Tirathaba Bunch Moth and Termite Management for Oil Palm Planting on Peat Soils

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Apical (M) Sdn. Bhd.
- The woody nature of tropical peat attracts termite infestation from the time of planting. It is estimated 3-5% casualties each year if not detected early and effectively treated.

- The hot and humid condition of peat soils encouraged the spread of the *Tirathaba* bunch moth when the palms approach maturity. In severe infestations, > 50% crop losses.

- These two pests if not properly managed using the IPM approach, pest outbreaks can occur, resulting in economic crop losses due to reduction in palm stand and FFB yield.
A new oil palm planting on peat
Termite infestation on 7 month old palm
Tirathaba infestation on 20 month old palm
Integrated Pest management (IPM)

- IPM is defined as a pest management system that utilizes suitable techniques and methods (esp. sanitation practices, biological control in a compatible manner, to maintain the pest populations at levels below those causing economic injury and crop losses.

- The focus is on early detection through regular monitoring/census of pest damage and use of selective pesticides.
Main components of IPM

- **ALERT** - Early detection by regular surveillance and monitoring pest populations and damage symptoms.

- **CENSUS** - To determine if pest population levels have reached threshold values and when to start treatment.
  
  * A trained P&D census team for each estate, is important.

- **TREATMENT** - Application of selective chemical with minimum impact on natural enemies/beneficial insects and environment.

- **POST TREATMENT CENSUS** - Provides feedback on the efficacy of the treatment and when to stop application.
Tirathaba management
Life cycle of *Tirathaba mundella*

- **Incubation of eggs**: 4-5 days
- **Larva**: 14-16 days
- **Pupa**: 9-12 days
- **Adults**: 8-9 days
Caterpillar: 2-3 cm
Tirathaba census on FFB platform
Analysis of Free Fatty Acid (FFA) content
Effect of *Tirathaba* infestation on Free Fatty Acid content

<table>
<thead>
<tr>
<th></th>
<th>% FFA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy bunches</td>
<td>1.5</td>
</tr>
<tr>
<td><em>Tirathaba</em> infested bunches</td>
<td>6.2</td>
</tr>
</tbody>
</table>
Healthy bunches
Average weight of healthy bunches - 25 kg
Tirathaba infested bunches
Average bunch weight *Tirathaba* infested bunches - 16 kg (36 % reduction)
Tirathaba census

• First stage census done on FFB platforms during FFB grading. When infested bunches > 5 %, carry out systematic census.

• Census 10 % trees (all trees every tenth rows).

• Interval of census – every month

<table>
<thead>
<tr>
<th>Category</th>
<th>% trees/infested bunches</th>
<th>Spray method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>&gt;5-25</td>
<td>Selective</td>
</tr>
<tr>
<td>Moderate</td>
<td>&gt;25-50</td>
<td>Selective</td>
</tr>
<tr>
<td>Serious</td>
<td>&gt;50</td>
<td>Blanket</td>
</tr>
</tbody>
</table>
Results of a *Tirathaba* control trial

<table>
<thead>
<tr>
<th>Date of Assessment</th>
<th>Bt WP (1g/liter)</th>
<th>Cypermethrin (5%) (1ml/liter)</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/8/2006</td>
<td>76.0</td>
<td>75.2</td>
<td>72.8</td>
</tr>
<tr>
<td>18/9/2006</td>
<td>52.6</td>
<td>63.6</td>
<td>91.2</td>
</tr>
<tr>
<td>7/10/2006</td>
<td>33.5</td>
<td>72.6</td>
<td>94.8</td>
</tr>
<tr>
<td>15/11/2006</td>
<td>14.9</td>
<td>67.8</td>
<td>95.2</td>
</tr>
<tr>
<td>30/11/2006</td>
<td>4.5</td>
<td>62.0</td>
<td>97.5</td>
</tr>
</tbody>
</table>

*Bt – Bacillus thuringiensis* (variety Kurstaki at 16,000 IU/mg)

Trial location - Riau, Indonesia.
Age of palms - 7 years
30 treated palms/treatment.
Spraying carried out every 2 weeks.
Total rounds of spraying - 6.
Date commenced - 7/8/2006
Infestation on bunches - 76.0 %
Date - 7/10/2006
(2 months after treatment)
Percentage infestation - 33.5%

Spraying with *Bt* 1gm/liter water
Date - 30/11/2006
(3 months after treatment)
Percentage infestation - 4.5 %
Elaeidobius kamerunicus

> 2000 /male inflorescence on palms sprayed with \textit{Bt}
A natural predator of *Tirathaba* caterpillars
Earwig – (*Chelisoches moris*)
Palms sprayed with cypermethrin. Population *Elaeidobius kamerunicus* greatly reduced.
**Tirathaba spray procedure**

- Harvest all seriously infested bunches first.

- Remove all harvested infested bunches to road sides to expose to direct sunlight. Spray with cypermethrin till wet.

- If palms are under-pruned, carry out a round of pruning together with sanitation harvesting of the rotten bunches.

- Commence 1st round of spraying when > 5% palms showed infestation.

- Spray at 2-weekly intervals with *Bt* at 1 gm/litre water.

- Normally 4-6 rounds of 2-weekly sprayings will be required.

- Stop spraying when > 95% of bunches are shiny black colour.
Harvest all seriously infested bunches first
Ensure all bunches are completely harvested
Carry out a round of sanitation pruning together with removal of rotten bunches at same time.
Target spray on the infested bunches, not frond bases
Allocate 1 sprayer per palm row
Top up pump at the end of each row with $Bt$ at 1 g/litre water.
Use extended lance for tall palms
Use a 2 litre hand-sprayer for shorter supplied palms
Stop spraying when > 95 % bunches are shiny
*Tirathaba* control for palms coming into maturity
Young palms start flowering and bunch formation as early as 12-15 months after field planting.
Carry out castration when > 50 % palms are flowering.

Carry out castration at 2-monthly intervals.

Remove only female inflorescences.
Stop castration 6 months before official harvesting
Termite Management
About termites

- Termite is a serious pest as it kills the palm quickly when not detected and treated early.

- Termites are social insects with a caste system consisting of workers, soldiers and reproductives.

- There are several species of termites found in peat areas.

- One species (*Coptotermes curvignathus*) infests and kills palms by feeding on the apical meristematic tissue.
Stages of termite infestation

1- Initial stage

Presence of fresh mudwork on the frond bases, inflorescences, developing bunches and spear region. At this stage the spear and upper fronds are still green. Can expect full recovery when palm treated at this stage.

If not treated, it will take 4-6 weeks to reach the next stage.

2- Intermediate stage

Discoloration of the spear and the upper 2-3 young fronds to yellowish brown. At this stage, the recovery rate after treatment will be relatively low, generally < 50%.

3 - Advanced stage

The spear and the upper 3-4 fronds start to dry up, turning brownish. The spear becomes rotten rotten and gradually collapse.

The recovery rate after treatment at this stage will be very poor at this stage.
Stages of termite infestation
Termite census and spray procedure

• Census all palms (100% census) every month by a trained P&D census team.

( Census other important pests such as rhinoceros beetle damage at the same time ).

• Other field personnel esp. harvesters and loose fruit collectors can be trained to assist in early detection of termite infested palms.

• For infested palms, spray with Fipronil 5.0% w/w - (2.5ml/5L water/palm).

• Organization of workers

  Census team - 1 mandore
    - 4 census workers

  Spray team - 1 mandore
    - 4 sprayers.
Termite census – 100% in all blocks
Marking of infested palms with rafia strings

Tie a piece of rafia string at the frond tip of an infested palm.

On the first palm of a row with infested palms, indicate the number of infested palms by the same number of knots.
Spray procedure

• Spray half the Fipronil solution onto the spear/crown region till wet.

• Spray the other half of the Fipronil solution around the trunk and base of the infested palm.
The mudwork is moist when the termites are active.
Spray 2.5 litres of the Fipronil solution into the crown region till wet.
Spray the other half of the solution around the trunk and palm base.
About 1 month after treatment, the mudwork dried up and no live termites detected. 1-2 new healthy young fronds will emerge.
Conclusions

• In the cultivation of oil palm on tropical peat soils, the 2 important pests are the *Tirathaba* bunch moth and *Coptotermes* termite.

• If not detected early and treated effectively using the IPM approach, outbreaks can occur, resulting in economic crop losses due to reduction in yield and palm stand.

• Considerable costs and management inputs will be required to control these 2 important pests during outbreak situations.

• Training and retraining are important, to ensure cost-effective management of these 2 key pests in peat soils.
THANK YOU