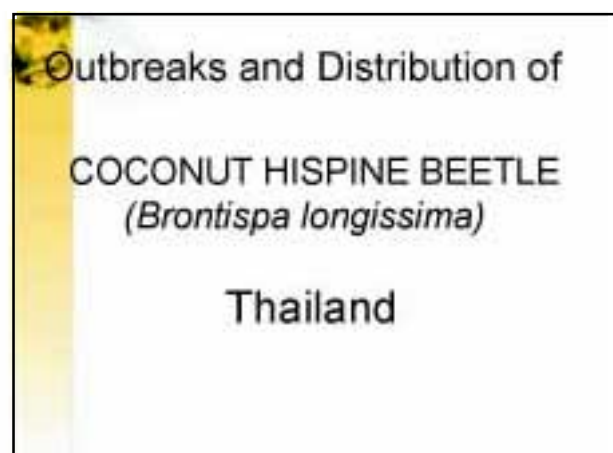
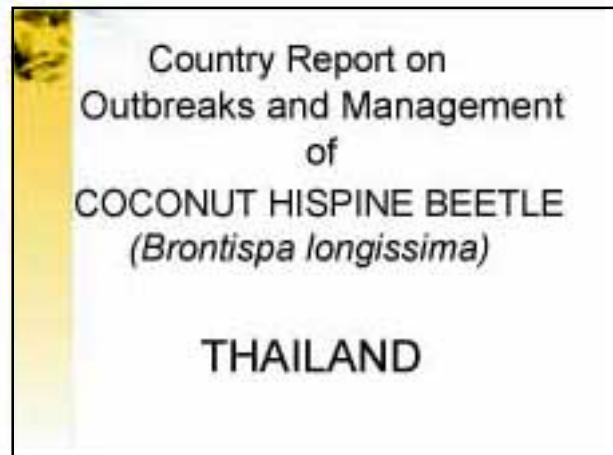
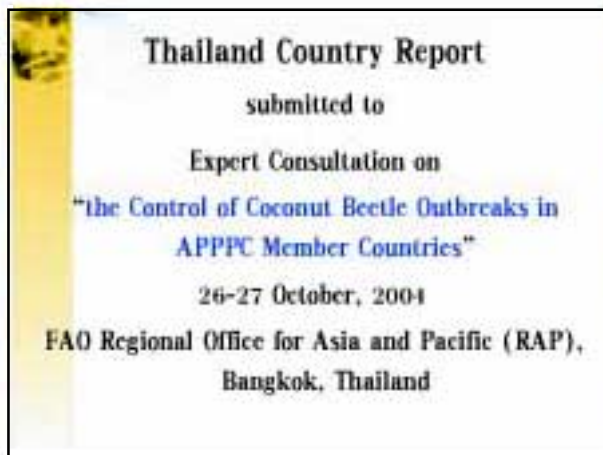


**Outbreaks and management of coconut hispine beetle  
(*Brontispa longissima*) Thailand**

Chalerm Sindhusake\* and Amporn Winothai\*\*



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## View of Samui Port



## Outbreaks

- First record of *Brontispa* damage at Narathiwat province, border area near Malaysia in 2000
- First report on heavy infestation from southern provinces at Surat Thani (Samui Island, Pa-ngan Island), and Prachuap Khiri Kan in February 2004

## Outbreaks

- Survey on distribution and degree of infestation on *Brontispa* was done in coconut plantation areas in Thailand

## Distribution of *Brontispa*

How do you know the *Brontispa* distribution and degree of infestation in Thailand?

- 4 Working Groups surveyed in the infestation areas
- 100 coconut trees along the road were counted every 50 km in the Central Plain, Eastern, Upper South and Lower South
- GPS as the tool for identify *Brontispa* at infested areas and recorded degree of infestation in each sites

## Distribution of *Brontispa*

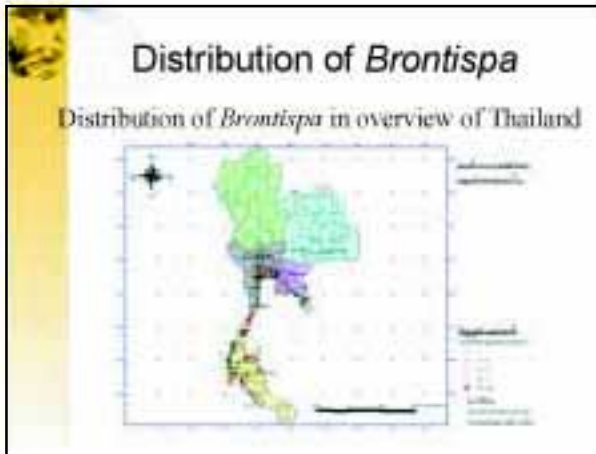
Distribution of *Brontispa* in Southern Thailand



## Distribution of *Brontispa*

Distribution of *Brontispa* in Central Thailand





### Control Strategies Programme in Thailand

1. Follow up procurement, importation and release procedures of international regulations:

- Code of Conduct for the Import and Release of Exotic Biological Control Agents – Part 1: Import Regulations. International Standards for Phytosanitary measures. FAO, Rome. 1996.

### Control Strategies Programme in Thailand

1. Follow up procurement, importation and release procedures of international regulations (Con't):

- Guideline for Biological Control Projects in the Pacific. Information Document No. 57 ACIAR and South Pacific Commission, Noumea, New Caledonia. 1997.

### Control Strategies Programme in Thailand



2. Mass rearing *Brontispa* in laboratory

### Control Strategies Programme in Thailand

3. Mass rearing of *Asecodes hispinarum* parasitoid in semi-quarantine room

- Allowed import permit from DoA
- Introduced of parasitoids as the mummified (dead larvae) from Nong Lam Univ., Vietnam
- Mass rearing of parasitoid with *Brontispa* in semi-quarantine room at Biological Control Res. Group as pure culture w/o any contaminants

Mass rearing *Asecodes hispinarum* in semi-quarantine rearing facility at Biological Control Section, PPRDO

- August 25, 2004: Amount of 100 mummified from Vietnam obtained only 88 parasitoid mummies and given 4,400 parasitoids

Mass *Asecodes hispinarum* in semi-quarantine rearing facility at Biological Control Section, PPRDO

Date	Larvae	Mummies	Parasitoid mummies	Parasitoid
Aug 31	560	399	152	
Sept 1	930	497	196	
Sept 2	600	332	197	
<b>Total</b>			<b>633</b>	<b>31,650</b>

Mass *Asecodes hispinarum* in semi-quarantine rearing facility at Biological Control Section, PPRDO

Date	Larvae	Mummies	Parasitoid mummies	Parasitoid
Sept 19	280			
Sept 20	1,920			
Sept 21	1,640			
Sept 22	1,115			
Sept 23	227			
<b>Total</b>	<b>4,902</b>		<b>2,395</b>	<b>119,750</b>

Control Strategies Programme in Thailand

4. Analysis of host specificity

- Host specificity has been tested on larvae of flour beetle (*Tenebrio molitor*), leaf beetle (*Harmonia convergens*), common cutworm (*Spodoptera litura*) and larvae of lacewing predators *Mallada basalis*, and *Chrysoperis carnea*

Control Strategies Programme in Thailand

4. Analysis of host specificity (Con't)

- Results were confirmed parasitoid does not attack these species
- Proven to be highly specific, survive only on *Brontispa longissima*

Control Strategies Programme in Thailand

5. Survey and identification of native natural enemies in Thailand

Parasitoid

- Larval parasitoid *Tetrastichus* sp. (Hymenoptera: Eulophidae) and unknown parasitoid at Songkhla Field Crop Research Center, Southern province
- Unknown egg parasitoid Encyrtid (Hymenoptera: Encyrtidae) at Prachuap Khiri Kan

Control Strategies Programme in Thailand

5. Survey and identification of native natural enemies in Thailand (Con't)

Predator and pathogen

- Predator earwigs at Prachuap Khiri Kan, Chachoengsao and BKK.
- Fungus *Metarhizium anisopliae* at Prachuap Khiri Kan, Chachoengsao, BKK and Surat Thani

## Training course



- Provide training course for farmers and hotel owners at Koh Samui, Surat Thani

## Training course



- Parasitoid releasing tool was adapted from fruit-fly pheromone trap set up at the coconut plantation

## Control Strategies Programme in Thailand

### Research programme

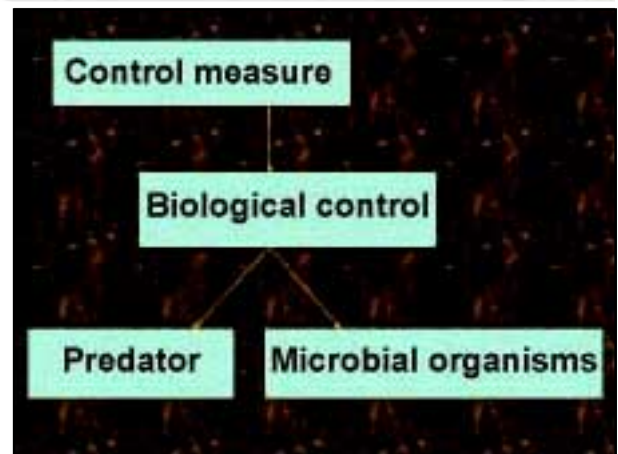
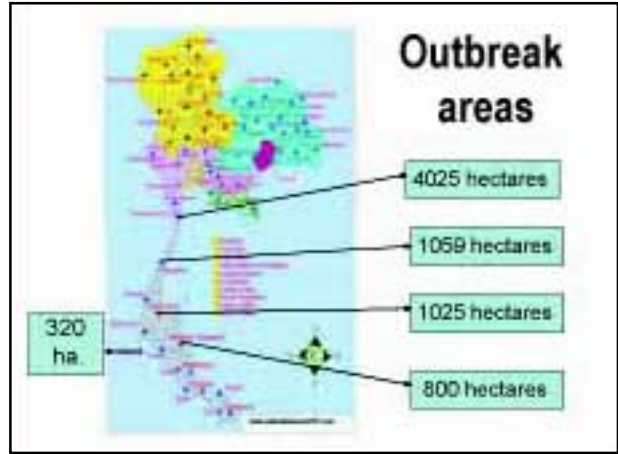
- Implementation and evaluation of *Brontispa* parasitism in the farmers' fields
- *Brontispa* ecology and alternate host plants
- Identify of the native natural enemies
- Make control strategies for sustainable control of *Brontispa* IPM and IPM on other coconut palm pests

## Control Strategies Programme in Thailand

### Implementation programme

- Arranging training courses (TOT) for at least 100 DoA and DoAE plant protection officials at the infestation areas in technology transfer
- Arranging Farmer Field Schools in infestation areas
- Kick-off campaign on awareness of move out of palm seedlings with pests to other non-infested areas

**Coconut beetle control**  
Patcharee Menakanit\*



\* Director of Pest Management Division, Bureau of Agricultural Product Quality Development, Department of Agricultural Extension (DoAE), Bangkok, Thailand; e-mail: patcharee@doae.go.th

### WORK PLAN

Activity	Duration
1. Pest and natural enemy monitoring	Oct 04 - Sept 05
2. Mass rearing of bio agents	Oct 04 - Sept 05
3. Training: Field technicians Farmers	Dec 04 - Feb 05 Jan 05 - Apr 05
4. Field release	Oct 04 - Sept 05
5. Communication campaign	Mar 05 - July 05

### Pest Management Center



- Chiangmai
- Pitsanulok
- Khon Kan
- Nakhon Rachasima
- Chainat
- Chol Buri
- Supanburi
- Prant Buri
- Surat Thani
- Songkla



### *Chelissoches*




### *Beauveria bassiana*

### Mass rearing of *Brontispa longissima*




### *Metarhizium anisopliae*





# Classical biological control of coconut hispine beetle with the parasitoid *Asecodes hispinarum* Boucek (Hymenoptera: Eulophidae) in Viet Nam

Tran Tan Viet\*

TCP/ME/2005-FAD Project

Classical Biological Control  
of Coconut Hispine Beetle with the Parasitoid  
*Asecodes hispinarum* Boucek (Hymenoptera:  
Eulophidae)  
in Viet Nam

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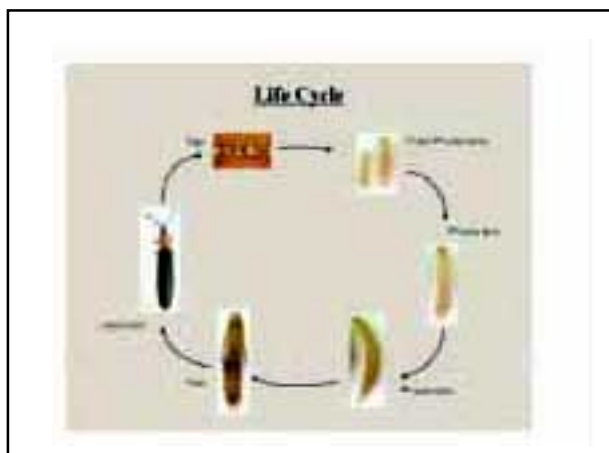
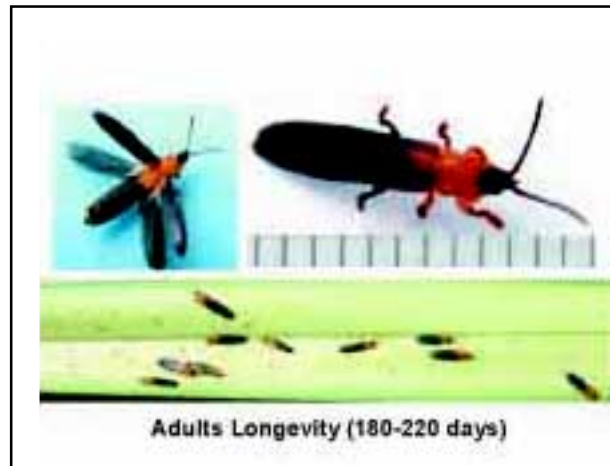
Contents:

- Importance of Coconut Palms and the Pest
- Pest History
- Control Measures
- Classical Biological Control

**1. The importance of Coconut and the Coconut Hispine Beetle (CHB)**

- 210,000 ha of Coconut Palms, value at \$US 87 millions/year (nuts).
- Yield loss: 30%
- Cost due to dead trees: \$US17.8 millions
- Cost due to damage to ornamental palm trees: \$US838,000
- Cost for pesticides applications: \$USD 722,323

(Source: PPD's reports July 2002, February 2003, MARD 2003)



**2. The pest, *Brontispa longissima* Gestro (Coleoptera: Chrysomelidae)**

- Developmental time: 29,9±2 days (at 28°C)
- Adult longevity: 223±15 days
- Total eggs laid: 153±20 to 431±108 (depend on food plants)
- Sex ratio = 1.0.5 (female/male)
- Both larva and adult eat on young coconut leaf
- Host ranges: attacking 17 species of two families Palmae and Cycadaceae

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**HOST RANGE**  
**17 Plant Species of Palmae and**  
**Cycadaceae**



Coconut Palm

Oil Palm

Ornamental  
Palm



**Including NIPA PALM**

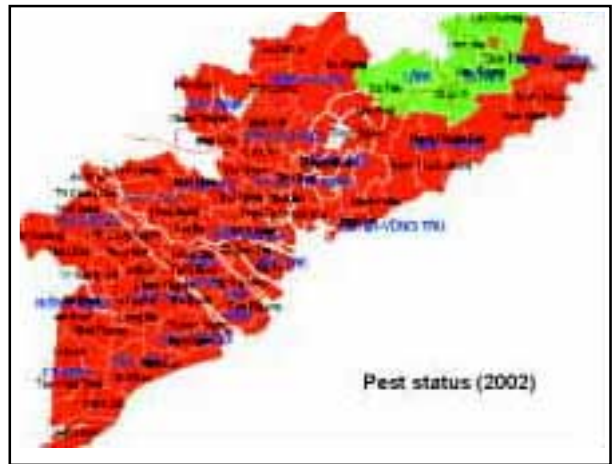
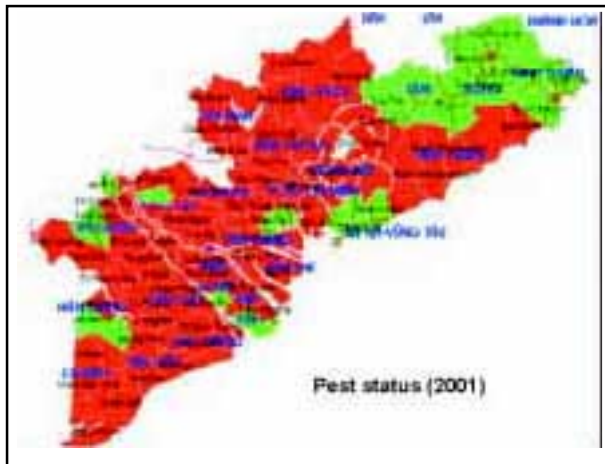
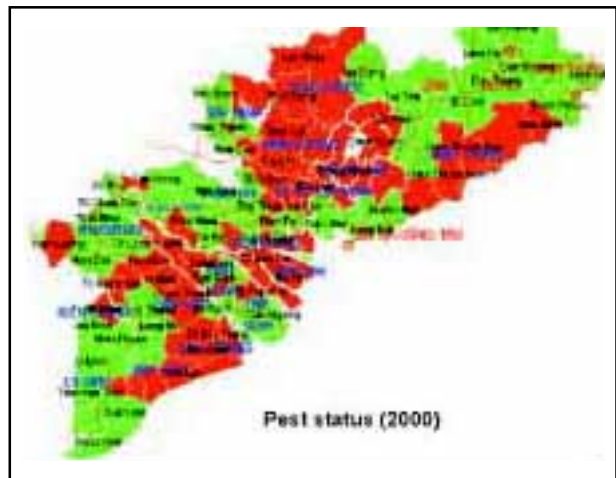
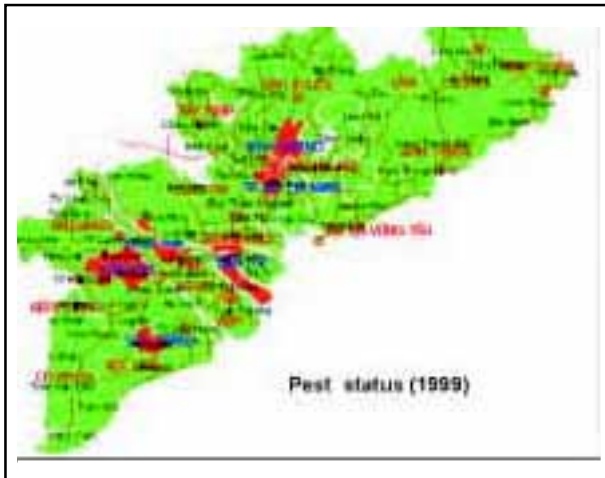


**Cycas**



**4. History of the CHB in Viet Nam**

- April 1999, recorded first time in Dong Thap Province in with a few plants infected
- July 2000, Found 18/30 Provinces of the Southern infected
- August 2001 found 30/30 Provinces (3 millions plants infected)
- August 2002, found any where in Viet Nam (5.6 millions plants infected)
- 2003, about 9 millions plants infected





**Eat on leaflet**

**...and kill**





5 Symptoms of damage

## 5. Control measurements

- Chemical Insecticides Spraying:
  - Fastac, Karate, Sherpa
  - Labour-consuming and costly (0.35US Cents/plant)
  - Endanger to environment and labour
  - Low accessibility to the pest
  - Short effective period
  - Should be treated repeatedly

## 5. Control measurements:

- Chemical insecticides "trunk injection":
  - Controversial effectiveness, mostly say ineffective
  - Costly
  - Labour consuming
- Chemical insecticides in "Tea-bag":
  - Effective
  - Acceptable
  - Easy to apply
  - Should be used repeatedly
  - Harmful to environment

### Chemical Control: Spraying Insecticides



### Spraying insecticides



### Placing "Tea Bag"



### Hanging "Tea Bag" in the Plant



### 5. Control measurements:

Bio-insecticides: *Metarhizium anisopliae*

- Labour consuming
- Weather depending
- Limit effective

### *Metarhizium anisopliae*



### 5. Control measurements:

- Mechanical control: Cutting the spears
- Cultural Control: Fertilising and watering

### Mechanical Control



### 5. Control measurements:

Native natural enemies conservations:

- + Yellow ants
- + Other ants colonied in plants
- + Earwigs
- + Small animals



**The Parasitoid *Asecodes hispinarum* Boucek**

- Larval endo-gregarious parasitoid
- Number of individuals produced per host: 30-160

**5. Control measurements:**

- **Classical biological control:**
  - Importation of *Asecodes hispinarum* from Western Samoa in June 2003
  - Subjected into quarantine procedures in Samoa and Viet Nam
  - First official release made on August 2003
  - The parasitoid has been released at 15 Provinces in the Southern and Central Viet Nam

***A. hispinarum*:**

- Developmental time:  $17 \pm 1$  days (at 28°C)
- Adult longevity: 3.4 days (female); 4.1 days (male)
- Host stage selection (table 1)

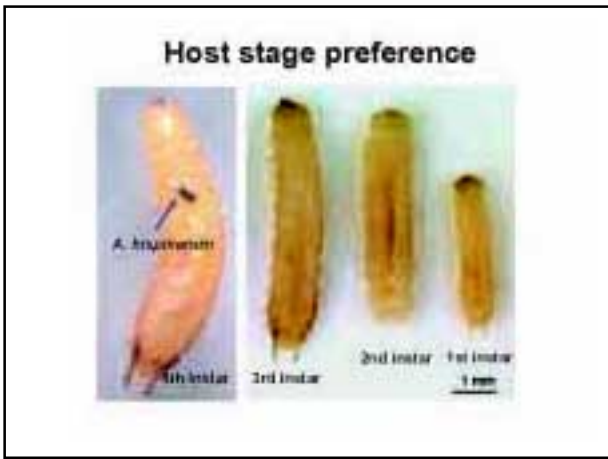
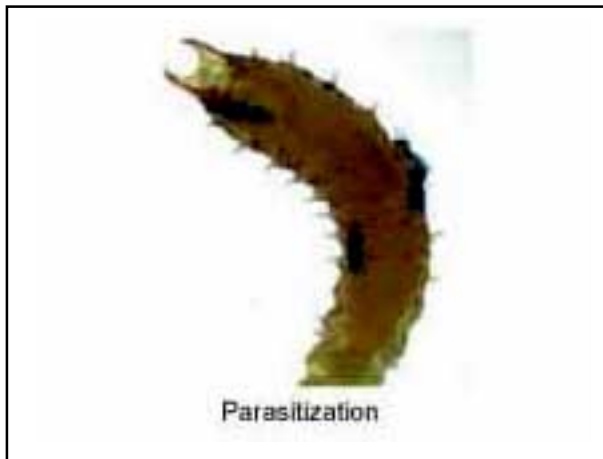


**Host Stage Suitability (non-choice test)**

Stage	No. host tested	% Parasitism	No. Parasitoids emerged per a host	Sex ratio (M/F)
Eggs	30	0.0	-	-
1 <sup>st</sup> instar	30	13.3	4.0	1:1
2 <sup>nd</sup> instar	30	40.0	9.6	1:1
3 <sup>rd</sup> instar	30	93.3	25.6	1:2
4 <sup>th</sup> instar	30	96.7	60.9	1:3
Prepupae	30	20.0	40.8	1:5
Pupae	30	3.3	59.0	1:4

**Host Stage Preference (choice test)**

Stage	No. Host tested	% Parasitism	No. Parasitoids emerged per a host	Sex ratio (M/F)
1 <sup>st</sup> instar	20	0	-	-
2 <sup>nd</sup> instar	20	5	5	1:1.5
3 <sup>rd</sup> instar	20	30	24.8	1:1.8
4 <sup>th</sup> instar	20	35	57.7	1:3.9
Prepupae	20	0		
Pupae	20	0		





Parasitoids emerged from parasitised larva



## 6. Parasitoid release

- Equipments for release:
  - Plastic boxes
  - Paper boxes
- Density of parasitoids: 5 mummies/box at each 200 m, or 500 m apart.



Collecting hosts for assessment

## 6. Parasitoid releasing methods:

- Adult stage:
  - Consuming labour
  - Ineffective (failed in Naruu)
- Developmental stages: It was found that the parasitoid can be released in form of mummies since 7 to 17 days after parasitization.
- Sites of release: close to infected areas

Release as mummified hosts in plastic box



## Release Site: Outdoor

### Release of parasites



Rate of spread in southern Viet Nam:  
5 (- 8) km per 2 months

## Official Ceremony for First Release (August 2003)



## Some Recent Results:

- Established at 15 Provinces where the parasitoids were released.
- Speed of spread: 5-8 km in 2 months from the releasing sites.  
(in BT province found 34 km down wind direction)
- Recovery of palm trees after 2-4 months release: 60-90%
- Pesticides companies failed to sell any insecticides to treat CHB since the project implementation