

# **INTEGRATED PEST MANAGEMENT OF TERMITE AND BUNCH MOTH IN OIL PALM PLANTED ON PEAT IN MALAYSIA**

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# INTRODUCTION

- Termite & bunch moth – common oil palm pests on peat
- Information on biology, life cycle & behavior-developing IPM for both pests
- **Termite :**
  - Six castes; workers, nymphs, alates, king & queen
  - damage caused by workers caste



- damaging shoot & trunk

- **Bunch moth :**

- Life cycle ; eggs, larvae, pupae & adults
- Damage inflorescences & bunches
- At high infestation – affect fruit set



# Location of termite & bunch moth study in Malaysia



Bunch moth study location

Termite study location



# Termite (Anai-anai)





# INTRODUCTION

- ✓ Termite infestation- as early as 12 months  
( may lead to death, > 3% of standing palm)



Young palm



Mature palm



Workers of pest termite



Queen of non- pest termite

- ✓ Population study recorded 45 species in oil palm in peat



# TERMITE POPULATION STUDY

## Methods:

1. Rubber wood stake
2. Transect belt



Removing  
rubber wood  
stake



Excavation patterns of  
several termite species



Collecting termite  
with transect belt method



# TERMITE SPECIES DETECTED IN OIL PALM PLANTATION IN MALAYSIA

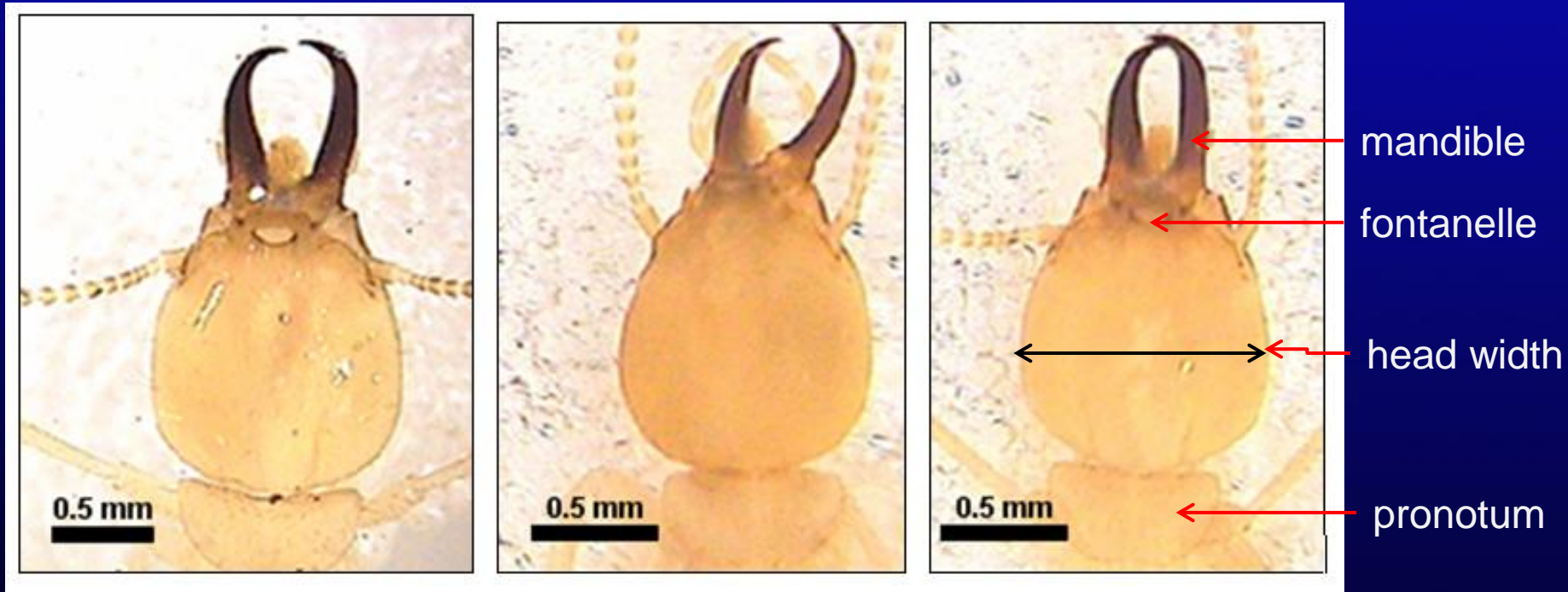
Method of sampling	*	Families	Subfamilies	Genus	Species
Rubber wood stake ( Sarawak peat soil)	1	3	5	4	7
Transect-belt (Sarawak peat soil)	3	2	4	15	22
Transect-belt ( Sarawak mineral soil)	2	2	3	12	15
Rubber wood stake + Transect-belt (Malaysia)	8	3	6	20	45

\* : Locations of termite population study





# Head and mandible shape of *Coptotermitinae* soldier detected with rubstake.



*Coptotermes curvignathus*

*Coptotermes sepangensis*

*Coptotermes kalshoveni*

Size : *C. curvignathus* – largest & vigorous; *C. kalshoveni* – smallest



# Soldier of common non-pest termite



*Macrotermes gilvus*



*Scherdorhinotermes*



*Nasutitermes*

Macrotermes – biggest in size; litter feeder & fungus grower ; mound termite  
Schedorhinotermes - damp wood termite; major & minor soldier; locomotory  
Nasutitermes – long nasus on soldier head; dead wood feeder





# Symptom & damage







## Infestation & damage on trunk





# Cross-section of oil palm trunk



Termite infestation starts from shoot and not from base of palm



Absence of termite tunnel or damage on oil palm base while serious infestation on trunk, frond base and shoots





# **Base on visual observation: 3 stages of termite infestation .**

## **1. Initial stage**

**Presence of fresh mud-work, spear and fronds are still green.**

## **2. Intermediate stage**

**Discolouration of spear & upper two young fronds turn to yellowish brown.**

## **3. Advanced stage**

**Spear & upper fronds start to dry up, turning brown, finally spear become rotten and collapse.**



# SERVERITY OF PEST TERMITE INFESTATION



Initial stage



Intermediate stage



Advanced stage



# IPM OF TERMITE

## i/ Early warning system- census

- visual observation on fresh mud-work
- baiting with rubber wood stake @ corrugated cardboard in termite detector station

## ii/ Mark infested & six adjacent palms

- to avoid new infestation at nearest palms

## iii/ Treat with chemicals

- scrape the mud-work to improve penetration
- avoid dry season





# TERMITE DETECTION WITH RUBBER WOOD STAKE



**installing**



**removing**



**collecting & identification**



# TERMITE BAITING USING CORRUGATED CARDBOARD IN TERMITE DETECTOR STATION



Pest termite



Non-pest termite





# Type of insecticides, rates, frequency and methods of application of termite control

Insecticides	Rates	Frequency	Methods of application
<b>Fipronil</b>	<b>5ml/ 5 liters water</b>	<b>Every 5-6 months</b>	<b>Spraying&amp; drenching Baiting</b>
<b>Chlorpyrifos</b>	<b>38 ml/5 litres water</b>	<b>Every 2-3 months</b>	<b>Spraying&amp; drenching</b>



scraping the mud-work



spraying mature palm with fipronil



# Termite control management with water-table

Increasing water- table can force termites to surface



BMP peat water-level 50-70cm

Adjustable weirs made from sand bags  
to increase water-table to 15-30 cm



# Other control methods



**Destroying termite food sources**



*Metharizium anisopliae* killed 100% of pest termite at 8 DAT in laboratory





# BUNCH MOTH (ulat tandan)

*Tirathaba rufivena* (*Tirathaba mundella*)



# INTRODUCTION

- Known as “inflorescences moth” @ “fruit moth”
- This pest also attacks *Nipah fruticans*, *Plectocomia* spp, *Pritchardia pacifica* and *Roystonea regia*



*Nipah*



*Rattan*



*Fiji fan palm*



*Royal palm*

- The incidence was reported in peat area in Mukah, Sibuh & Miri, Sarawak





# Biology of bunch moth : Life cycle 1 month

Eggs: 4-5 days  
( batches of 4-20)



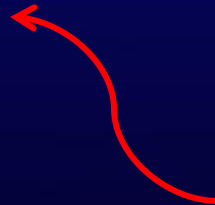
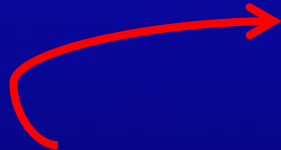
Larva ( 5-6 instars): 14-21 days



Pupa: 10-12 days



Adult: 8 days



# Symptom & damage



- ✓ Larvae feeds on both male & female inflorescences
- ✓ Pitting & scoring fruits
- ✓ Faeces are moist & reddish brown when fresh
- ✓ Damage fruit falls prematurely or without kernel







# Population study of bunch moth







# Male inflorescence







## Female inflorescence





# Chopping of infested bunches & female inflorescences to determine actual number of larvae & pupae



Chopping & counting



At anthesis



Post anthesis



Bunch



# IPM OF BUNCH MOTH

## i/ Early detection & regular census

- visual observation on fresh damage & frass
- chopping the infested inflorescences or bunches to determine the bunch moth stages

## ii/ Treat with chemicals

- *Bacillus thuringiensis* – every 2 weeks
- Cypermethrin – avoid spray drift on male inflorescences

## iii/ Cultural practice

- removing female inflorescences – disbudding , ablation, castration, deflowering
- sanitation practice; removing rotten bunches
- consistent on doing the practice



# DISTRIBUTION OF LIVE LARVAE FROM INFESTED FEMALE INFLORESCENCES & BUNCHES FROM YOUNG PALM ( 18 months)

Inflorescences stage	n	Mean $\pm$ SE	Range
Pre anthesis (female)	17	5.20 $\pm$ 1.35	0-23
At anthesis (female)	16	7.56 $\pm$ 1.97	0-27
Post anthesis (female)	14	8.0 $\pm$ 1.91	1-21
Bunch	70	4.79 $\pm$ 0.55	0-18





## DISTRIBUTION OF LIVE LARVAE *T. rufivena* FROM YOUNG PALM (ABLATION PROGRAM)

<b>Infestation stage</b>	<b>n</b>	<b>Mean <math>\pm</math> SE</b>	<b>Range</b>
<b>Female inflorescence</b>	<b>13</b>	<b>19.4 <math>\pm</math> 4.4</b>	<b>0-39</b>
<b>Male inflorescence</b>	<b>12</b>	<b>35.3 <math>\pm</math> 15.7</b>	<b>1-207</b>
<b>Bunch</b>	<b>10</b>	<b>9.9 <math>\pm</math> 3.5</b>	<b>1-30</b>



# Spraying infested inflorescences and bunches



- ✓ *B. thuringiensis* spray at 500g /ha
- ✓ Treats every 2 weeks
- ✓ Add wetting agent to improve penetration



Dead weevils  
15 minute after  
contact with  
cypermethrin

Avoid direct spray of cypermethrin onto anthesising male inflorescence



# EFFECT OF DIFFERENT INSECTICIDES AND BIOLOGICAL AGENTS IN CONTROLLING BUNCH MOTH POPULATION

No.	Common Name	Trade Name	Application Rate
1.	Control	-	Without insectides
2.	Cypermethrin	Cypermethrin	300ml/16L water
3.	Chlorantraniliprole	Prevaton	8ml/16L water
4.	<i>Bacillus thuringiensis</i>	MPOB Bt	640ml/ 16L water
5.	<i>Metarhizium anisopliae</i>	-	1 x 10 <sup>7</sup> conidia/ml





# CONCLUSIONS

- ✓ **Good agriculture practice & sanitation can reduce pest infestation**
- ✓ **Fipronil are effective in controlling termite**
- ✓ **Biological control agent should be consider as the other alternative in controlling both pests**
- ✓ **The awareness of cypermethrin on beneficial insects should be considered to avoid residual and adverse effect.**



# THANK YOU

See you in  
Persidangan Pekebun Kecil Kebangsaan  
Sibu 11-12 August 2014

