Training Growers and Trainers: Farmer Field Schools for Estate Crop IPM in Indonesia

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The Integrated Pest Management for Smallholder Estate Crops Project

13 provinces in the project
The IPM for Smallholder Estate Crops Project

3 major components:

- Training: farmers and trainers
  - by far the largest part of the project
- Research
- Quarantine

Funded by the Asian Development Bank (loan) and the Indonesian Government
Five Major Crops

- Cacao
- Coffee
- Black pepper
- Cashew
- Tea

Cotton and citrus were minor crops in the project
Farmer Field School (FFS) process

* Agroecosystem Analysis
  - Field observations
  - Small groups compile and analyze data
FFS process
FFS process

Agroecosystem Analysis

- Each small group presents their analysis to the large group (~25 farmers + 1-3 facilitators)
- Large group discussion
- Decision about pest control measures is made
FFS process

- Group dynamics
- Special topic: usually some type of demonstration or technology transfer exercise
- Farmer research trials
Curriculum needs

Needs were determined based on feedback from trainers and farmers, and observations by consultants.

**Primary needs:**
- Materials to help trainers and farmers **differentiate** between pests, natural enemies and neutral species.
- Materials to help trainers and farmers **identify** natural enemies (NE), pests and diseases.
- Materials regarding **biology and ecology** of NE, pests and diseases which are useful in implementing IPM.
Curriculum needs

These needs were met in two ways:

- Writing booklets for farmers and trainers about NE, pests and diseases for six crops in the project
- Conducting training of trainers (ToT) on identification, ecology and behavior of insects and spiders
Curriculum developed

Series of 50-60 page booklets on NE, pests and diseases on 6 crops - cacao, cashew, tea, coffee, cotton and black pepper

Many color photos included
Curriculum developed

MUSUH ALAMI, HAMA DAN PENYAKIT TANAMAN JAMBU METE

Musuh alami dan hama pada kapas

Proyek Pengendalian Hama Terpadu Perkebunan Rakyat
Direktorat Pengembangan Perkebunan, Direktorat Jenderal Bina Produksi Perkebunan
Departemen Pertanian
Jakarta, 2001

Buku ini tidak diperjualbelikan. Diberikan secara cuma-cuma kepada petani.
Curriculum developed
All available as pdf files at: http://www.mamud.com/beneficials.htm

Booklets highlight trophic relationships and other information on pest and NE biology likely to be important to extensionists and farmers.
Training of Trainers
Overall program

5-7 months long

Wide variety of topics:

- Participatory training methods, especially FFS
- Group dynamics
- Entomology, plant pathology, weed science
- IPM theory
- Pesticide application methods, safety issues, etc.
- Agronomy and soil science, esp. for their crop
- Insect/spider identification, ecology, behavior
ToTs on insect/spider identification, ecology and behavior

Sites:
- Kalimantan (Borneo)
- Lombok
- Bangka
- Java
- Bali
- Sulawesi
- Sumbawa
Training of Trainers

Powerpoint presentation as an introduction:

- Methods for differentiating between pest, natural enemy and neutral species based on Order and Family
- Focus on insects and spiders which are important for plant protection in general (13 insect Orders) and important on their specific commodity
Training of Trainers

Agroecosystem census:

Trainers collect as many kinds of insects/spiders as possible from their crop ecosystem.
Training of Trainers

Agroecosystem census:

Trainers identify insects/spiders to Order/Family and categorize them into “pests”, “natural enemies” or “neutral”

Each small group presents their collection to the large group, and is judged (prize given to top group)
Training of Trainers

Follow a predator:

- Trainer finds a predator in the field and observes it for ~2 hours
- Trainer reports on its behavior to the large group
- Familiarizes trainers with roles of insects and spiders and helps in IPM implementation
Training of Trainers

Food web:

• Each trainer is given the name of a pest or NE or the main crop or the sun, and then asked to draw it

• Trainers are tied together according to trophic relationships in the agroecosystem
Training of Trainers

Food web:

- Yellow string represents energy from the sun, green represents energy from plants, and red represents carnivory.
- More effective than a lecture because participants can feel the relationships in the agroecosystem.
Training of Trainers

Pest – NE drama:

- Each pair of trainers is given the name of a pest and a NE that feeds on it.
- Each pair acts out their pest-NE combination.
- Other trainers then guess what is being portrayed.
- Facilitates the learning process about pest-NE relationships.
Terima Kasih
Extra slides
Insect pests of cacao in Indonesia

- Cocoa pod borer 
  \textit{(Conopomorpha cramerella)} 
  (Gracillariidae)

- Cocoa pod sucker 
  \textit{(Helopeltis spp.)} 
  (Miridae)

- Trunk/branch borer \textit{(Zeuzera coffeae)} 
  (Cossidae)

- Trunk/branch borer \textit{(Glenea spp.)} 
  (Cerambycidae)
Natural enemies commonly seen on cacao in Indonesia

- Jumping spiders
- Weaver ants
  \((Oecophylla smaragdina)\)
Natural enemies commonly seen on cacao in Indonesia

- Dragonflies
- Black cacao ant (*Dolichoderus bituberculatus*)
- Earwigs
Cocoa pod borer IPM methods

- Harvest all ripe fruits once a week.
- Husks should be discarded in tightly sealed plastic bags or buried to cut off the CPB life cycle.
Cocoa pod borer IPM methods

- Put plastic bags over pods (hole in bottom).
- Fertilize properly – a healthy plant can better withstand pest attacks.
- Prune to keep the canopy relatively open, as this reduces CPB numbers.
Cocoa pod borer IPM methods

- Encourage black cacao ants, which chase away CPB and *Helopeltis*.

- Encourage weaver ants, which attack CPB larvae.
Insect pests of coffee in Indonesia

- **Coffee berry borer**
  \[(Hypothenemus hampei)\]
  \[(Scolytidae)\]

- **Green scale**
  \[(Coccus viridis)\]
  \[(Coccidae)\]
Natural enemies commonly seen on coffee in Indonesia

- Crab spiders
- Mantids
- Wolf spiders
- Orb web weaving spiders
Natural enemies commonly seen on coffee in Indonesia

- Coccinellids
- Earwigs
- White mantids – coffee flower mimics?
Insect pests of black pepper in Indonesia

- Small pepper weevil (*Lophobaris piperis*) (Curculionidae)
- Pepper berry bug (*Dasynus piperis*) (Miridae)
- Lace bug of pepper blossom (*Diconocoris hewitti*) (Tingidae)
Natural enemies commonly seen on black pepper in Indonesia

- Dragonflies
- Mantids
- Tiger beetles
Natural enemies commonly seen on black pepper in Indonesia

- Robber flies
- Jumping spiders
Insect pests of cashew in Indonesia

- Cashew silkmoth (*Cricula trifenestrata*) (Saturniidae)
- Cashew sucker (*Helopeltis* spp.) (Miridae)
- *Machaerota rostrata* & *Lawana* sp. (Flatidae)
- Thrips
Natural enemies commonly seen on cashew in Indonesia

- Weaver ants
- Funnel weaver spiders (Agelenidae)
Natural enemies commonly seen on cashew in Indonesia

- *Aphanomerus* sp. (Platygastridae)

- *Synnematium* sp. fungus
Insect pests of tea in Indonesia

- Tea leaf bug (*Helopeltis* spp.) (Miridae)
- Tea tortrix (*Homona coffearia*) (Tortricidae)
- 3 species of Geometridae
- Shoot roller of tea (*Cydia leucostoma*) (Tortricidae)
Natural enemies commonly seen on tea in Indonesia

- Jumping spiders
- Mantids
- Wasps