EXPERIENCE WITH COCOA PODBORER PHEROMONE IN S E ASIA

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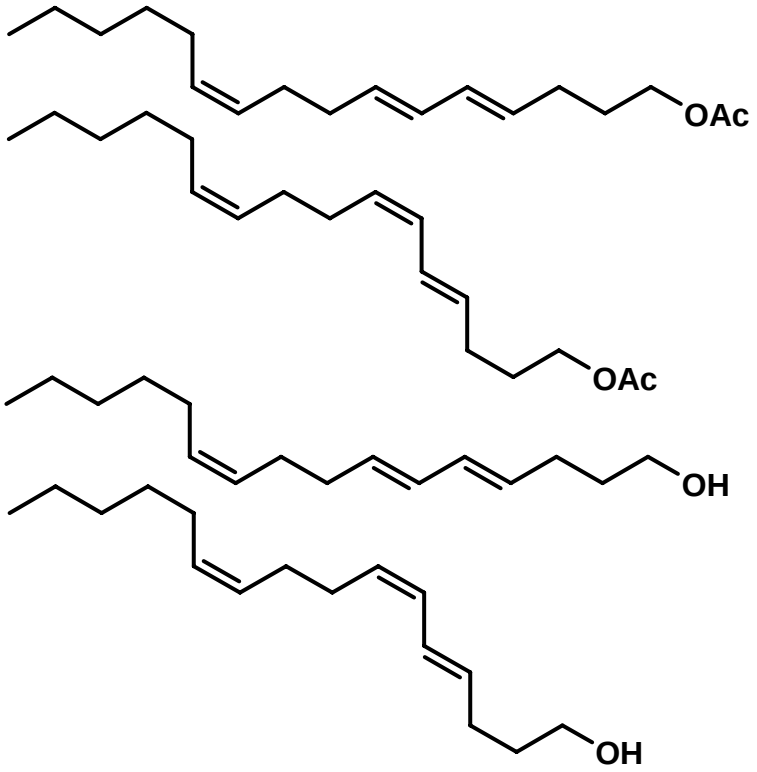
COCOA POD BORER

Cocoa pod borer,
Conopomorpha cramerella
(Lepidoptera: Gracillaridae)

COCOA POD BORER

FEMALE SEX PHEROMONE

- Female sex pheromone identified at NRI
- 4 main components in 50:50:10:10 ratio
- Complex synthesis, semi-commercialised at Imperial College



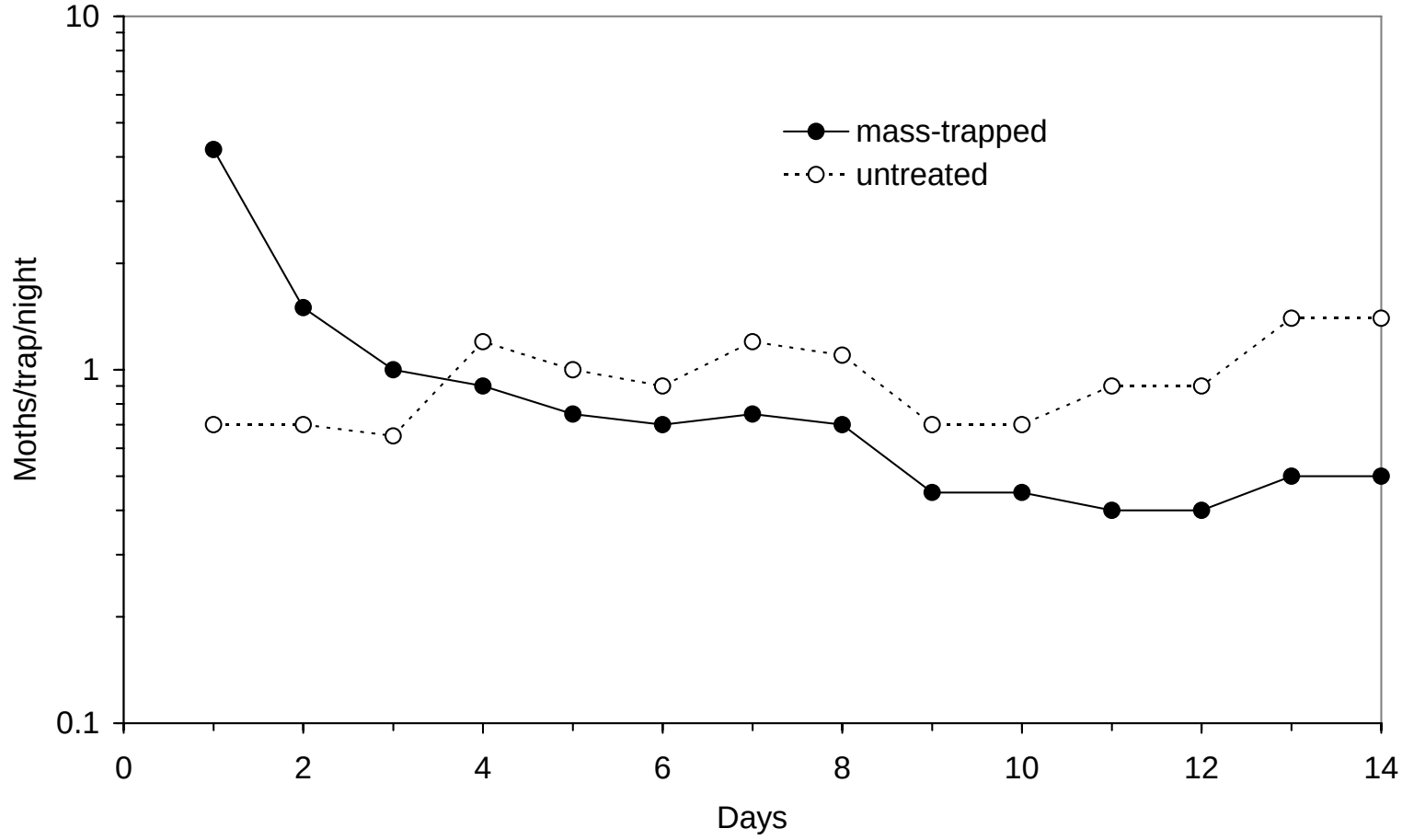
COCOA POD BORER

TRAPS AND LURES

- Traps and lures developed and commercialised
- "Sandwich" trap, later modified to "Lobster pot" trap
- Pheromone dispensed from polyethylene vials loaded with 0.1 mg pheromone + extender; changed every 4 weeks

COCOA POD BORER

"TRAPPING-OUT" EFFECT



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MASS TRAPPING TRIAL

- Mass trapping trial on 204 ha at BAL Estate, with untreated control areas of 74 and 31 ha
- Initially 4 traps/ha, after 65 weeks 8 traps/ha
- Trap catch reduced by 90% in treated area
- Damage reduced to one third
- Estate-wide mass trapping (2,800 ha) started after week 45

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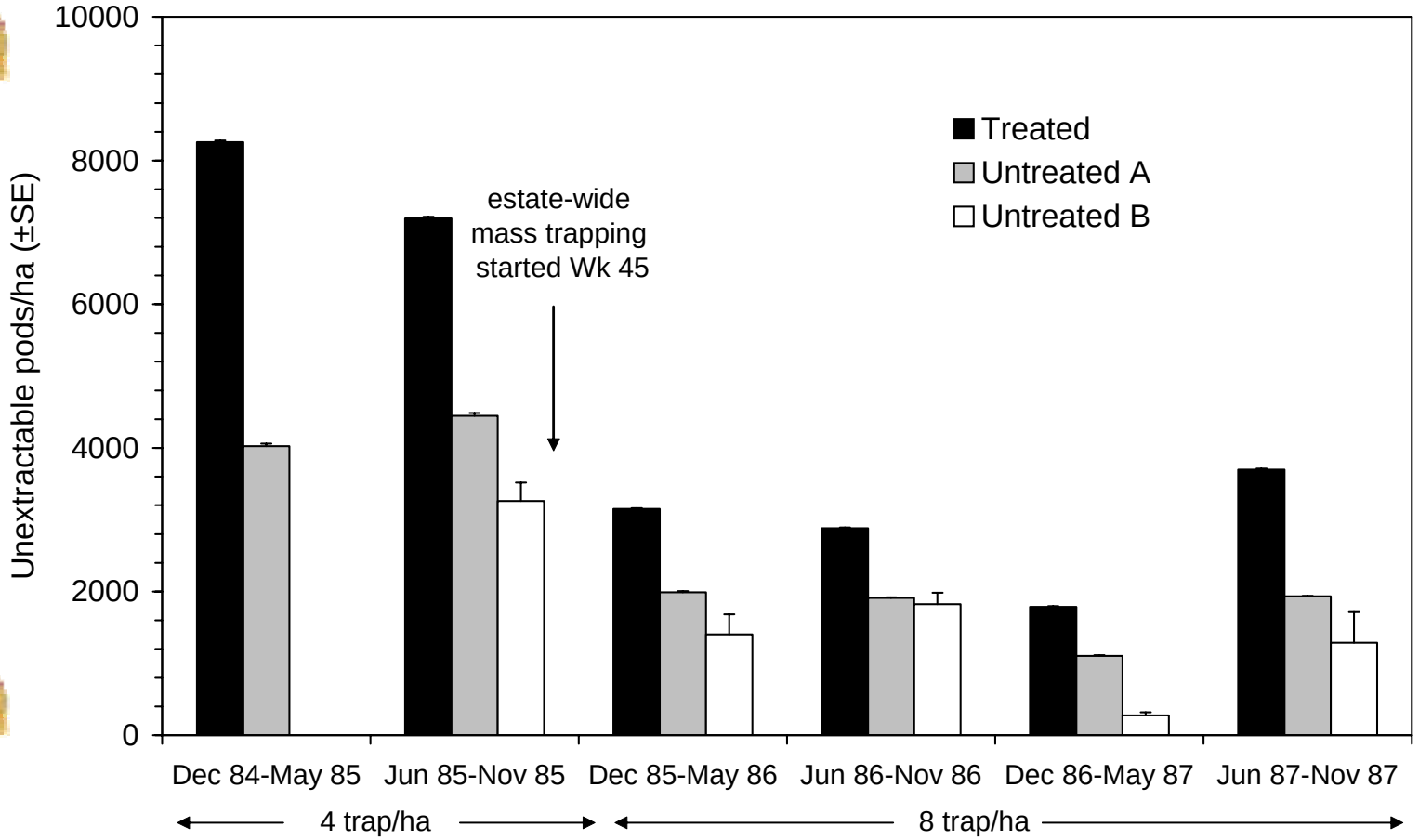
MASS TRAPPING TRIAL



COCOA POD BORER

MASS TRAPPING

- Mass trapping used on 11,000 ha in Sabah, alone or with limited insecticide application and improved cultural practices.
- Cost of pheromone trapping M$ 135/ha/year (£35/ha/year) in 1990
- Yield 1 tonne/ha giving approx £800/ha
- Pheromone trapping cost-effective if only 5% reduction in damage

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THE RACE ISSUE

1. **The Sabah blend did not work in Peninsular Malaysia**

- ***Initial trials carried out on Jasin Lallang Estate with 15 different blends, but intensive control measures may have reduced populations.***
- ***Subsequent trials on Sua Batung Estate where moths could be caught by hand during the day***

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THE RACE ISSUE

2. The Sabah blend became less effective in Sabah

- ***Suggested because "Race 1" had been trapped out, leaving predominantly "Race 2".***
- ***Explained why mass trapping showed good reduction in damage intitially, then plateaued out***
- ***Could be moth populations low due to control measures or other factors***

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THE RACE ISSUE

3. There are a lot of closely related, very similar *Conopomorpha* species

- ***Loke et al. (1984) listed 10 different species.***
- ***Bradley (1986) defined C. cramerella and separated three other closely related species***
- ***"C. cramerella on rambutan in Peninsular Malaysia does not attack cocoa"***
- ***Saahlan et al. (1985) found different polymorphisms in C. cramerella collected from cocoa in Sabah and rambutan in Peninsular Malaysia***

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MATING DISRUPTION

Tay & Sim (1989), Sabah, Malaysia

0.2 ha plots
30 g/ha or 15 g/ha ± insecticide
(9 applications)
Twist-tie formulations

Results difficult to interpret and plots too small

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MATING DISRUPTION

Awang, Wakamura & Tay 91993), Sabah, Malaysia

- Non-replicated 2 ha plots: treated and untreated
- Twist-tie formulation with 60 mg 85 : 12 : 3 EZZ:Ac/EEZ:Ac/EZZ:OH
- 1 dispenser per tree (1000/ha; 60 g/ha)
- Traps baited with rubber septum with 0.04 : 0.06 : 0.083 : 0.015 : 0.10 EZZ:Ac/EEZ:Ac/EZZ:OH/EEZ:OH/16:OH

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MATING DISRUPTION

Awang, Wakamura & Tay 91993), Sabah, Malaysia

- Good trap catch suppression for up to 8 weeks
- Mating of females 99% (2.01 spermatophores) in untreated, 80% (0.98) and 90% (1.28) in centre and periphery of treated.
- No effect on oviposition

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NEW WORK BY AIJUN ZHANG et al. (2008) (MARS/USDA)

- Pheromone produced by Pest Control India
- Compared new pheromone with old NRI pheromone
- Used standard delta traps
- Pheromone attracts moths in Sabah, Peninsular Malaysia and Indonesia
- Reported no differences in mitochondrial DNA of *C. cramerella* populations collected from cocoa in Malaysia, Philippines, PNG, Indonesia

COCOA POD BORER

LOCATION	DATES	BAITED	UNBAITED
MCB, Sabah, Malaysia			
Mile 10	23/8/05-4/1/06	100	5
Madai	13/9/05-5/1/06	249	0
Kg Ranggu	23/8/05-4/1/06	277	0
Kau Sing	23/8/05-4/1/06	564	0
Teck Guan Estate, Sabah, Malaysia			
Field 5	9/2/06-6/2/07	13,289	181
Field 47	9/2/06-6/2/07	9,143	77
MCB, Peninsular Malaysia			
Hilir Perak	9/9/05-25/12/05	204	6
Kg Lekir	9/9/05-25/12/05	21	1
Effem Foods, Sulawesi, Indonesia			
Wonosari	16/1/06-10/9/06	1,497	0
Yaminas, Noling	13/12/06-13/3/07	261	3
Pinrang 1	16/1/06-4/6/06	139	7
Pinrang 2	16/1/06-4/6/06	140	8

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PROPOSED NEW PROJECT??

- Smallholder farmers in Sulawesi : field trials on mass trapping to control CPB
- Estate cocoa in Java: field trials on mass trapping to control CPB and detailed investigation of insect behaviour and associated work on pheromone lure characteristics, trap design and trap deployment
- Estate cocoa in Sabah and Papua New Guinea: preliminary mass trapping trials as a preliminary to smallholder use
- Smallholder cocoa in Philippines: small scale smallholder trials.