World Agroforestry Centre

Integrated Pest and Disease Management for Cacao as Agroecological Practice

Sustainable Farming in Tropical Asian Landscapes (SFITAL)

Integrated Pest and Disease Management (IDPM)

The goal of IDPM is to **reduce the levels** of pests and diseases through a **combination of methods** (cultural, chemical, and physical controls such as site hygiene, and biological controls) to **minimise the use of pesticides** and their negative impact on natural enemy populations and **minimise the cost of control.**

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Agroecological practices which relate to pest and disease control

- Agrobiologically diversification - creates habitats for predators and natural enemies of common cacao pests and diseases, enhances pollination and provides biological control services.
- Integrated pest and disease management (IPDM)
  - Improved farm sanitation
  - Proper pruning
  - Shade management
  - Improving soil health
  - Use of bio-pesticides

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Pest and disease control for cacao

- Pests and diseases are the leading cause of production loss in cacao.
- Integrated Pest and Disease Management (IPDM) intended to reduce the levels of pests and diseases in cacao, reduce the **inappropriate use of chemicals**, provide alternatives for pests and disease management, and improve the yield and quality of cacao, thereby increasing farmers' income.

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Pest and disease control for cacao

Insect Pest: Cacao Pod Borer (CPB)

- CPB is the major insect pest of cacao in the Philippines and across Southeast Asia.
- **Causal Organism:** *Conopomorpha cramerella*.
- **Damage symptoms on cacao pod:** Cacao pod borer damage. The larva feeds on the tissue surrounding the cacao beans and on the placenta; the beans are seldom attacked.
- **Potential Economic Losses:** 80% of the production.

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Pest and disease control for cacao

Insect Pest: Cacao Pod Borer (CPB)

Control Measures

1. Use of resistant cacao clones (side grafting or replanting)
2. Proper pruning
3. Pod sleeving (every 2 weeks or less)
4. Regular & complete harvesting (every 2 weeks or less)
5. Remove and bury pods to prevent the population of the larvae.
6. Maintain farm cleanliness.

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Pest and disease control for cacao

Insect Pest: Cacao Pod Borer (CPB)

Control Measures

- Natural enemies (NEs):
- small 'sugar' ants (*Iridomyrmex* spp.)
- large black ant (*Dolichoderus* sp.)
- weaver ant (*Oecophylla smaragdina*)

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Pest and disease control for cacao

Insect Pest: Cacao Pod Borer (CPB)

Control Measures

- Chemical spraying (Optional):
- Spray insecticide every 7-10 days alternate the use of different chemical brands (e.g., Pyrethrin and Chlorpyrifos).

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Pest and disease control for cacao

Insect Pest: Mealybug

- **Causal Organism:** *Planococcus lilacinus.*
- **Mode of action:** Feeding causes distorted shoots, stunted growth and wilted cherelles (young cacao pods).
- Potential Economic Losses: 60% of the production.

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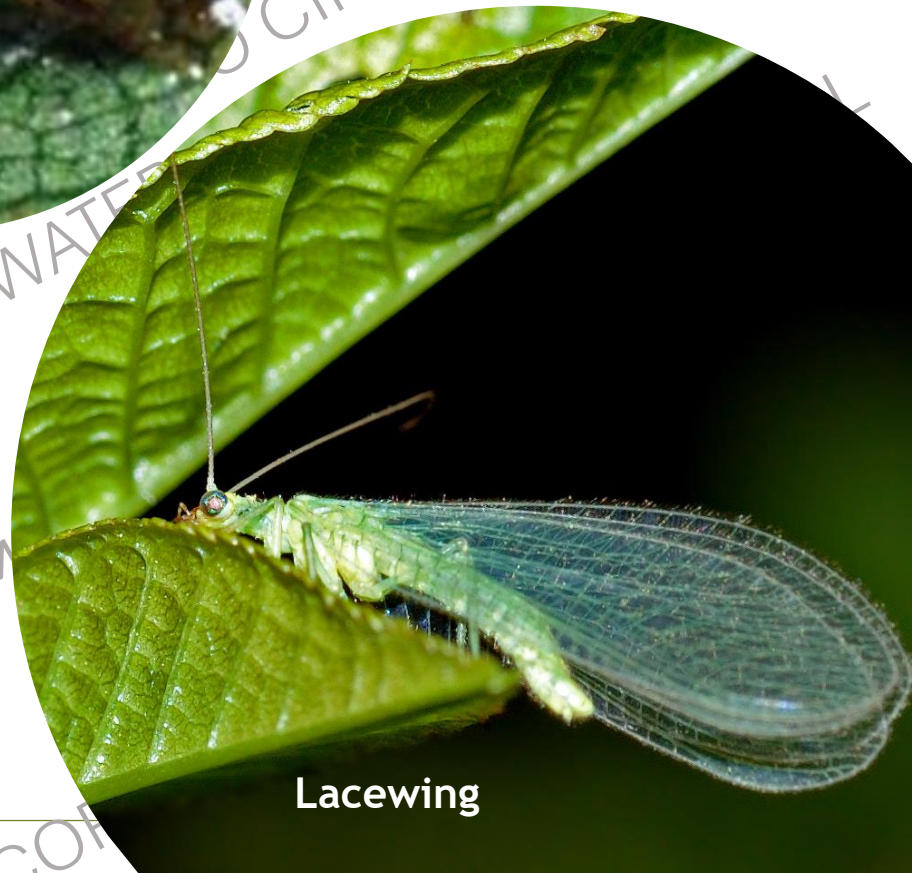
Pest and disease control for cacao

Insect Pest: Mealybug

Scymnus sp.

Control Measures

1. Pod sleeving (every 2 weeks or less). Should be done when the pod is at battery size D.
2. Mix detergent powder and oil (30-60ml) with 10 Liters of water and spray it at intervals of 7-10 days.
3. Natural enemies: *Scymnus* sp., Lacewing.



Lacewing

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Pest and disease control for cacao

Insect Pest: Stem Borer/Twig Borer

- **Causal Organism:** *Zeuzera* sp.
- **Mode of action:** The destruction is caused by the caterpillars of this pest. It bores into the bark of the stem and makes a tunnel inside it. They may reach up to the roots of the plant by extending the tunnel. The leaves of the affected stem wither and branches ultimately die.
- **Potential Economic Losses:** 20% of the production.

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Pest and disease control for cacao

Insect Pest: Stem Borer/Twig Borer

Control Measures

1. Cut/prune branch having stem borer.
2. Use of plant extracts or botanicals – Spray a mixture of panyawan (*Tinospora rumphii Boerl.*) plants, roots of tubli plant (*Derris Elleptica Benth.*) and tobacco leaves to make a concoction.

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Pest and disease control for cacao

Cacao Disease: Cacao Pod Rot

- **Causal Organism:** *Phytophthora palmivora*
- **Potential Economic Losses:** 80-90% of the production.

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Pest and disease control for cacao

Cacao Disease: Cacao Pod Rot

- **Control measure:**

1. Application of sanitary pruning and management of the shade regularly to allow sunlight penetration.
2. Have a good drainage practice so that the spores cannot spread in puddles of water.
3. Remove and bury infected pods.
4. Use of resistant clones.
5. Use of fungicides (e.g., Alliet – copper-based fungicides).

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Pest and disease control for cacao

Cacao Disease: Stem Canker

- **Causal Organism:** *Lasiodiplodia theobromae*
- Stem cankers are produced following the infection of wounds on the trunk or branch, caused by insects or man.
- The whole plant can be affected causing cocoa black pod, bark or stem and cushion canker, Cherelle wilt and chupon blight.
- **Potential Economic Losses:** 60% of the production

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Pest and disease control for cacao

Cacao Disease: Stem Canker

- **Control measure:**

1. Use of fungal antagonists such as Trichoderma.
2. Use of plant extracts or botanicals like the Kamantigue (*Impatiens balsamina*), extract (rub on the infected area).
3. Spray copper-based fungicides on the infected area.

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Pest and disease control for cacao

Cacao Disease: Vascular Streak Disease (VSD)

- **Causal Organism:** *Oncobasidium theobromae*
- **Potential Economic Losses:** 70% of the production

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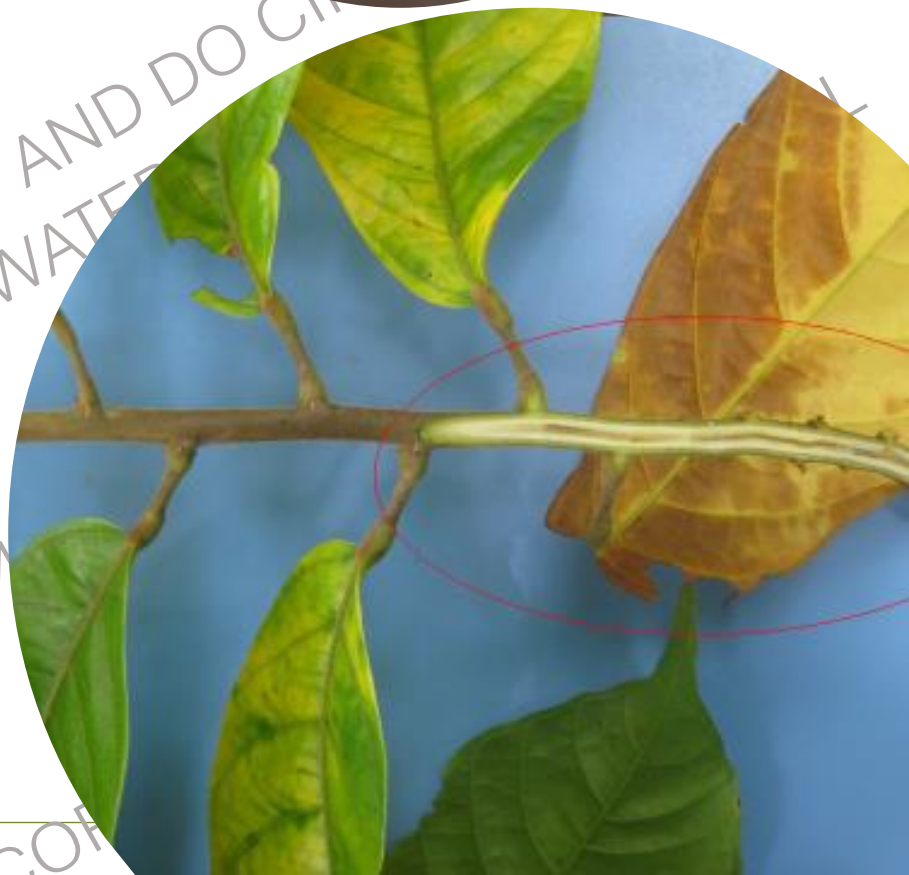
Pest and disease control for cacao

Cacao Disease: Vascular Streak Disease (VSD)

- **Control measures:**

1. Regular pruning
2. Sun drying of infected parts
3. Sanitation
4. Use of resistant clones (PBC 123)



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The key steps of Integrated Disease Management

- **Prevention**

1. Select disease-resistant varieties.
2. Conduct field sanitization.
3. Proper pruning.
4. Apply balanced nutrients to have healthy plants.

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The key steps of Integrated Disease Management

➢ **Identify Disease, Diagnose Severity, and Apply Treatments**

1. Identify the causes of the disease.
2. Assess the disease level.
3. Apply control methods appropriate for the disease level.
4. Remove pathogen sources such as diseased plant parts and pods.
5. Prune the cacao trees.
6. Irrigate and pay attention to soil fertility to improve plant health and disease resistance.
7. Apply fungicide in appropriate concentrations only when diseases begin to cause unacceptable financial losses.

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Thank you!