired together in 1oz. Jars
- Cathartus ate Leptophloeus larvae 16/20 times



Lepto larvae, only tail left after being eaten by Cathartus adult

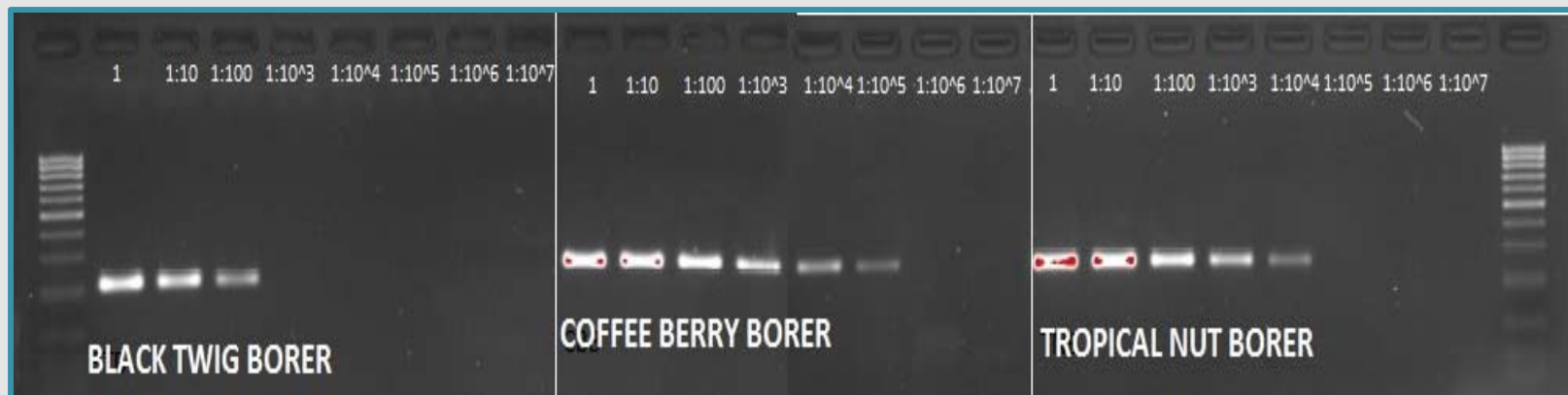
“sharkbite”



Lepto larvae chomped by Cathartus adult

Predation on other pest bark beetles

- How much do predators move between habitats?
- Molecular marker studies with other potential bark beetle prey





IPM – raise and release

- ❑ Mass rearing is easy
- ❑ Diet of cracked corn and cornmeal 4:1



Cathartus workshops

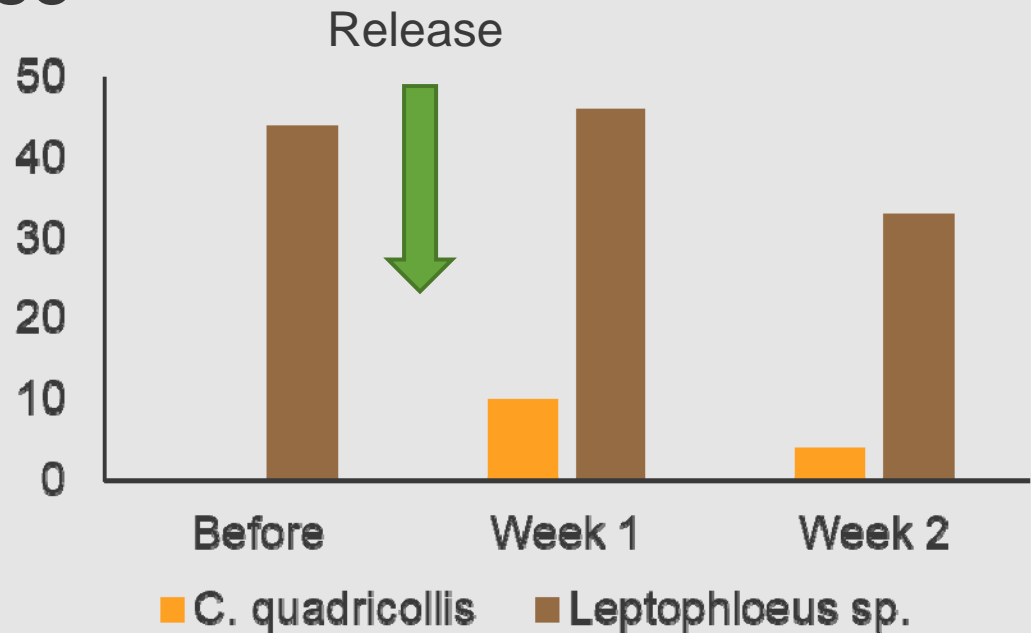
- ❑ Coffee grower education and outreach
- ❑ Provided >200 predator 'starter' kits

Mass release

- Released 10,000 adults on a farm with no *Cathartus* (only *Leptophloeus*)
- *Cathartus* was recovered in raisins one and two weeks after release



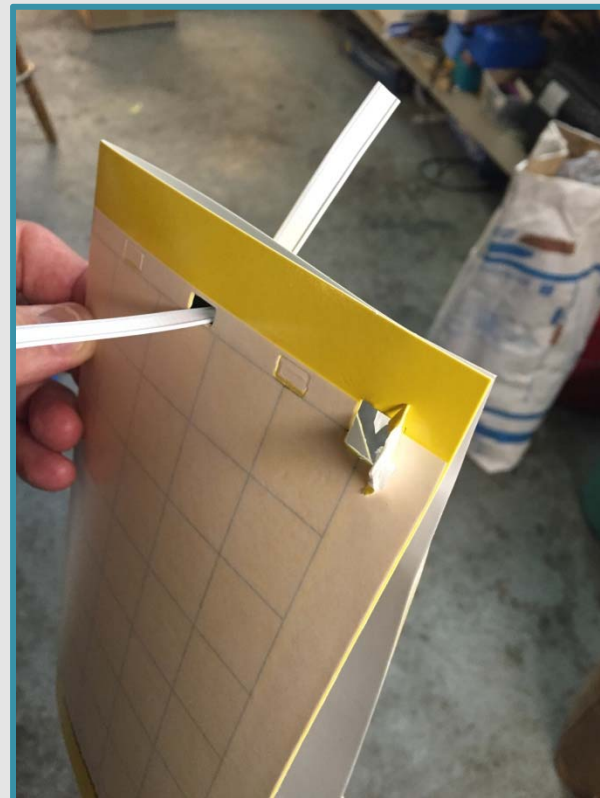
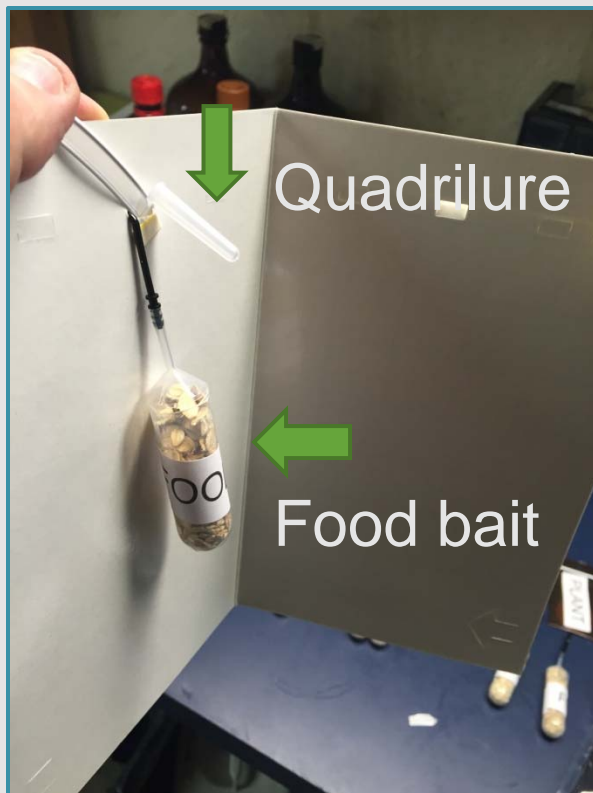
Kimura Iauhala farm, Holualoa



Breeding stations



- Aggregation pheromone plus food bait
- First, identify best lure and food bait using traps



Alpha Scents
Portland, OR



Other studies

- ❑ Susceptible to *Beauveria bassiana*?

No

- ❑ What impact are flat bark beetles having?
 - ❑ Sleeve cage tests



Questions?