INTEGRATED PEST MANAGEMENT OF CBB
(Hypothenemus hampei Ferr. 1867)

Ing. Juan Carlos Araya Vega.
Translated 2010 by PePe Miranda
Control

- **CBB**  Biology & attack
- **IPM**
  - Cultural Practices
  - Ethological
  - Biological
  - Chemical
CBB Distribution in Costa Rica
Number of farms and area with CBB. December 2005.
GENERAL ASPECTS

- Very small insect, with fast reproduction and high adaptation to different climates.
- Most important Plage for Coffee in the World.
- It can bring loss of more than 50%.
- It will elevate production cost and processing
DISCRIPTION

- Coleoptera: Curculionidae (Scolytinae)
- Color black
- Size: approximate 2 mm
- The Female penetrate the fruits and deposit from 60 to 75 eggs
- The temperature is very important for the development of these plague.
## Temperature Effect

<table>
<thead>
<tr>
<th>Stage</th>
<th>Temperature (° f)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>66.2</td>
</tr>
<tr>
<td>Egg</td>
<td>16.4 days</td>
</tr>
<tr>
<td>Larva</td>
<td>40.8 days</td>
</tr>
<tr>
<td>Pupa</td>
<td>19.1 days</td>
</tr>
<tr>
<td>Young Adults</td>
<td>8.5 days</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>85.0 días</strong></td>
</tr>
</tbody>
</table>
Infestation

- Start from 40-50 days after blooming or flowering
- The penetration will be by the bottom or belly bottom of the fruit
- Racings will be attack any where

Larvae will developed inside of the fruit and together with the adults will cause the damage
IT WILL CAUSE THE FOLLOWING DAMAGE

- Early falling of fruits (5-24%)
- Loss of harvest conversion (2-25%)
- Loss of quality cup
- Increased in production cost and processing
- Contamination risk of microorganisms
Keep track of flower or blooming.
Integrated Pest Management

**Cultural Control**
- Pruning, shoot selection, shade control, weed control, fertilization Program
- Stripping
- Stripping, Sanitation, Sanitation

**Ethological Control**
- Installation of traps after stripping & pruning (monitoring)

**Biological Control**
- Application *Beauveria bassiana*

**Chemical Control**
- Insecticide
- Insecticide
Stripping sanitation
Collect Infested Cherry

Before they fall

Irregular flower

Rain fall

Stripping sanitation

Rain fall
THE INFESTED BEANS

• Will be removed from the field and destroyed ASAP

• In plastic bags 4ml.
ETHOLOGIC CONTROL
Traps
PLACE THEM AFTER PRUNING

Pruning

Use of Traps

ENE  FEB  MAR  ABR  MAY  JUN  JUL  AGO  SET  OCT  NOV  DIC
5 traps per acre
Clean traps every 2 weeks

Soapy water cups (3 oz)
BIOLOGICAL CONTROL
Beauveria bassiana
FUNGUS *Beauveria bassiana*

Fungus with white mycelium
Kill CBB in 3 to 9 days
It is present naturally
Affecting in climatic condition
PERIOD TO KILL CBB: 3 to 6 days at 100% and 9 days with 70 to 80%
NATURAL CONTROL

*Beauveria bassiana*
2.5 months After the principal flower
HOW TO APPLY IT?

BOTANIGARD ES
MYCOTROL
B. bassiana

1 Quart per acre
PARASITOIDS & DEPREDATORS
ESPECIALLY FOR CBB
## PARASITOIDES CARACTERÍSTICAS

<table>
<thead>
<tr>
<th>Insect</th>
<th>Life Cycle</th>
<th>Action</th>
<th>Características</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Prorops nasuta</em></td>
<td>17-33 days</td>
<td>Parasit to larvaees &amp; pupas</td>
<td>Female deposit one egg into larvies</td>
</tr>
<tr>
<td></td>
<td>Depending of temperature</td>
<td>Deposit eggs, larvaees &amp; adults</td>
<td></td>
</tr>
<tr>
<td><em>Cephalonomia stephanoderis</em></td>
<td>18 days 25 °C</td>
<td>Simillar to <em>P. nasuta</em></td>
<td>Similar to <em>P. nasuta</em></td>
</tr>
<tr>
<td><em>Phymastichus coffea</em></td>
<td>20-25 days 25,6 °C</td>
<td>Parasit adults CBB</td>
<td>Deposit 1 or 2 eggs in CBB borreing</td>
</tr>
</tbody>
</table>
Cephalonomia stephanoderis
Female & Male
Prorops nasuta
Looking for a host (Pupa)
Prorops nasuta
CBB Larvae
Phymastichus coffea
Female & Male
Phymastichus coffea
Female Infesting a CBB
Larvae *P. nasuta* parasiting CBB larvae

*P. coffea* parasiting a female CBB

Adult *P. coffea* emerging from a dead CBB
Chemical CONTROL
Application of Insecticide or *B. bassiana*

April-Jun

In position D control will be invane
## INSECTICIDE CHARACTERISTICS

<table>
<thead>
<tr>
<th>Product</th>
<th>Family</th>
<th>Ribbon</th>
<th>Toxicology</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endosulfan</td>
<td>Organo chlorade</td>
<td>Yellow</td>
<td>Moderate Dangerous</td>
<td>Contact &amp; ingestion</td>
</tr>
<tr>
<td>Clorpiriphos</td>
<td>Organo phosphorai d</td>
<td>Yellow</td>
<td>Moderate Dangerous</td>
<td>Contact &amp; ingestion</td>
</tr>
<tr>
<td>Fipronil</td>
<td>Pirazol</td>
<td>Yellow</td>
<td>Moderate Dangerous</td>
<td>Contact</td>
</tr>
</tbody>
</table>

*These may not be approved for use in Hawaii!*
# Chemical Control Conversion

<table>
<thead>
<tr>
<th>Product</th>
<th>Comercial</th>
<th>Rate (L)</th>
<th>Cost (¢)</th>
<th>Cost (¢/Ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endosulfan</td>
<td>Thiodan 35 CE</td>
<td>1,5</td>
<td>4 500 /L</td>
<td>6 750</td>
</tr>
<tr>
<td>Clorpirifos</td>
<td>Lorsban 48 CE</td>
<td>2,0</td>
<td>5 400 /L</td>
<td>10 800</td>
</tr>
<tr>
<td>Fipronil</td>
<td>Regent 20 SC</td>
<td>0,3</td>
<td>8 000 /100 cc</td>
<td>24 000</td>
</tr>
</tbody>
</table>

*Application with 600 L/ Ha*
Negatives Aspects from Endosulphan

- Highly toxic (according to many Researchers)
- Create Resistance
- No antidote available
- Ecologic Unbalance
- Intoxications
Field Monitoring

- Divide farm in even fields.
- Take 20 samples (one lateral) in 20 fields.
- Count total of green fruits and infested green beans for each field for each field.
- Calculate Infestation percentage:
  \[
  \% \text{ Infestation} = \frac{\text{infested}}{\text{total}} \times 100
  \]
- Locate fields with higher attack.
- Apply the most practical control measurement.
CONTROL Investment
CBB Management COSTS
¢/fanega (40 Fan/Ha)

Collection: 3 Fan/Ha (If not done with Re-collection recolección)
Re-collection Sanitation: if there are more than 5 fruits per tree
Source: ICAFE, Region Pérez Zeledón

Updated in May, 2005
MANAGEMENT OF CBB
(40 Fan/Ha)

¢1 264/Fan: Collection & Re-collection during Harvesting

¢4 327/Fan: Re-collection (sanitation) during Harvest.

¢4 792/Fan: With out Sanitation & Recollection during Harvest.
CBB Fluctuation in population during a year

CBB cycle related to the Coffe production Cycle

PRACTICES TO MANAGE CBB

Coffee resting or dormant Flowering Harvest Bean development

Granea sanitaria Trampas Beauveria bassiana Granea sanitaria Cosecha Junta

MARZO ABRIL MAYO JUNIO JULIO AGOSTO SETIEMBRE OCTUBRE NOVIEMBRE DICIEMBRE

Enero FEBRERO MARZO ABRIL MAYO JUNIO JULIO AGOSTO SETIEMBRE OCTUBRE NOVIEMBRE DICIEMBRE

Repela Poda Trampas Granea sanitaria

Huevos Larvas Pupas Adulto

Granos en el suelo Curva de crecimiento del grano

CBB Behavior

Coffee resting or dormant Flowering Bean development Harvest

CBB Behavior

Café de Costa Rica
Ex: if the farmer deliver 56 to 60 cajuelas and on the test 4 to 6 full beens are infested; they will deduct 15 quarts (3.75 cajuelas)

This table is disigned to put in practice in floters on 250 milliliters (one quart of liter)