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

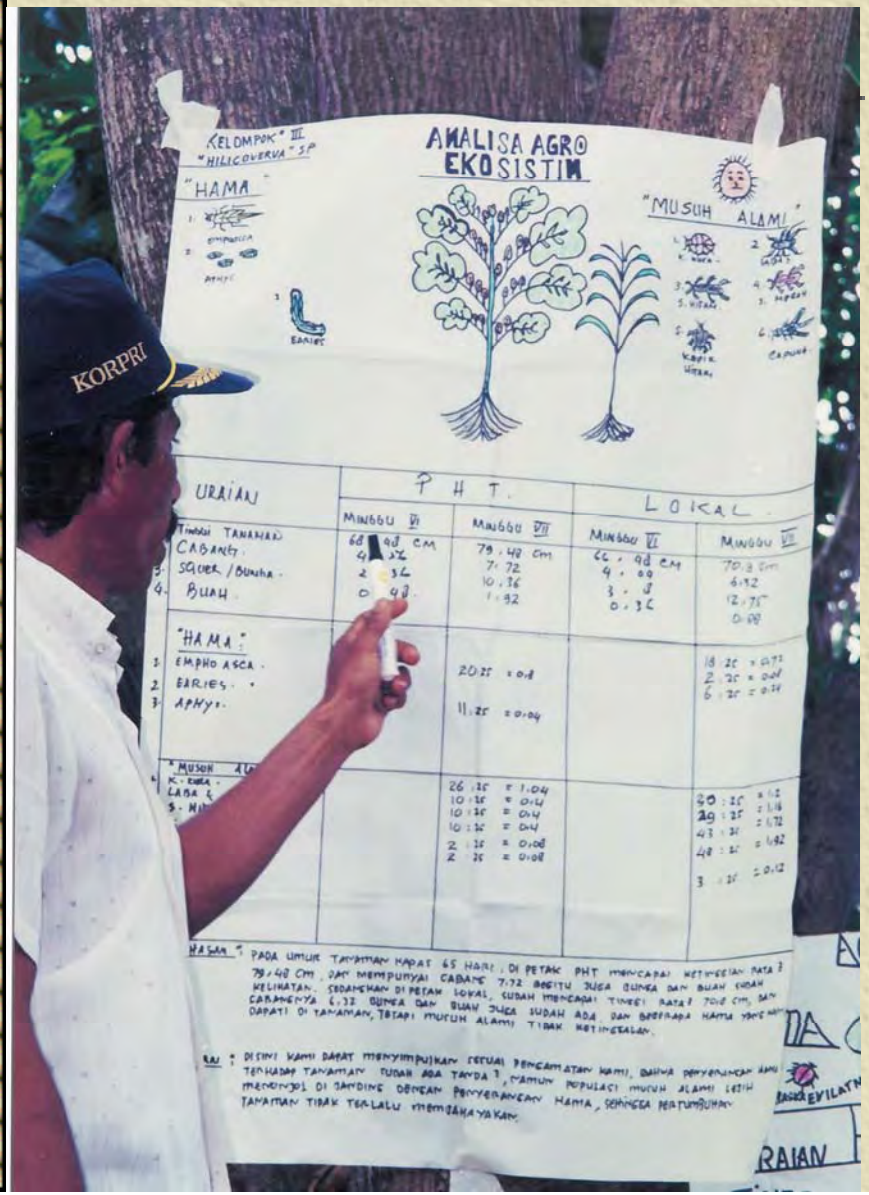
- Cacao
- Coffee
- Black pepper
- Cashew
- Tea

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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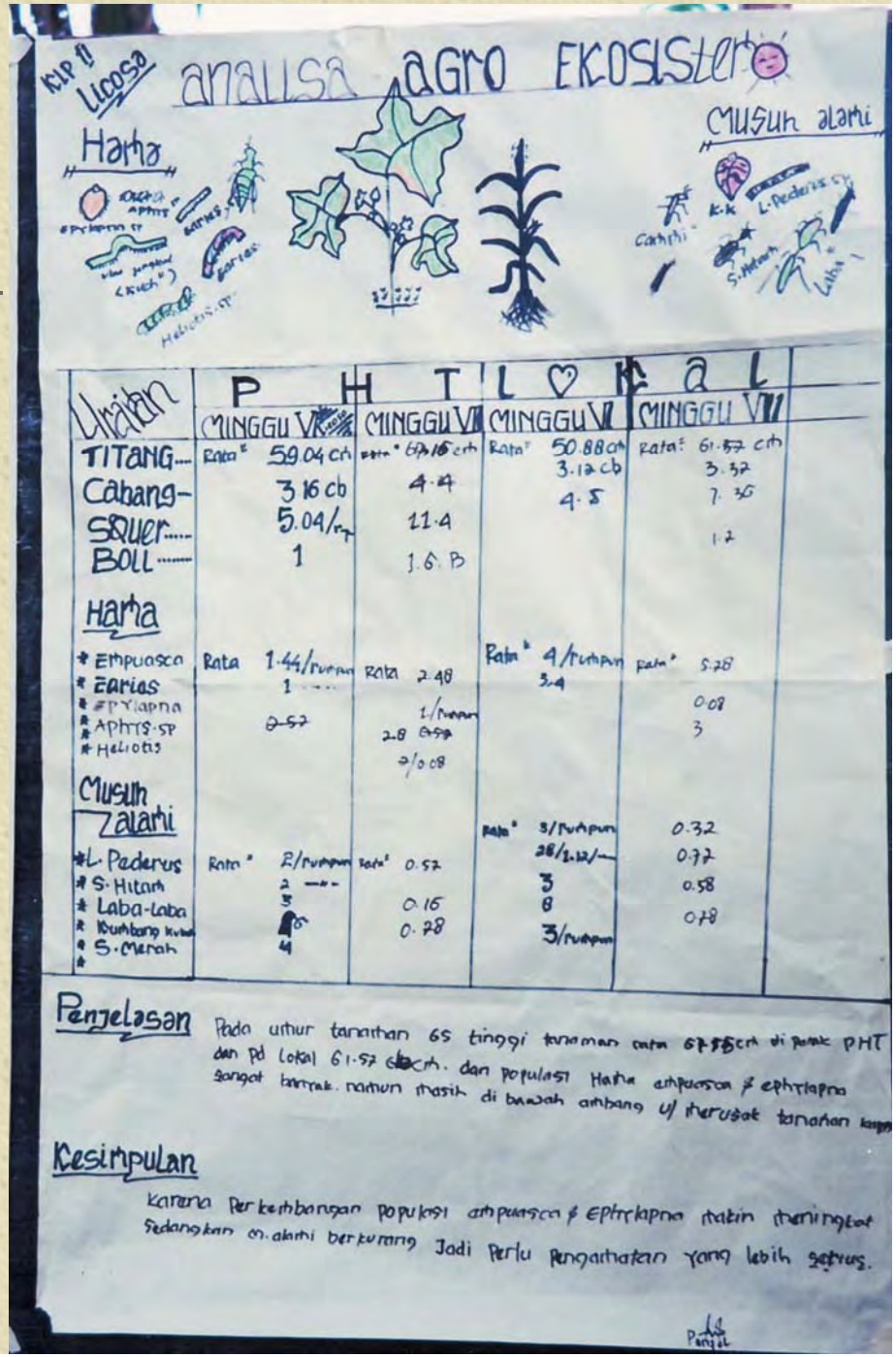
KLP II
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Musuh Alami
L. Pederus
S. Hitam
Laba-laba
S. Merah
Penjelasan
Kesimpulan

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:

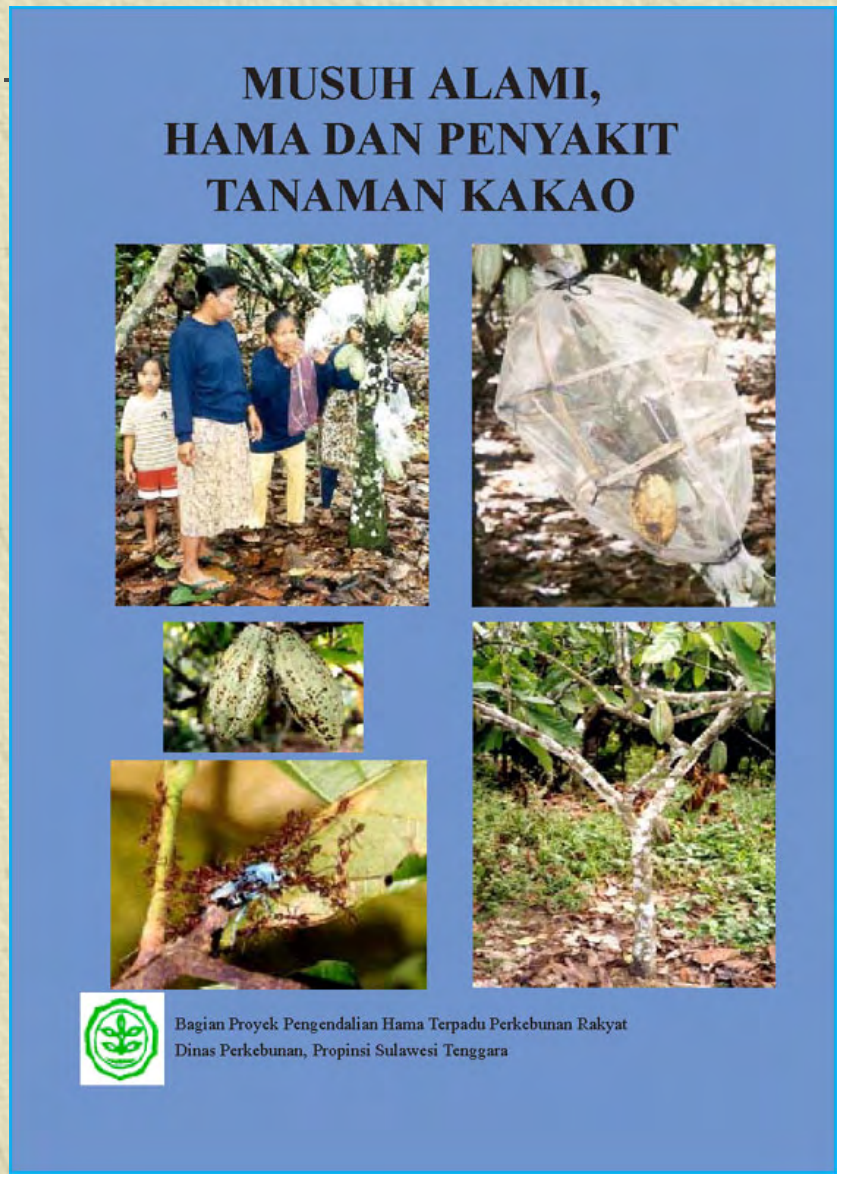
- Materials to help trainers and farmers differentiate between pests, natural enemies and neutral species
- Materials to help trainers and farmers identify natural enemies (NE), pests and diseases
- Materials regarding biology and ecology of NE, pests and diseases which are useful in implementing IPM

Curriculum needs

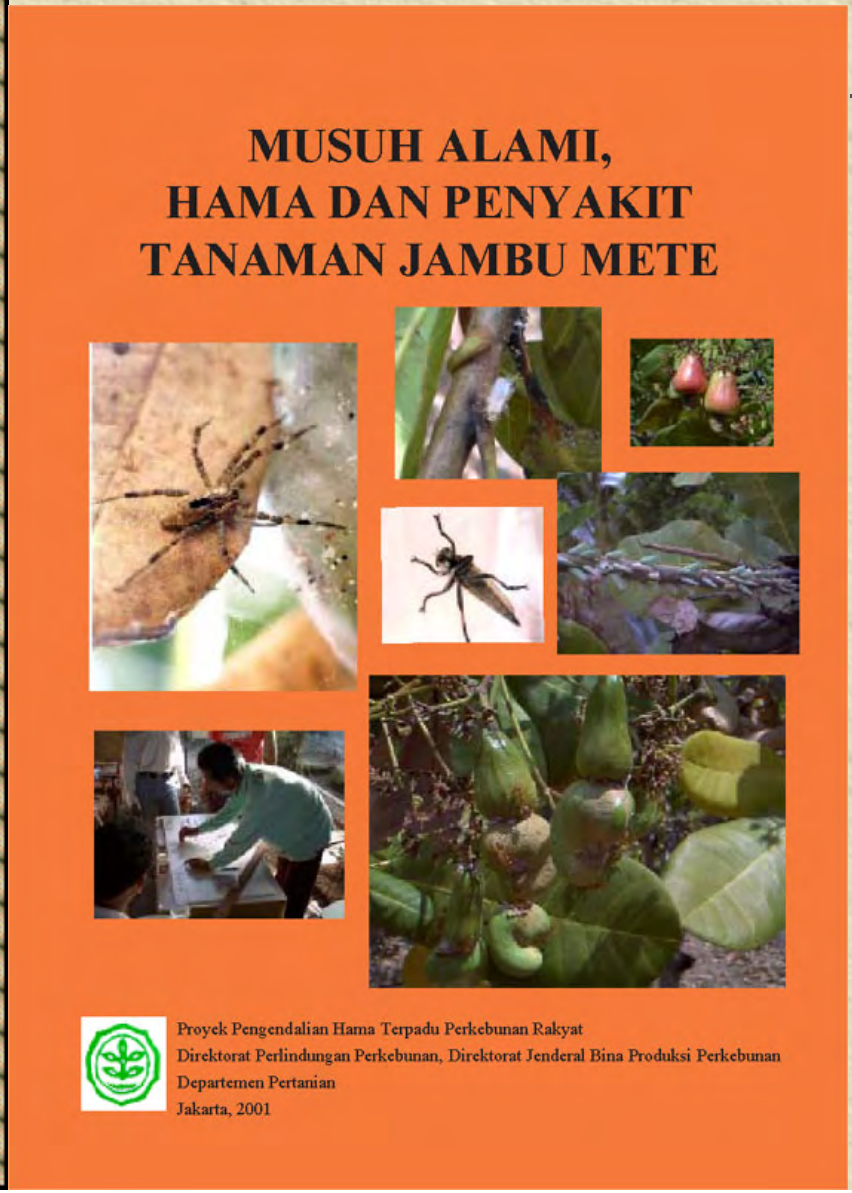
- These needs were met in two ways:
  - Writing booklets for farmers and trainers about NE, pests and diseases for six crops in the project
  - Conducting training of trainers (ToT) on identification, ecology and behavior of insects and spiders

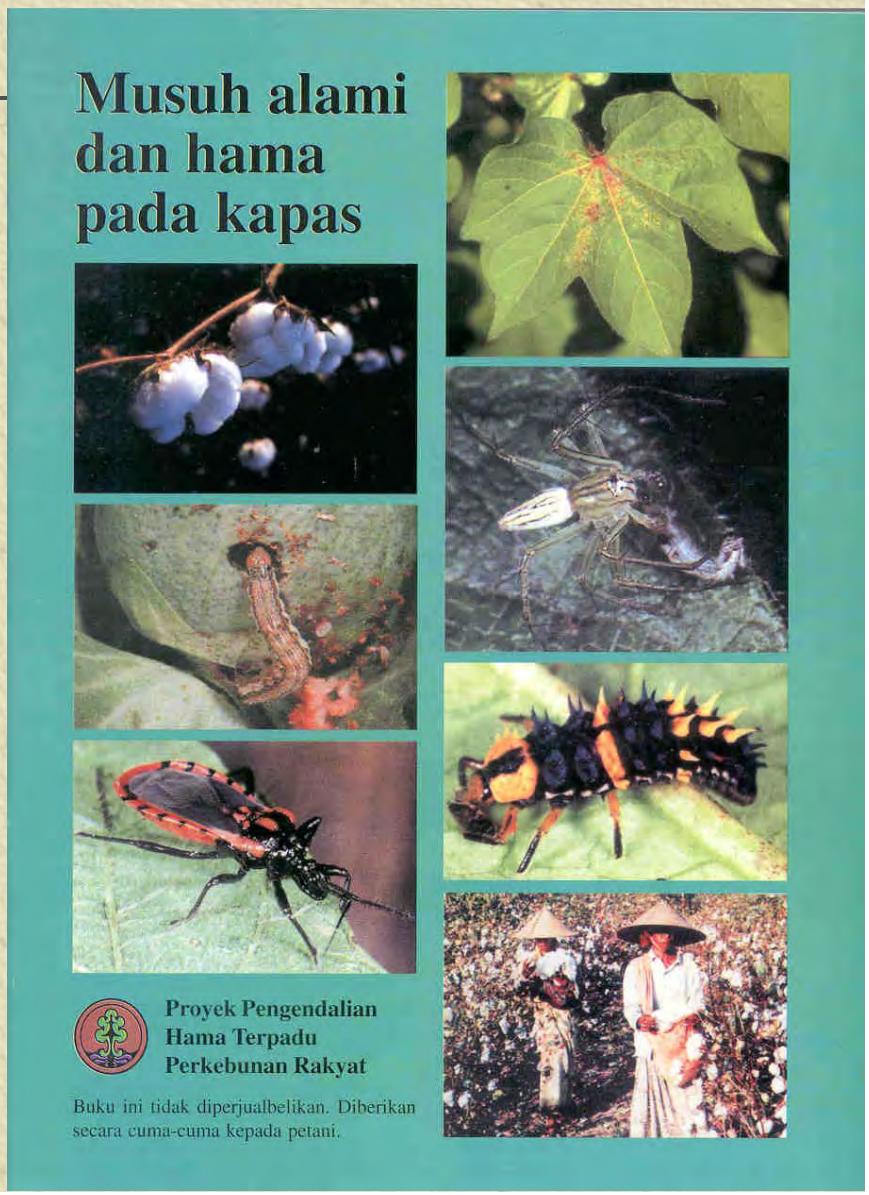
Curriculum developed

- 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

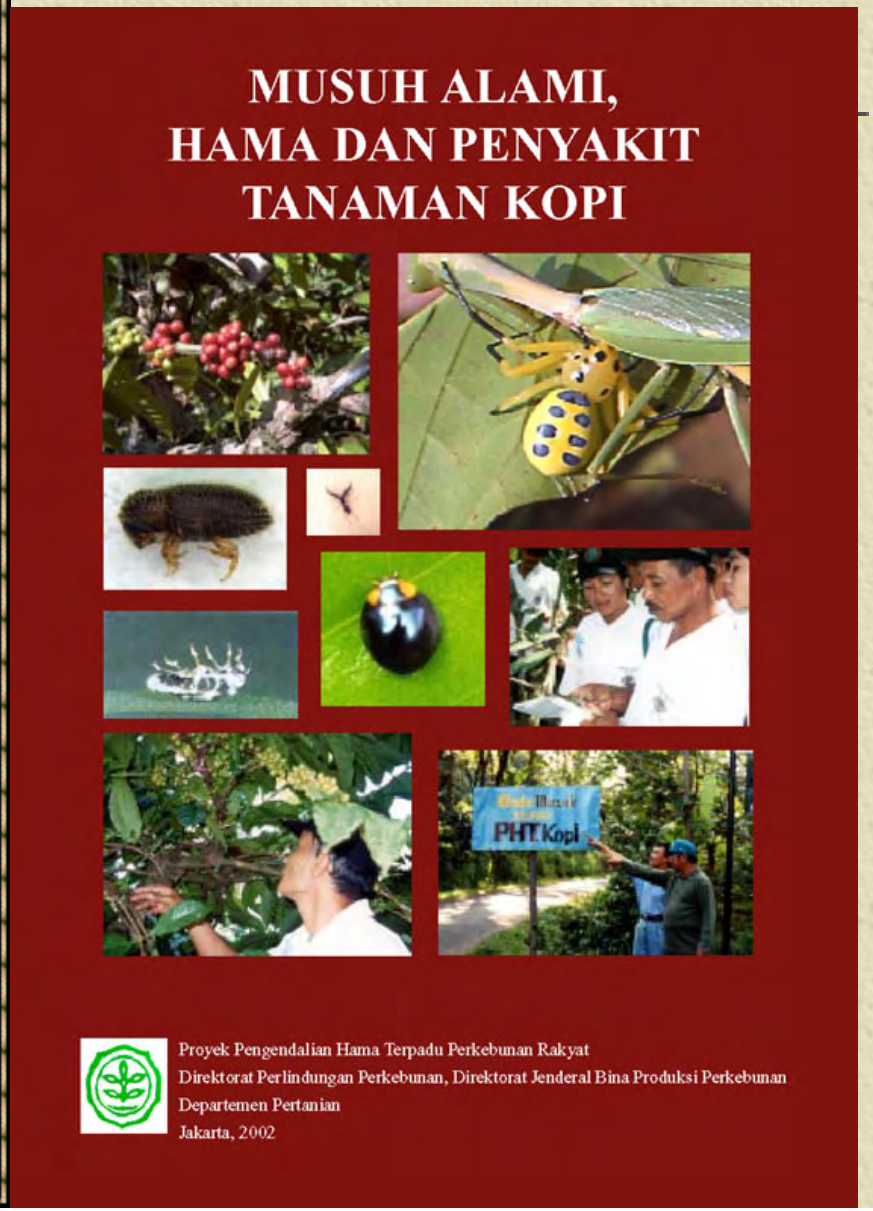


Curriculum developed



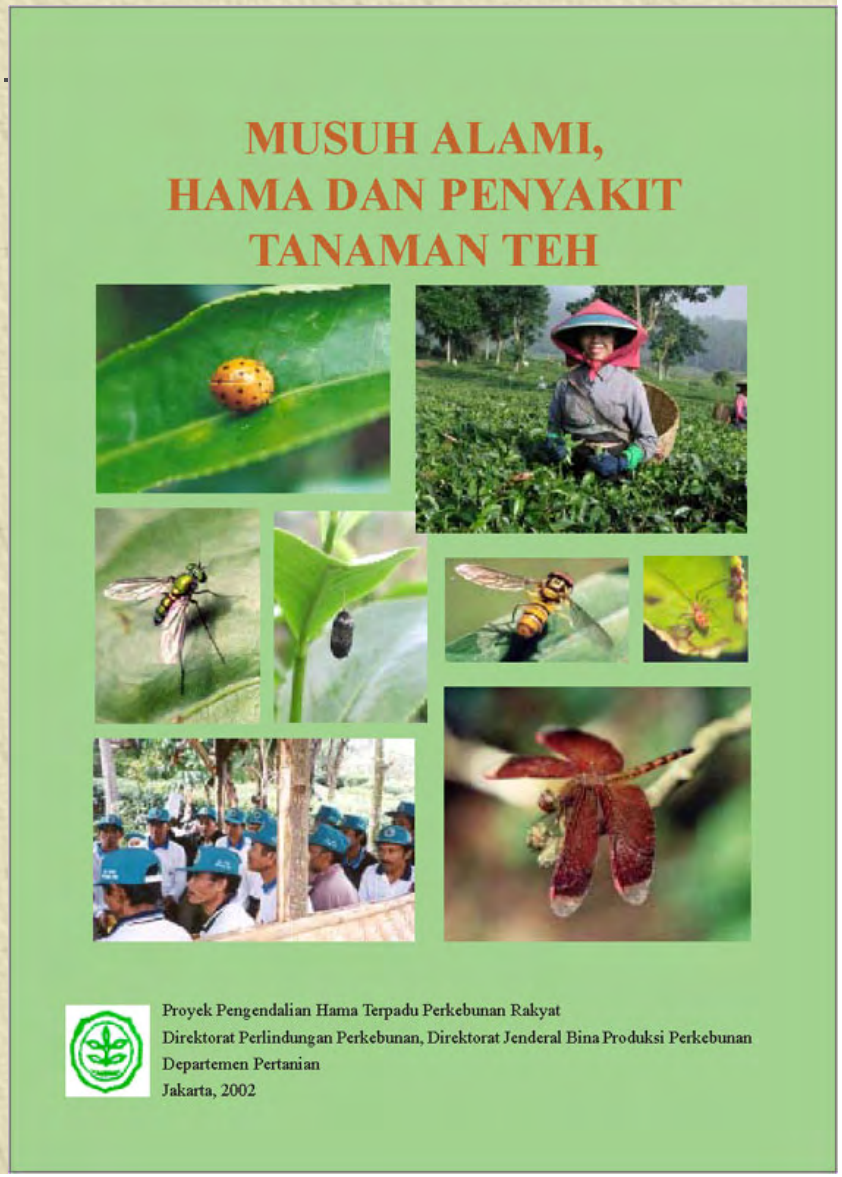


Curriculum developed



- 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 (*Conopomorpha cramerella*) (Gracillariidae)
- Cocoa pod sucker (*Helopeltis* spp.)(Miridae)
- Trunk/branch borer (*Zeuzera coffeae*) (Cossidae)
- Trunk/branch borer (*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.

CPB damage

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.

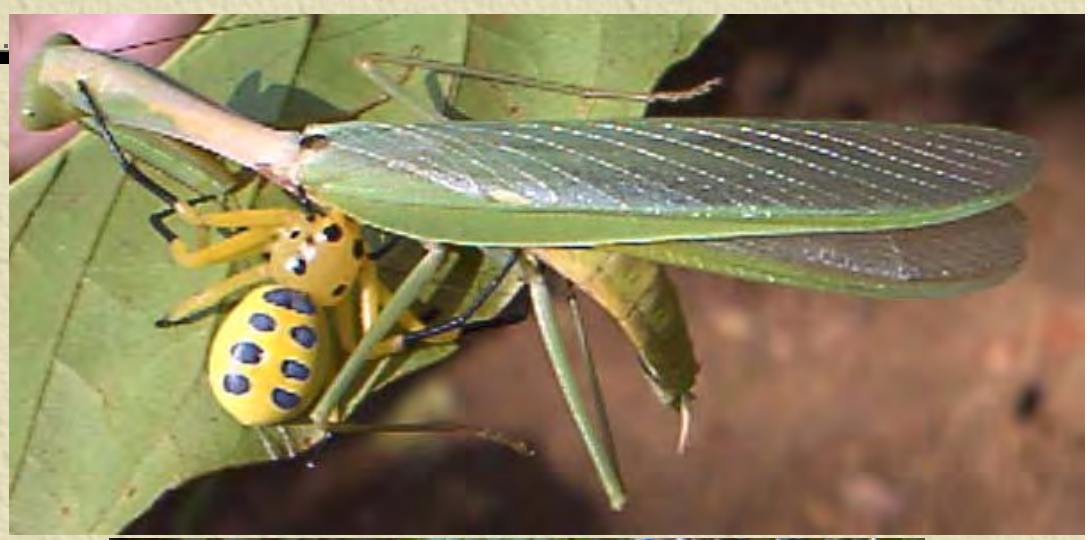
Insect pests of coffee in Indonesia

- 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)

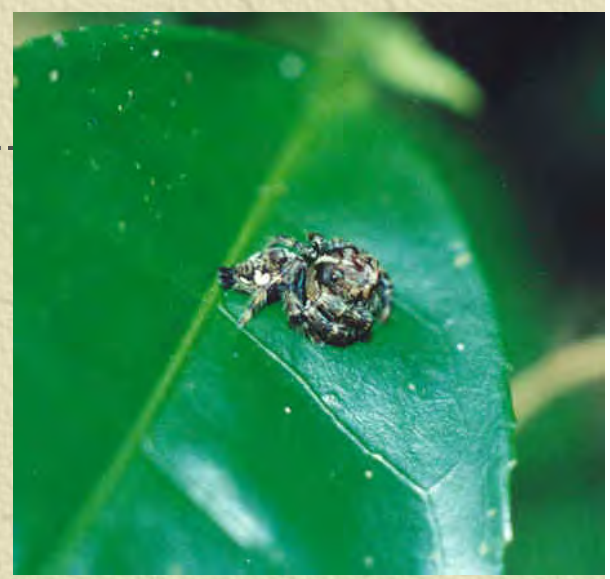
- *Synnematium* sp. fungus

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