

INSECT PESTS OF OIL PALM PLANTED ON PEAT IN SARAWAK

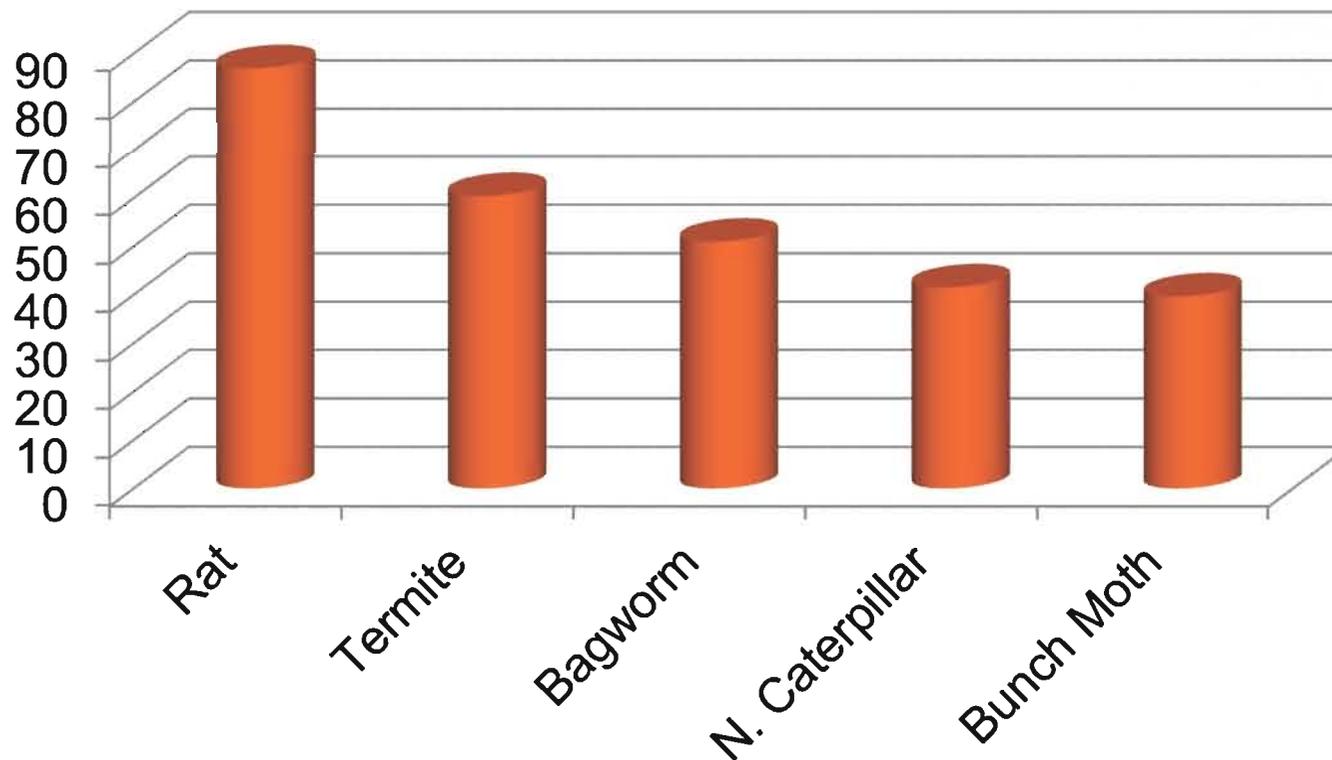
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**Seminar MPOB-SOPPOA
10 March 2016, RH Hotel Sibu Sarawak**



INCIDENCE OF INSECT PESTS AND RATS ON OIL PALM PLANTED ON PEAT IN SARAWAK



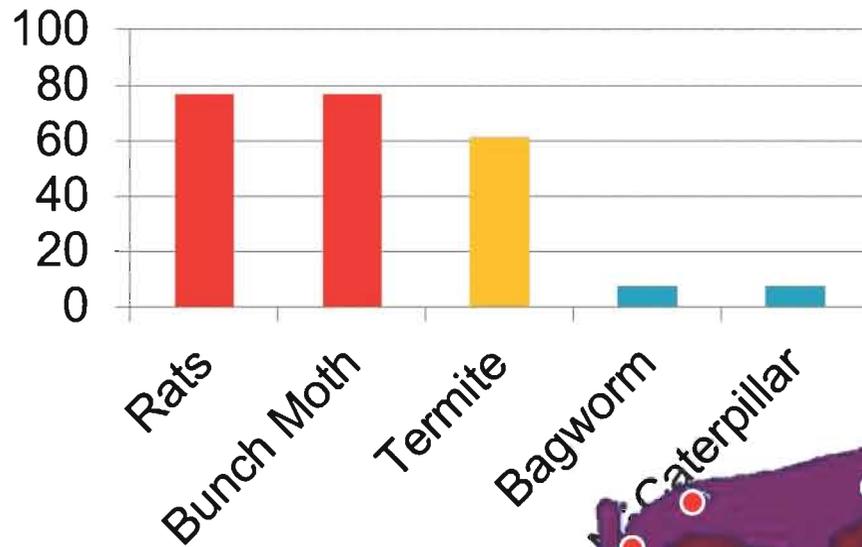
Samples from 53 estates

Kushairi *et al.*, (2013)

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INFESTATION OF INSECT PESTS AND RATS ON OIL PALM PLANTED ON PEAT IN SARAWAK



Survey (2016)

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BUNCH MOTH

Tirathaba rufivena

- Eggs is oval in yellow, incubation period 4-5d.
- Larvae live in fruit bunches, light to dark brown, developmental period 16-17d.
- Adults - forewings green (female), silver (male).
- The moth is in triangular shape during resting.
- Pupae - dark brown, developmental period 29-35d
- Female lays eggs in rotting / undeveloped or aborted bunches.
- Reduce yield & quality of fresh fruit bunches (FFB)

DEVELOPMENTAL STAGES OF BUNCH MOTH



Fruits due to serious attack by bunch
moth



Larva (L1-L5)



Pupa



Male

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DAMAGE BY BUNCH MOTH



Malaysia



MANAGEMENT OF BUNCH MOTH

- ❑ Census and monitoring
 - Should be conducted monthly on 10% of the young palm or harvested FFB.
- ❑ Cultural and mechanical methods
 - Removing rotted / aborted bunches (male & female)
 - Removing the fronds supporting near ripe bunches to increase the efficiency of spraying insecticides on the bunches.
- ❑ Chemical control
 - Spraying of *Bacillus thuringiensis* , chlorantraniliprole and Cypermethrin
 - A wetting agent should be included in the mixture to improve penetration.

EVALUATION OF PRODUCTS TO CONTROL BUNCH MOTH

Study 1 - December 2014.

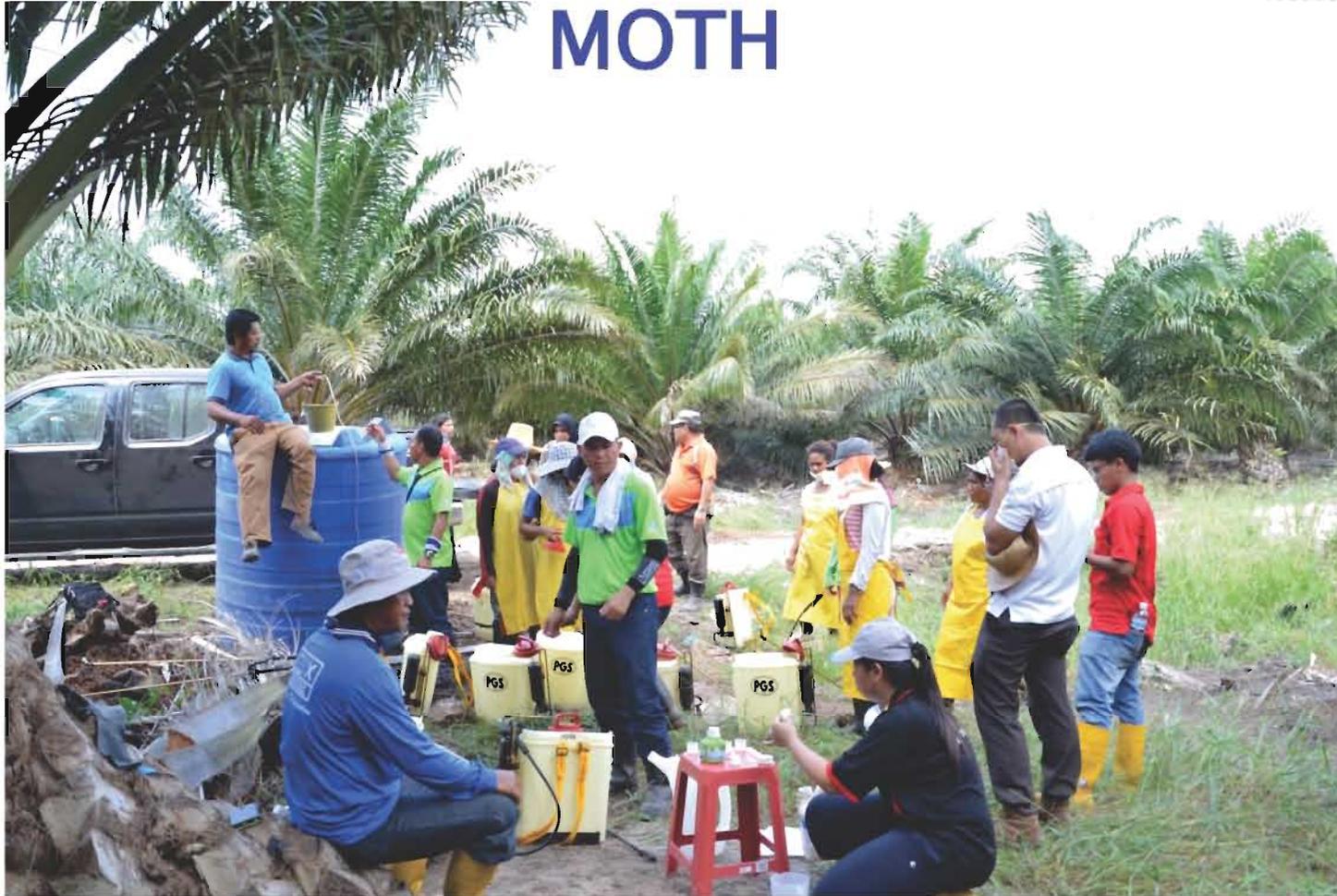
Palm age – 5 years old in Kuala Igan, Igan Sarawak.

Treatments by spraying 1L/palm applied at 4 rounds at 15 days interval.

Treatments: T1-Cypermethrin, T2-Chlorantraniliprole, T3-Bt (1), T4-Bt (2), T5-Control

No	Active ingredient (Trade name)	Application rate / 16L sprayer
T1	Cypermethrin (Contest 50)	30ml
T2	Chlorantraniliprole (Prevathon)	8ml
T3	<i>B. thuringiensis</i> (Dipel ES)	25ml
T4	<i>B. thuringiensis</i> (Ecobac-1)	640ml

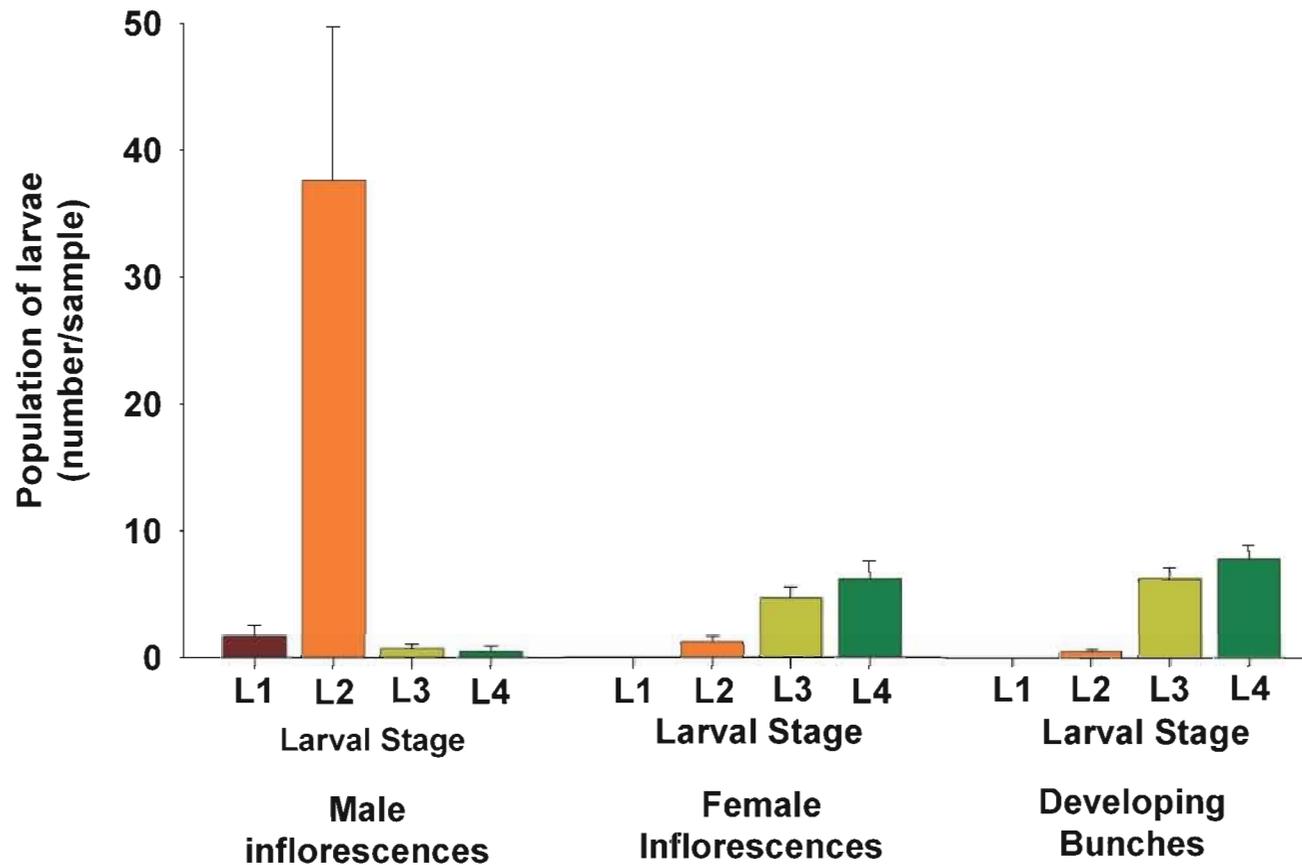
FIELD TRIAL TO CONTROL BUNCH MOTH



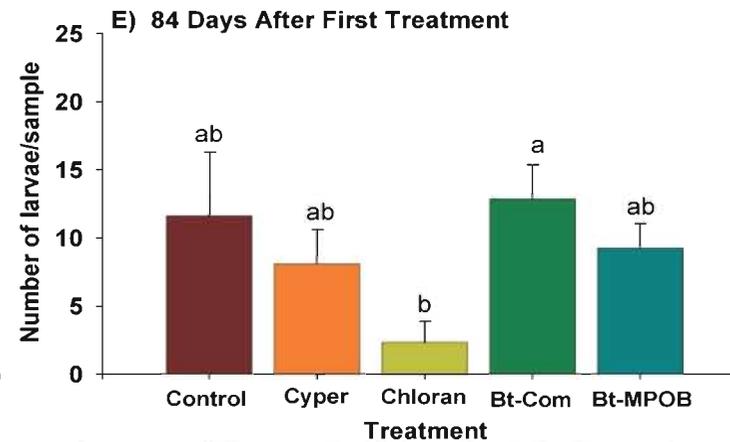
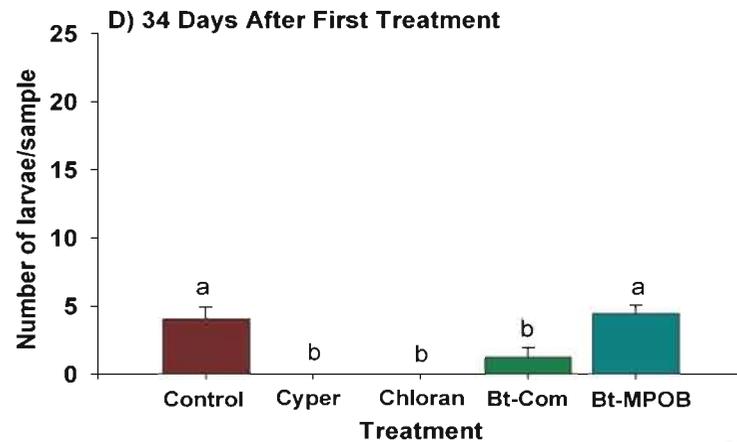
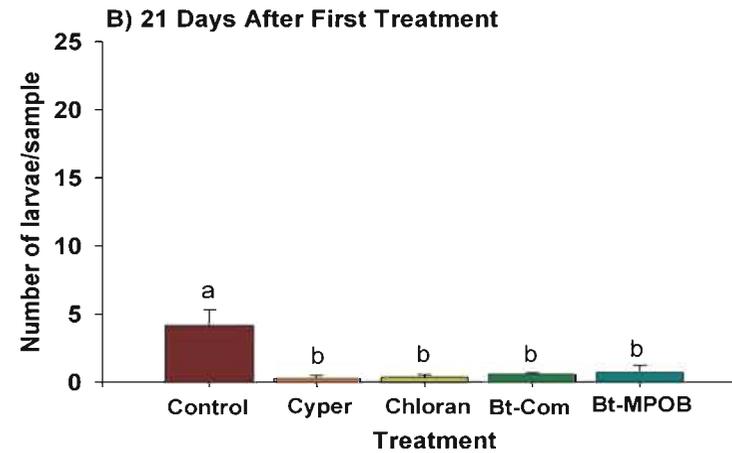
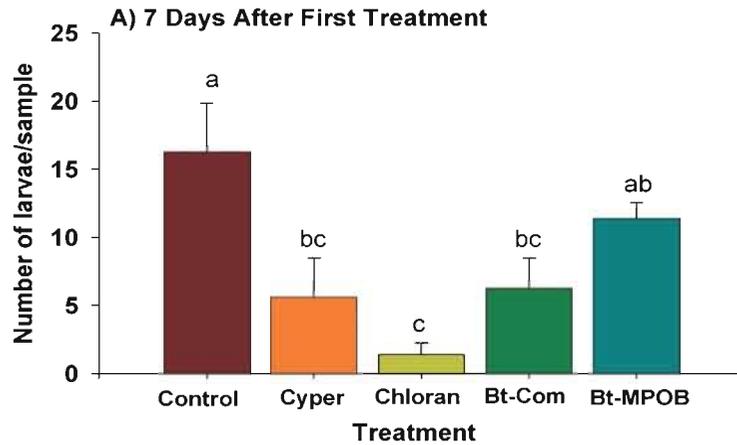
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DISTRIBUTION OF BUNCH MOTH ON MALE AND FEMALE FLOWERS



EFFECTIVENESS OF TREATMENTS TO CONTROL BUNCH MOTH



EVALUATION OF PRODUCTS TO CONTROL BUNCH MOTH

Study 2 - April 2015.

Palm age - 4 year old in Tinbarap 9, Bakong Miri Sarawak.
Treatments by spraying 1L/palm applied at 4 rounds at 15 days interval.

Treatments: T1-Control, T2-Cypermethrin,
T3-Chlorantraniliprole, T4-Bt, T5-Metarhizium,

No.	Active Ingredient	Trade Name	Application Rate / 16 L water
T1	Control		untreated
T2	Cypermethrin	Cypermethrin	15ml
T3	Chlorantraniliprole	Prevaton	8ml
T4	<i>B. thuringiensis</i>	Dipel ES	24ml
T5	<i>M. anisopliae</i>	Ory-X WP	150g

APPLICATION OF TREATMENTS BY SPRAYING METHOD



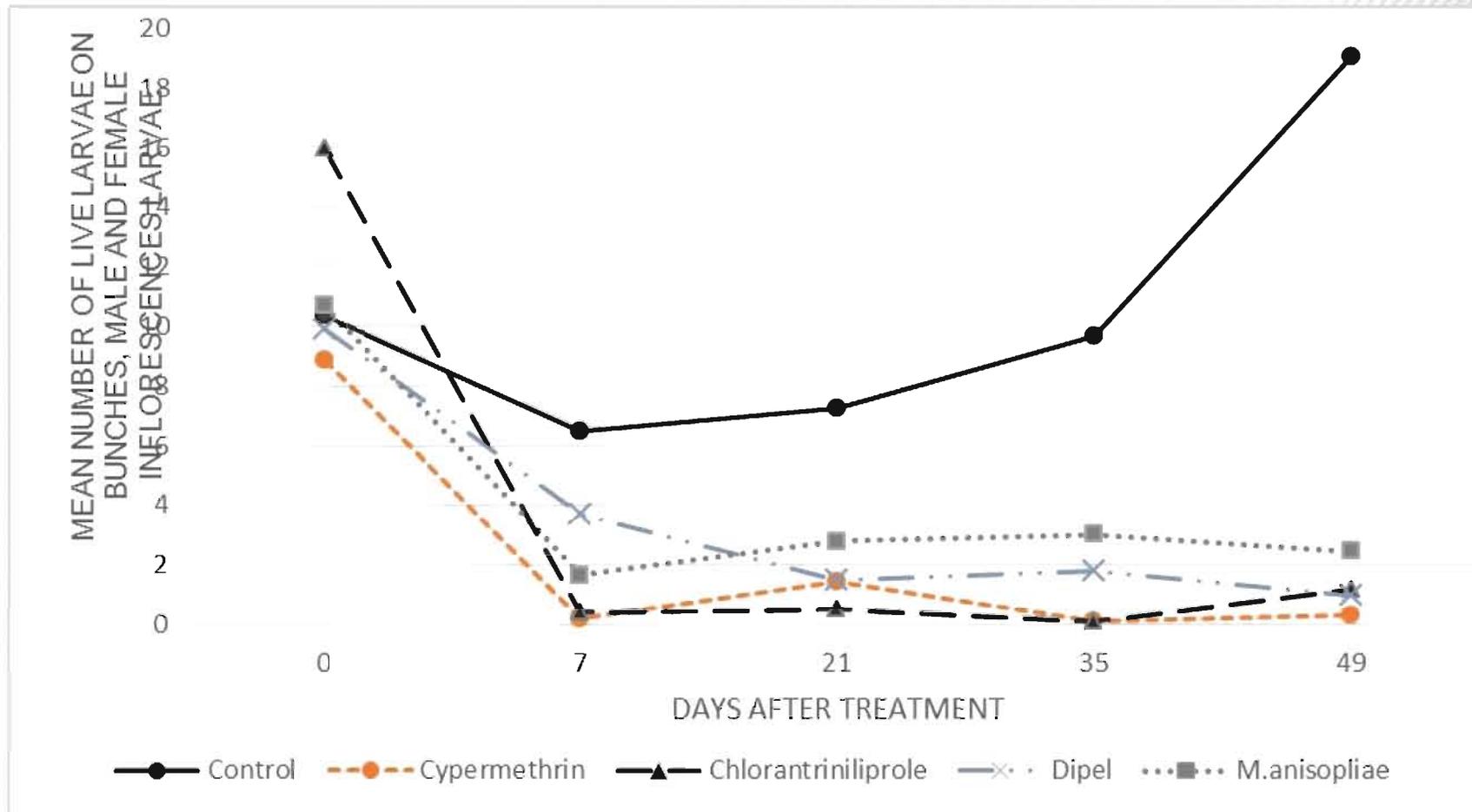
M P O B

DATA RECORDING

- Male inflorescences
- Female inflorescences
- Developing bunches



EFFECTIVENESS OF TREATMENTS TO CONTROL BUNCH MOTH



FURTHER RESEARCH ON MANAGEMENT OF BUNCH MOTH

- Ecological study – natural enemies (predators), alternative host plants
- Mass trapping of adults (pheromone, light trap).
- Spraying of biological or chemical with longer interval (>30 days).

TERMITES

Coptotermes curvignathus, Macrotermes gilvus

- ❑ Sosial insect with several castes – workers, soldiers, reproductives, nymphs and larvae.
- ❑ Worker responsible for nests, foraging, feeding, grooming and tending eggs.
- ❑ Soldiers having strong chitinised head and moutparts to protect the colony.
- ❑ Nymphs develop into winged reproductive for new colonies
- ❑ Many species - species that attack oil palm was *Coptotermes curvignathus*.
- ❑ *Specific character of soldier C. curvinathus*
Secrete sticky white fluid when disturbed

WORKER & SOLDIER OF TERMITES

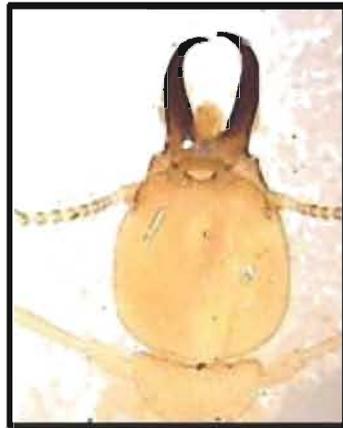


Macrotermes gilvus

Coptotermes culvignathus

Workers and soldiers live span approximately one to two years

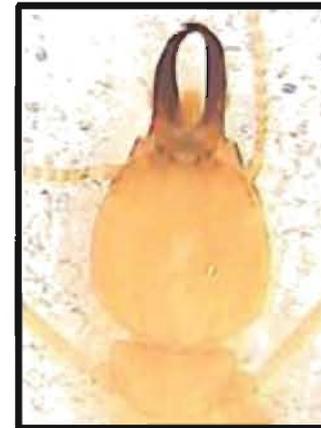
IDENTIFICATION OF TERMITES



Coptotermes curvignathus



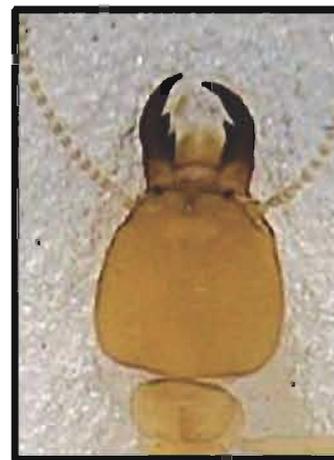
Coptotermes sepangensis



Coptotermes kalshoveni



Macrotermes gilvus



Schedorhinotermes sarawakiensis

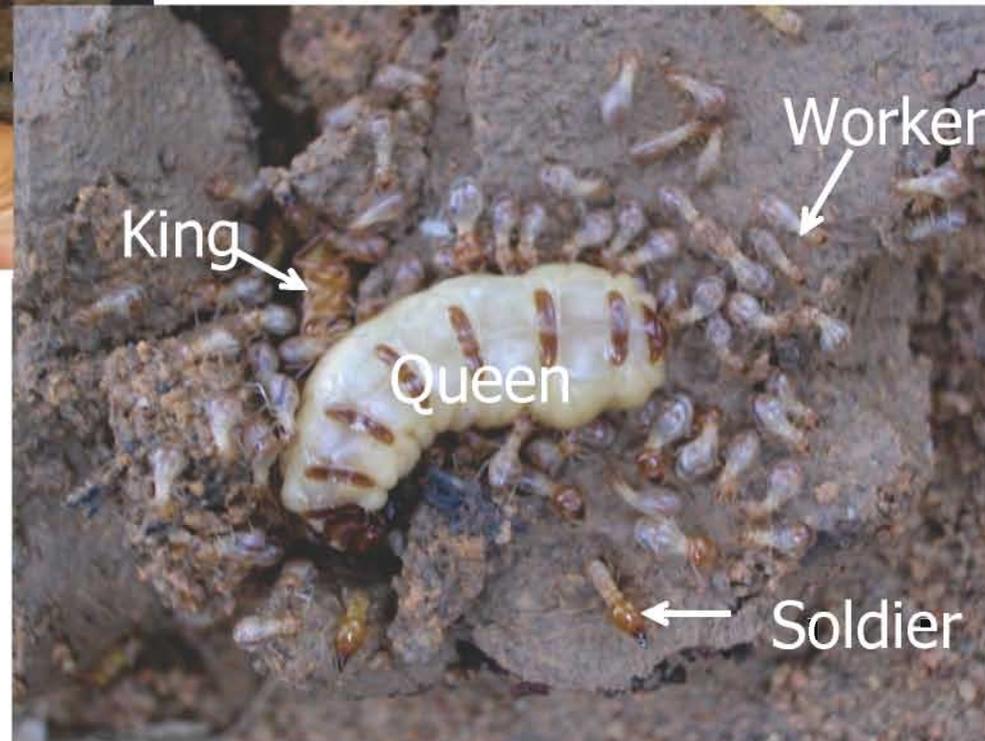


Nasutitermes sp

QUEEN & KING OF TERMITES



Queen life span for over a decade under optimal climate conditions.



IDENTIFICATION OF SPECIES



The soldier of *Coptotermes curvignathus* secretes whitish fluid as a defensive behaviour

ATTACK OF TERMITES ON OIL PALM



Moist mud work on trunks and spears indicate active termite colonies

ECONOMIC IMPORTANCE

- Level of infestation vary with palm age and location.
- In 3 years old planting in Sarawak, infestation may up to 8-9%, causing 2-3% dead palms.
- In other location, infestation below than 0.1%.

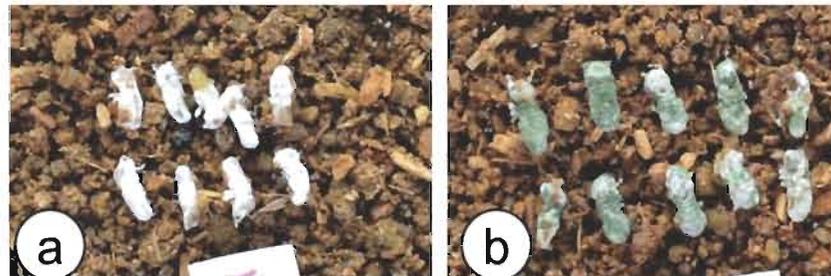
MANAGEMENT OF TERMITES

- ❑ **Cultural Practices**
 - Destroy or removal of breeding materials
- ❑ **Biological Control**
 - Fungal pathogens *Metarhizium sp*, *Beauveria sp*
- ❑ **Water management & chemical controls**
 - Maintain high water table
 - Initial stage – Spraying **chlorpyrifos (2g a.i./1L)** at spear or trunks, soil injection / drenching at palm bole may act as a barrier.
 - Long term - Baiting with **fipronil / insect growth regulators (Chlorfluazuron & hexaflumuron)** by placing perforated mineral water bottles (1500ml) with rice husks / rubber sawdust at the base of infected palms.

BIOLOGICAL CONTROL FOR TERMITES

- Fungal pathogens *Metarhizium sp.*, *Beauveria sp.* & *Paecilomyces sp.*

Fungus	Infectivity (%)
<i>Beauveria bassiana</i>	90%
<i>Metarhizium anisopliae</i>	90%
<i>Paecilomyces farinosus</i>	30%



Burial of dead infected termites by fungi

EVALUATION OF PRODUCTS TO CONTROL TERMITES

PRELIMINARY TRIAL - SEP 2014

Matured palm : 10 year-old Naman Estate, Sibuan Sarawak)

Supply seedling : 6 month after planted

Treatments : T1- *B. bassiana* (10^7 spores/ml),
T2- *M. anisopliae* (10^7 spores/ml),
T3- Fipronil (1ml/10L)

Application : Spraying of palm trunk (8L/trunk)

Soil injection around palm base (10 points at 1L/point)

Treatment	Mature palm (N)	Supply seedling (N)
<i>M. anisopliae</i>	17	14
<i>B. bassiana</i>	10	10
<i>Fipronil</i>	8	4

DAMAGES BY TERMITES



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DAMAGES BY TERMITES



ON SITE HARVESTING OF FUNGAL SPORES OF *Beauveria bassiana*



APPLICATION OF TREATMENTS BY SPRAYING METHOD



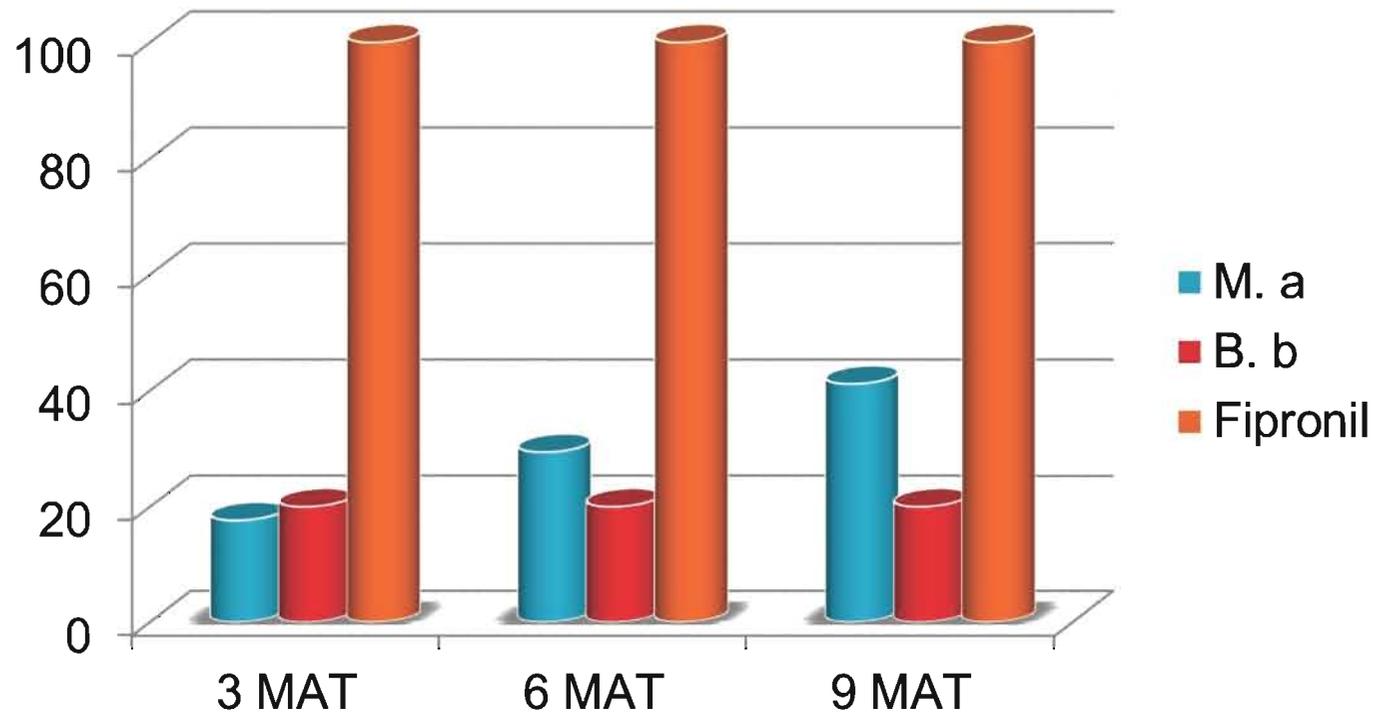
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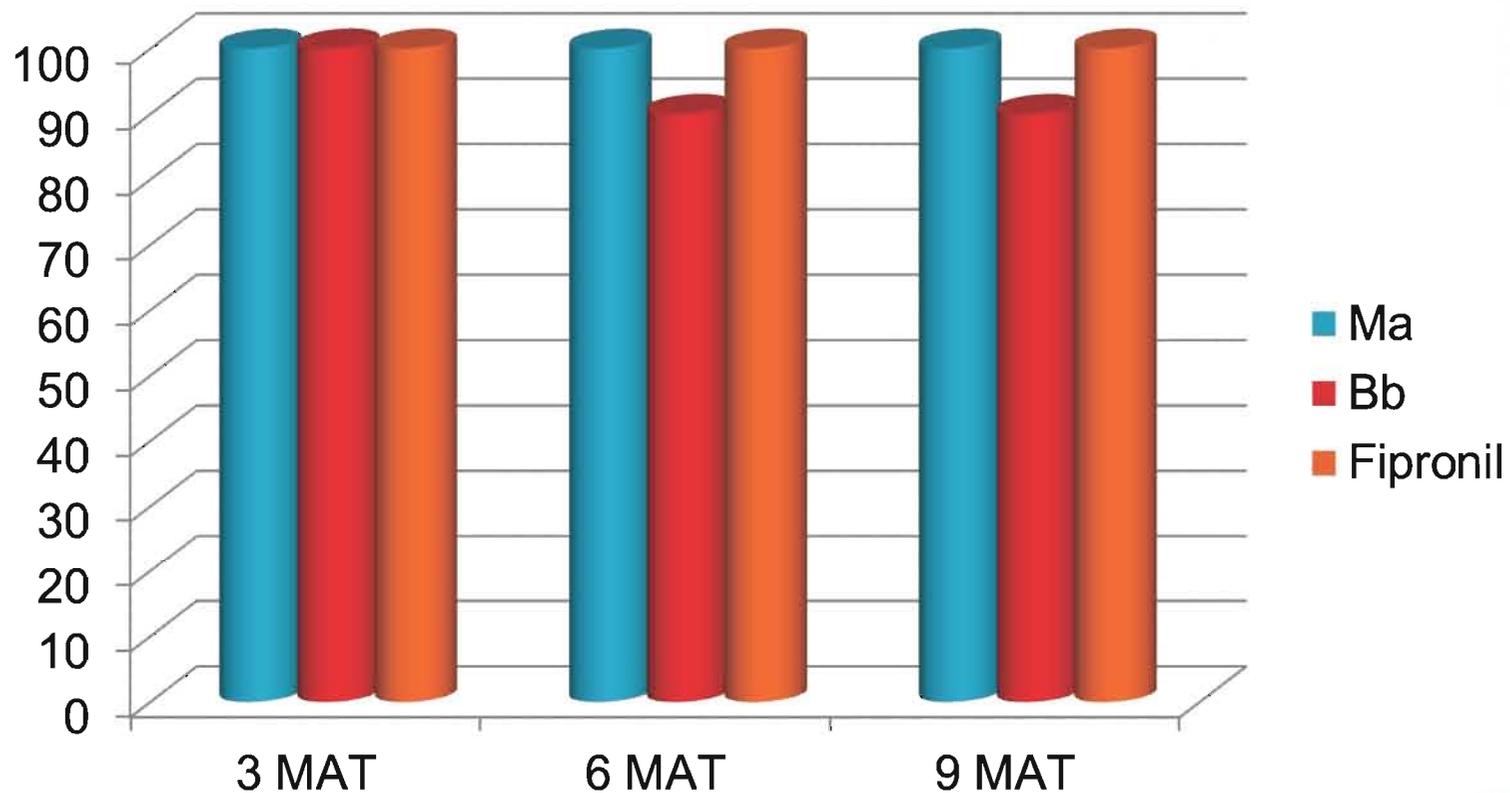
APPLICATION OF TREATMENTS BY SOIL INJECTION



EFFECTIVENESS OF TREATMENTS TO CONTROL TERMITE INFESTING MATURE PALM



EFFECTIVENESS OF TREATMENTS TO PREVENT TERMITE INFESTING ON SUPPLY SEEDLING



EVALUATION OF PRODUCTS TO CONTROL TERMITES

FIELD TRIAL - June 2015 (on going)

Matured palm : 10 year-old Naman Estate, Sibuan Estate, Sarawak

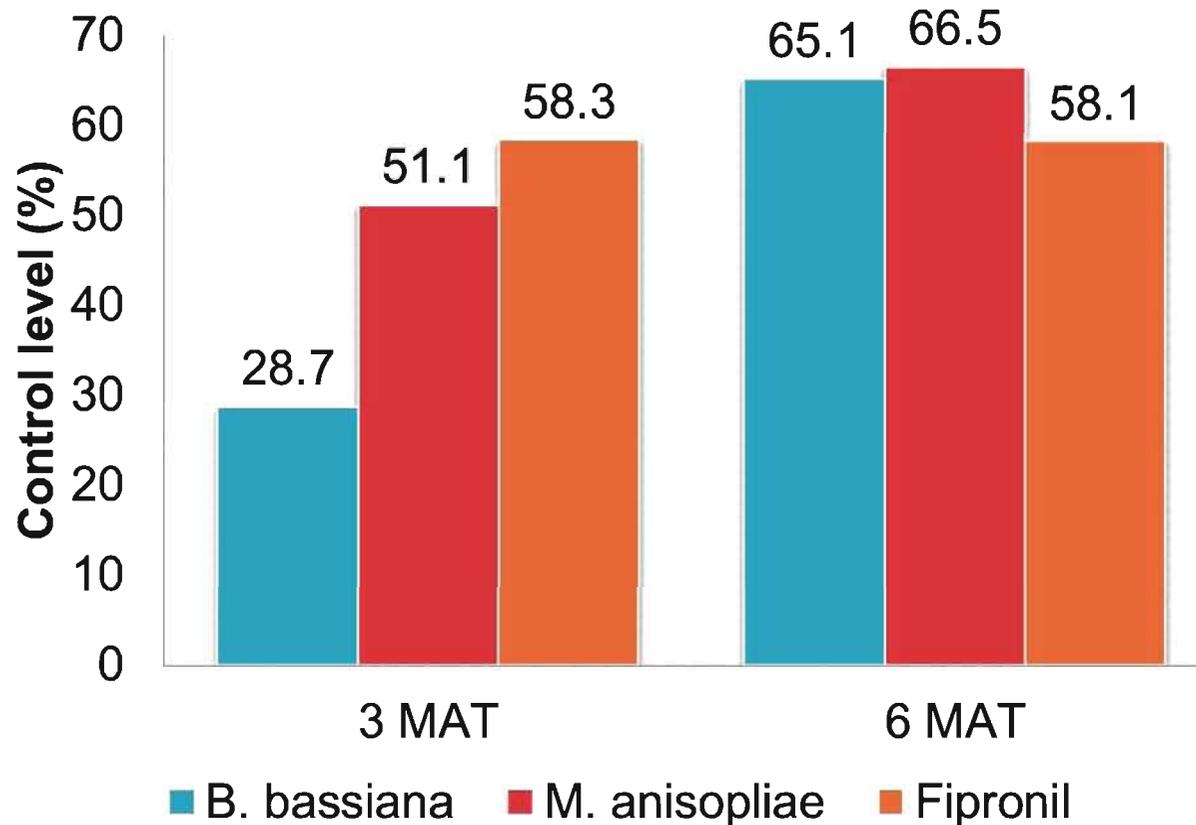
Treatments : T1- *B. bassiana* (10^7 spores/ml),
T2- *M. anisopliae* (10^7 spores/ml),
T3- Fipronil (1ml/10L)

Application : Spraying of palm trunk (8L/trunk) Soil injection
around palm base (10 points at 1L/point)

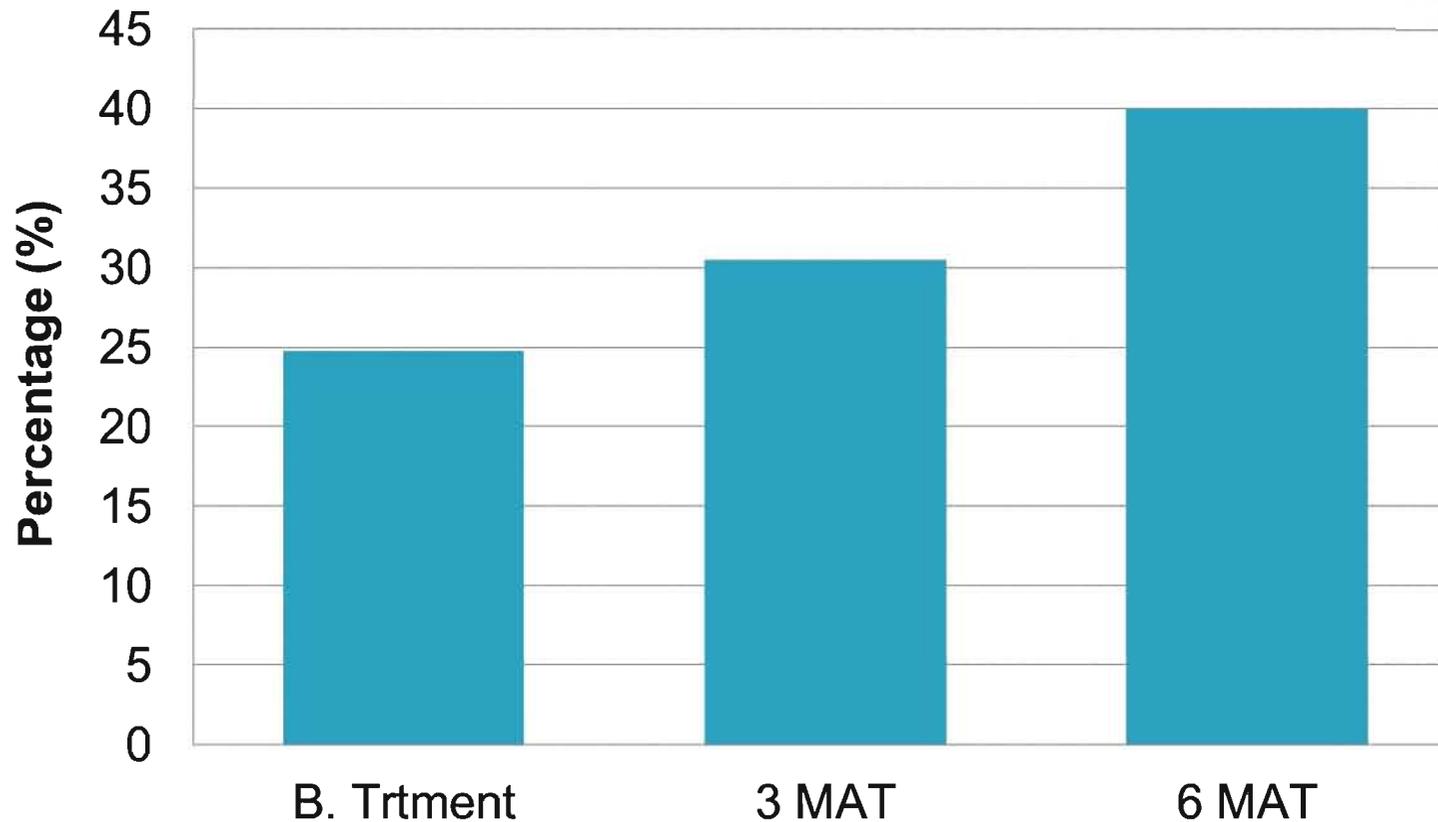
Background of experimental site (pre-census data)

Total planting points	: 2040
Total vacant planting points	: 387
Total supply seedlings	: 25
Total infested palms	: 93
Termite infestation	: 24.75%

EFFECTIVENESS OF TREATMENTS TO CONTROL TERMITE INFESTING OIL PALM



INFESTATION OF TERMITE ON OIL PALM IN THE EXPERIMENTAL AREA



Workers of Naman Estate involved in assisting the project



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FURTHER RESEARCH ON MANAGEMENT OF TERMITE

- Early detection of infestation.
- Baiting techniques to reduce population of termite colonies in the ground.
- Baiting techniques to control termite in the trunk.

Active ingredient using insect growth regulator (Chlorfluazuron & hexaflumuron) and biological agents (fungus, bacteria or virus)



CONCLUSION

- Bunch moth and termite are major insect pests in oil palm planted in peat, especially in coastal areas.
- Biological and chemical products can be used to reduce or prevent the pests infestation.
- Monitoring of pests is essential to ensure effective managements
- Adoption of sustainable management methods in control the pests.
- Further research covering fundamental aspects and applied management need to be carried out.

Thank You
Thank You



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