

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

KELOMPOK "B"
"HILICOVERVA" SP

"HAMA"

1. EMPHOASCA
2. EPHRAPNA
3. APTIS-SP

ANALISA AGRO EKOSISTIM

"MUSUH ALAMI"

1. K. KUBA
2. L. KUBA
3. S. HITAM
4. S. MERAH
5. LABA-LABA
6. LABA-LABA

URAIAN

URAIAN	P H T		LOKAL	
	MINGGU VI	MINGGU VII	MINGGU VI	MINGGU VII
Tinggi TANAMAN	68.48 CM	79.48 CM	66.48 CM	70.8 CM
CABANG	4.32	7.72	4.00	4.92
SQUER / BUNHA	2.32	10.36	3.00	12.72
BUAH	0.92	1.92	0.32	0.08
"HAMA"				
1. EMPHOASCA		20.25 ± 0.8		18.25 ± 0.72
2. EPHRAPNA		11.25 ± 0.04		2.25 ± 0.04
3. APTIS-SP				6.25 ± 0.72
"MUSUH ALAMI"				
1. K. KUBA		26.32 ± 1.04		30.32 ± 1.12
2. L. KUBA		10.32 ± 0.16		20.32 ± 1.12
3. S. HITAM		10.32 ± 0.16		43.32 ± 1.72
		10.32 ± 0.16		48.32 ± 1.82
		2.32 ± 0.08		3.32 ± 0.12
		2.32 ± 0.08		

REKAM

PADA UHUR TANAMAN PADAT 65 HARI, DI PETAK PHT MENCAPAI KETINGGIAN RATA 79.48 CM, DAN MEMILAI CABANG 7.72 BERTUJUAN BUNHA DAN BUAH SUDAH KELIHATAN. SEDIKIHAN DI PETAK LOKAL, SUDAH MENCAPAI TINGGI RATA 70.8 CM, DAN CABANG 4.92 BUNHA DAN BUAH SUDAH ADA DAN BERTUJUAN HAMA YANG TERDAPATI DI TANAMAN, TETAPI MUSUH ALAMI TIDAK KETINGGALAN.

RAIAN

DISINI KAMI BAPT MENYIMPULKAN TERJUAL BENCAMSTAN HAMA, BAHWA PENYERAN HAMA TERHADAP TANAMAN TUDAH ADA TANDA 3, NAMUN POPULASI MUSUH ALAMI LEBIH MENYIMPULI DI SAMPING DENGAN PENYERAN HAMA, SEHINGGA PERTUMBUHAN TANAMAN TIDAK TERLALU MEMBAHAYAKAN.

KIP II LUCASA

analisa agro ekosistem

Hama

1. EMPHOASCA
2. EPHRAPNA
3. APTIS-SP
4. HELIOTIS-SP

Musuh alami

1. K. KUBA
2. L. KUBA
3. S. HITAM
4. S. MERAH
5. LABA-LABA
6. LABA-LABA

URAIAN

URAIAN	P H T		LOKAL	
	MINGGU VI	MINGGU VII	MINGGU VI	MINGGU VII
TITANG	Rata 59.04 ch	Rata 67.16 ch	Rata 50.88 ch	Rata 61.52 ch
Cabang	3.16 cb	4.4	3.12 cb	3.32
SQUER	5.04/m	11.4	4.5	7.36
BOLL	1	1.6 B		1.2
"HAMA"				
* EMPHOASCA	Rata 1.44/rumpun	Rata 2.48	Rata 4/rumpun	Rata 5.28
* EPHRAPNA	1	1/rumpun	3.4	0.08
* APTIS-SP	0.52	2.8 0.92		3
* HELIOTIS		2/0.08		
"MUSUH ALAMI"				
* L. Paderus	Rata 2/rumpun	Rata 0.52	Rata 3/rumpun	0.32
* S. Hitam	2		28/1.12	0.72
* Laba-laba	3	0.16	3	0.58
* Bumbang KUBA	4	0.28	3/rumpun	0.78
* S. Merah				

Penjelasan

Pada uhir tanaman 65 tinggi tanaman rata 67.16 ch di petak PHT dan di lokal 61.52 ch. dan populasi hama empusca & ephrapna sangat banyak. namun masih di bawah ambang 4/rumpun tanaman lagi.

Kesimpulan

Karena Perkebangan populasi empusca & ephrapna makin meningkat sedangkan m. alami berkurang. Jadi Perlu pengamatan yang lebih seksus.

RAIAN

Penjel

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

MUSUH ALAMI, HAMA DAN PENYAKIT TANAMAN KAKAO



Bagian Proyek Pengendalian Hama Terpadu Perkebunan Rakyat
Dinas Perkebunan, Propinsi Sulawesi Tenggara

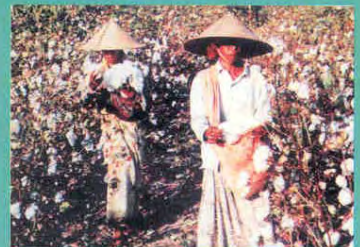
Curriculum developed

MUSUH ALAMI, HAMA DAN PENYAKIT TANAMAN JAMBU METE



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

Musuh alami dan hama pada kapas



Proyek Pengendalian
Hama Terpadu
Perkebunan Rakyat

Buku ini tidak diperjualbelikan. Diberikan
secara cuma-cuma kepada petani.

Curriculum developed

MUSUH ALAMI, HAMA DAN PENYAKIT TANAMAN KOPI



Proyek Pengendalian Hama Terpadu Perkebunan Rakyat
Direktorat Perlindungan Perkebunan, Direktorat Jenderal Bina Produksi Perkebunan
Departemen Pertanian
Jakarta, 2002

MUSUH ALAMI, HAMA DAN PENYAKIT TANAMAN LADA



Proyek Pengendalian Hama Terpadu Perkebunan Rakyat
Direktorat Perlindungan Perkebunan, Direktorat Jenderal Bina Produksi Perkebunan
Departemen Pertanian
Jakarta, 2002

✳ 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

**MUSUH ALAMI,
HAMA DAN PENYAKIT
TANAMAN TEH**



Proyek Pengendalian Hama Terpadu Perkebunan Rakyat
Direktorat Perlindungan Perkebunan, Direktorat Jenderal Bina Produksi Perkebunan
Departemen Pertanian
Jakarta, 2002

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



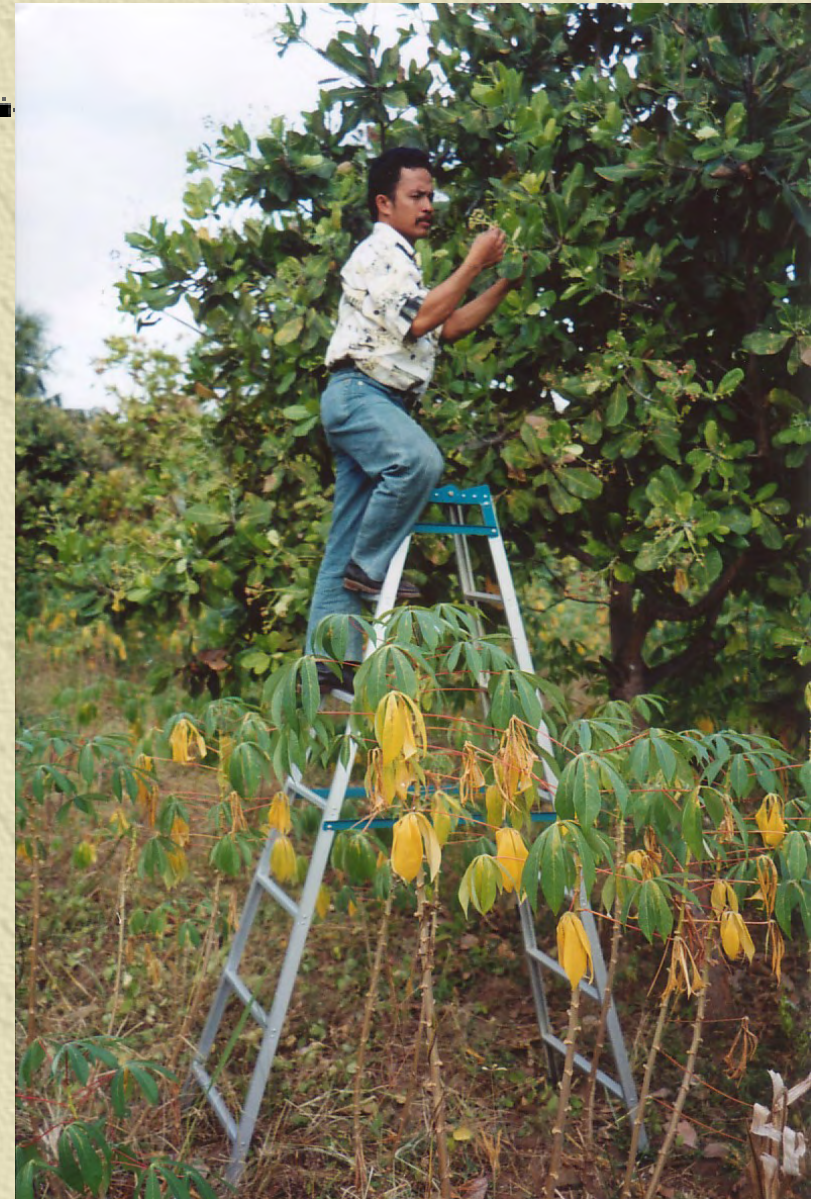
✳ Powerpoint presentation as an introduction:

- ✳ 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



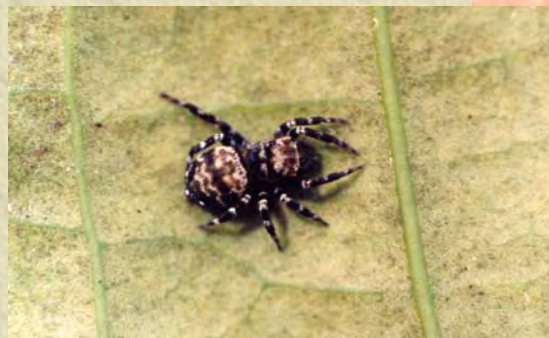
Tiger
beetles

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

