Coffee Berry Borer (CBB)
Preliminary Results

Elsie Burbano

January 19, 2012
What is UH–CTAHR doing to manage the Coffee Berry Borer?

- **Russell Messing:** Alternate hosts, trapping, oviposition deterrent, invasion biology, natural enemies and ground cover effect.
- **Loren Gautz:** Heat treatment
- **Elsie Burbano and Mark Wright:** Efficacy of *Beauveria bassiana* and Provado on the CBB, coffee phenology and CBB reproduction, coffee berry susceptibility to CBB attack and efficacy of commercials and home made trap.
- **Elsie Burbano and Karla Casco (Student Intern from Zamorano, Honduras):** Determine cost and benefit of *Beauveria bassiana* on CBB, Determine the efficacy of different doses and time application of *B. bassiana* on CBB.
Outline

• A. Heat treatment results and farmers experience
• B. Efficacy of *Beauveria bassiana* and Provado on the CBB
• C. Efficacy of commercials and home made traps
• D. Karla Casco’s research
• E. Recommendation to manage the CBB during harvest and pruning season
• F. Take home message
We can get 100% kill at 49 °C (120.2 °F) (bean temperature) for 10 min. There is a small humidity effect but anything less than 80% RH is good.

All CBB are killed in forced air dryers. I don't know the time temperature of deck drying at the end.

I have formed a hypothesis based on our experiments that all CBB are dead in green bean held at less than 12% moisture for more than a few hours. However, the situation is different depending on elevation.

We do know that adults can survive in very dry cherry on the ground in the field. I still need to test the hypothesis and collect data on cherry on the ground. CBB can survive for 3 months in dry berries on the ground (CENICAFE).
• Farm location: Captain Cook Rd: Captain Cook, HI 96704.
• Elevation: 2,000 feet

• The coffee was picked and processed (pulped) on September 20th & 21st, 2011
• Parchment was sun dried for approximately 2 weeks prior to bagging.

• Moisture content (measured with an old style Dickey-John) was recorded at 11.1%.
• Parch was placed in burlap bags and moved to storage (65°F and 70/75% RH).
• Bags were in the storage area for 4 days.
A. CBB surviving after drying coffee process

- Large numbers of CBB were lying on the floor. Then, move to room temperature and beetles started to move around.

- Parchment dried on a deck (at this elevation anyway) does not get hot enough to kill CBB even though the RH level was recorded as being below 12%.

- Even though storage of parchment in a cool environment appears to have driven some of the insects out of the beans, a somewhat short period of time in this environment was not enough to kill the insects.
B. Efficacy of *Beauveria bassiana* and Provado on the CBB

**Application date:**

**B. bassiana:** Aug-16, Sept-1, Sept-15  
Dose: 6 oz per 27 gallons of water. 2 oz less than the label.  
Label: 32 to 48 oz per acre / 100 gallons of water

**Provado (foliar):** July-21, Aug-30, Sept-22, Oct-20  
Dose: 4 oz per 100 gallons of water  
Label: 40 oz per year, max. is 8 oz
B. Presence of *B. bassiana* outside coffee berries

Application date:

*B. bassiana*: Aug-16, Sept-1, Sept-15

*Provado*: July-21, Aug-30, Sept-22, Oct-20

% of berries with fungus outside (100 berries)
B. Presence of *B. bassiana* inside coffee berries

<table>
<thead>
<tr>
<th>Application date:</th>
<th>Provado: July-21, Aug-30, Sept-22, Oct-20</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>B. bassiana</em>:</td>
<td>Aug-16, Sept-1, Sept-15</td>
</tr>
</tbody>
</table>

% of berries with fungus inside (100 berries)

- **Provado**
- **B. bassiana**
- **Control**
B. Number of live CBB females inside berries

% live CBB female (100 berries)

- **Provado**
- **B. bassiana**
- **Control**

- **Aug-17-2011**
- **Aug-25-2011**
- **Oct-1-2011**
- **Oct-13-2011**
B. Conclusions

- These are preliminary results / raw data
- Presence of fungus outside of berries does not necessary mean dead CBB
- The dose of Provado used was the lowest (4 oz per acre).
- Provado seems to be ineffective
- This experiment will be done next Spring (2012). Final results will be available.
C. Effectiveness of several commercial traps vs. a homemade trap to capture the CBB

- Broca trap
- Green Japanese beetle trap
- Red Japanese beetle trap
- Homemade trap
C. Number of CBB captured in different traps

Mean number of CBB (±SE)

April | May | June | July

Green Japanese Beetle Trap
Broca Trap
C. Number of CBB captured in different traps

<table>
<thead>
<tr>
<th>Traps</th>
<th>Mean number of CBB (±SE)</th>
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<tbody>
<tr>
<td>Broca Trap</td>
<td>100 ± 5</td>
</tr>
<tr>
<td>Green Japanese Beetle Trap</td>
<td>60 ± 3</td>
</tr>
<tr>
<td>Homemade Trap</td>
<td>20 ± 1</td>
</tr>
<tr>
<td>Red Japanese Beetle Trap</td>
<td>30 ± 2</td>
</tr>
</tbody>
</table>
### C. Materials and contact information for Japanese Beetle Trap

<table>
<thead>
<tr>
<th>Material</th>
<th>Company name</th>
<th>Phone number</th>
<th>Price per unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japanese Beetle trap: green top only</td>
<td>Trécé incorporated</td>
<td>(918) 785 - 3061</td>
<td>$ 5.00</td>
</tr>
<tr>
<td>Plastic container: Straight side wide mouths jar. 125 ml. Catalog number: 2118-0004</td>
<td>Nalge Nunc International</td>
<td>(770) 871-4500 ext 4090</td>
<td>$ 2.41</td>
</tr>
<tr>
<td>Vaportape pest strip</td>
<td>Hercon Environmental</td>
<td>(866) 443 - 7266</td>
<td>$ 1.08</td>
</tr>
<tr>
<td>Ethanol container. 50 ml centrifuge container</td>
<td>Fisher Scientific</td>
<td>(800) 766 - 7000</td>
<td>$ 3.55</td>
</tr>
<tr>
<td>Ethanol + Methanol, 1:3 (1 gallon)</td>
<td>Greenwell farm</td>
<td></td>
<td>~ $ 12</td>
</tr>
</tbody>
</table>
C. Participating farms

• Brooks and Bill Wakefield and Asia Vinayaga

C. Conclusions

- These preliminary results show that the Coffee Berry Borer (CBB) was attracted to methanol:ethanol 3:1.

- All tested traps captured CBB however, the higher number of females was captured in Broca traps, Green Japanese Beetle traps and Red Japanese Beetle traps.

- The home made trap captured the less number of CBB females.

- A second trial of this experiment will be conducted in Spring 2012.
D. Karla Casco’s research

- **A.** Determine cost and benefit of *Beauveria bassiana* on Coffee Berry Borer.
- **B.** What is the cost of applying BB to a coffee plantation?
- **C.** What the level of effectiveness of BB as a control method?
- **D.** What is the benefit (in economic terms) of BB as a control method?
- **E.** Determine the efficacy of different doses and time application of *B. bassiana* on CBB.
D. Karla Casco’s sponsors

- Zamorano Agricultural University. Honduras
- University of Hawaii at Manoa, College of Tropical Agriculture and Human Resources
- Christ Manfredi (Ka’u Farm and Ranch Company, LLC)
- Ka’u Cooperative (Gloria Camba)
- Pahala Plantation Cottages
E. Cultural practices: Harvesting season

- Efficient harvesting, **removing all** ripe and do not drop cherries on the ground.
- Bags should be tied shut at harvest to avoid the escape and dispersal of CBB.
- These sacks should **NOT** be left all day in the coffee plantation; they should be carried to the wet mill as soon as possible.
- **Use wide baskets**
E. Cultural practices: After harvesting season

- A management program for CBB starts with harvesting **ALL** raisins and dropped berries. These should be burned or buried.
- Once the harvesting of mature fruits is done, monitor out-of-season infestations *with traps* and observations in each field.
- CBB can survive for 3 months in dropped berries.
E. Cultural practices: Pruning season

- Before pruning, remove all the remaining berries, including immature out-of-season berries, raisins (cherries dried on the tree) and drops (fallen berries).
- Berries should be destroyed by burying/burning.
- Set baited traps in the pruned fields where the CBB are emerging from the berries.
F. Take home message

The Coffee Berry Borer CAN ONLY BE MANAGED WITH **Integrated Pest Management** AND COLLABORATION OF FARMERS.

*Beauveria bassiana* is **NOT** a Magic Bullet, that will control CBB to a high degree by itself.