COCOA POD BORER, CURRENT STATUS AND RECOMMENDED CONTROL

INDONESIAN COFFEE AND COCOA RESEARCH INSTITUTE (ICCRI)
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Total area: 1.677,254 Ha (Source: Dirjenbun)
Total Production: 480,000 tonnes (Source: ICCO)
Indonesia

- Third largest cocoa producer in the world after Cote d’Ivoire and Ghana
- The first largest cocoa producer in Asia & Oceania
- In 2003 – 2009, cocoa productivity in Indonesia declined.
- Main factors causing the declined productivity: ageing, CPB & VSD damage.
COCOA POD BORER, *Conopomorpha cramerella*

- CPB : indegenous pests
- First reported in 1860’s in Sulawesi and 1895 discovered in Java and eradicated,
- 1990 new infestation found in Central Sulawesi
- In Philippines: confirmed in 1930’s
- Malaysia: confirmed in Sabah 1980 and Sarawak in 1985
- In PNG : confirmed in 2006
COCOA POD BORER, *C. cramerella*

- CPB the most serious pest of cocoa its direct effect on yield and quality

Symptom:
- **External**: early and uneven ripening (sometimes with exit holes)
- **Pulp** forms a callus-like tissue causing petrifying of beans in clumps
The Effect of CPB infestation

- Cocoa quality: low grade
- High remnants content
- High seed shell content
- Low out-turn
- Reduced seed density
- High cost of harvesting
High cost of harvesting

- Clumped bean → difficult to extract bean

Healthy pod
Life Cycle of CPB, *C. cramerella*

- **Egg**: ± 7 days
- **Larvae**: 14-18 days
- **Moth**: 1-7 days
- **Pupae**: ± 7 days
Current situation of CPB in Southeast Asia & Pasific

- All cocoa areas in Indonesia infested by CPB with annual losses approx. US$ 200 millions
- One of main reasons for the strong reduction of cocoa production and cocoa area in Malaysia
- Limiting factor for cocoa production in Philippines
- Threatening cocoa production in PNG
- Vietnam still free from CPB: cocoa new commodity
HOW TO PREVENT INCURSION OF CPB

• QUARANTINE measures: important to prevent incursion of CPB.

• MONITORING important for detecting early CPB infestations.

• SANITATION:
  • regular, complete harvesting of ripe or damaged pods
  • burying of pod husks, placenta, rotten pods, and all the remains of harvest in a hole and covering with soil to a depth of 20 cm.
INTEGRATED MANAGEMENT OF CPB

- Resistant/high yield planting materials
- Cultural practices
- Sanitation
- Pod Sleeving
- Biological Control
- Pheromones
- Pesticides
Cocoa clones resistant to CPB has been released by Indonesia Ministry of Agriculture

1. SULAWESI 3

2. ICCRI 7
Side grafting using resistant/high yield clones (Sulawesi 3, ICCRI 7, Sulawesi 1, Sulawesi 2, ICCRI 3, ICCRI 4, Sca 6) in rehabilitation programme
CULTURAL METHOD CONTROL

PURPOSE:
• Pruning → keep canopy height less than 4 m
• Fertilizing in right kind, dose, and time of application to improve healthy trees and fruitset
• Frequent harvesting: to minimize source of CPB infestation

Pruning
Fertilization
Frequent & complete harvesting
SANITATION kill CPB larvae before exit

- burying pod husk covering with soil 20 cm depth
- bagging or composting pod husks for cattle feed or organic fertilizer
- prevent emergence of adults after harvest.
Purpose: to prevent CPB moth laying egg on the pod & reducing of population by insect trapped.
Pod sleeving tool

CPB damage before sleeving

600-800 cherelles/per day

Efter sleeving
BIOLOGICAL CONTROL OF CPB

Black ant

Entomopathogen fungus:
- *Beauveria bassiana* (10⁷ spore/ml)
- *Paecylomyces fumosoroseus*
Biological control using black ants

*Dolichoderus thoraxicus*

Black ants covered cocoa pod > 50% could control CPB infestation → up to 4%
Biological control using entomopathogen fungus

- **Bioinsecticides**:
  - *Beauveria bassiana* (10⁷ spore/ml)
  - *Paecylomices fumosoroseus*

- Spray when many cherelles on cocoa tree

- **Target of spraying**:
  - cocoa pod : cherelles (in length <9cm)
  - horizontal branches (resting sites of CPB)

- Number of spray: 3-5 times in 10 days interval
- Using knapsack sprayer with volume 250 ml/tree
<table>
<thead>
<tr>
<th>Active ingredient</th>
<th>Formulation Concentration (%)</th>
<th>Efficacy on infestation level (%)</th>
<th>Saved yield (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>deltametrin</td>
<td>0,06</td>
<td>94,7</td>
<td></td>
</tr>
<tr>
<td>Sihalotrin</td>
<td>0,06 - 0,12</td>
<td>76,3 – 86,8</td>
<td></td>
</tr>
<tr>
<td>betasiflutrin</td>
<td>0,05 - 0,1</td>
<td>69,1 – 85,2</td>
<td></td>
</tr>
<tr>
<td>alfa sipermetrin</td>
<td>0,06</td>
<td>61,6</td>
<td></td>
</tr>
<tr>
<td>bifentrin</td>
<td>0,12</td>
<td>64,9</td>
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<tr>
<td>esfenvalerat</td>
<td>0,2</td>
<td>85,5</td>
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<tr>
<td>fipronil</td>
<td>0,2 – 0,4</td>
<td>84,6 - 96</td>
<td>40,5 – 43,4</td>
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<td>Sipermetrin + klorpirifos</td>
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<td>sihalotrin Z</td>
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<td>L-sihalotrin + tiametoksan</td>
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<td>Sihalotrin (Matador EC)</td>
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<td>*</td>
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<td><strong>Beauveria bassiana</strong></td>
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Biodegradable Coater

- Main material of degradable coater extraction of *Amorphophallus muelleri* tubers, can grow under cocoa
- Active ingredient: glucomannan compound
DAMAGE INTENSITY AND YIELD LOSSES DUE TO CPB ON BIODEGRADABLE TREATMENT

- Infected pod, %
- Yield loss, %

<table>
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<tr>
<th>Treatment</th>
<th>Infected Pod (%)</th>
<th>Yield Loss (%)</th>
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<tr>
<td>Pure coater (F1)</td>
<td>23.1</td>
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<tr>
<td>Coater Formula 2 (F2)</td>
<td>14.7</td>
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<tr>
<td>Coater Formula 3 (F3)</td>
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<tr>
<td>Insecticide</td>
<td>15</td>
<td></td>
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<tr>
<td>Pod Sleaving</td>
<td>27.1</td>
<td>4.9</td>
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<tr>
<td>Control</td>
<td>87.1</td>
<td>35.9</td>
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ACKNOWLEDGMENT

- Indonesian Coffee and Cocoa Research Institute (ICCRI)
- Ghana Cocoa Board (COCOBOD)
- International Cocoa Organization (ICCO)
- Common Fund for Commodities (CFC)
- Cocoa Research Institute of Ghana (CRIG)
THANK YOU