# The Insect Pests and Their Natural Enemies Infesting Teak (*Tectona Grandis* L.f, Lamiaceae) Plantations in Bago Region, Myanmar

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# Content



# Introduction

- Teak (*Tectona grandis* L.f.) (Family Lamiaceae) is highly prized constructional and multipurpose timber species, found in the tropical and sub-tropical forests.
  Its natural distribution in India, Myanmar and Thailand ranges from sea level to 800m, even up to 1300m above sea level.

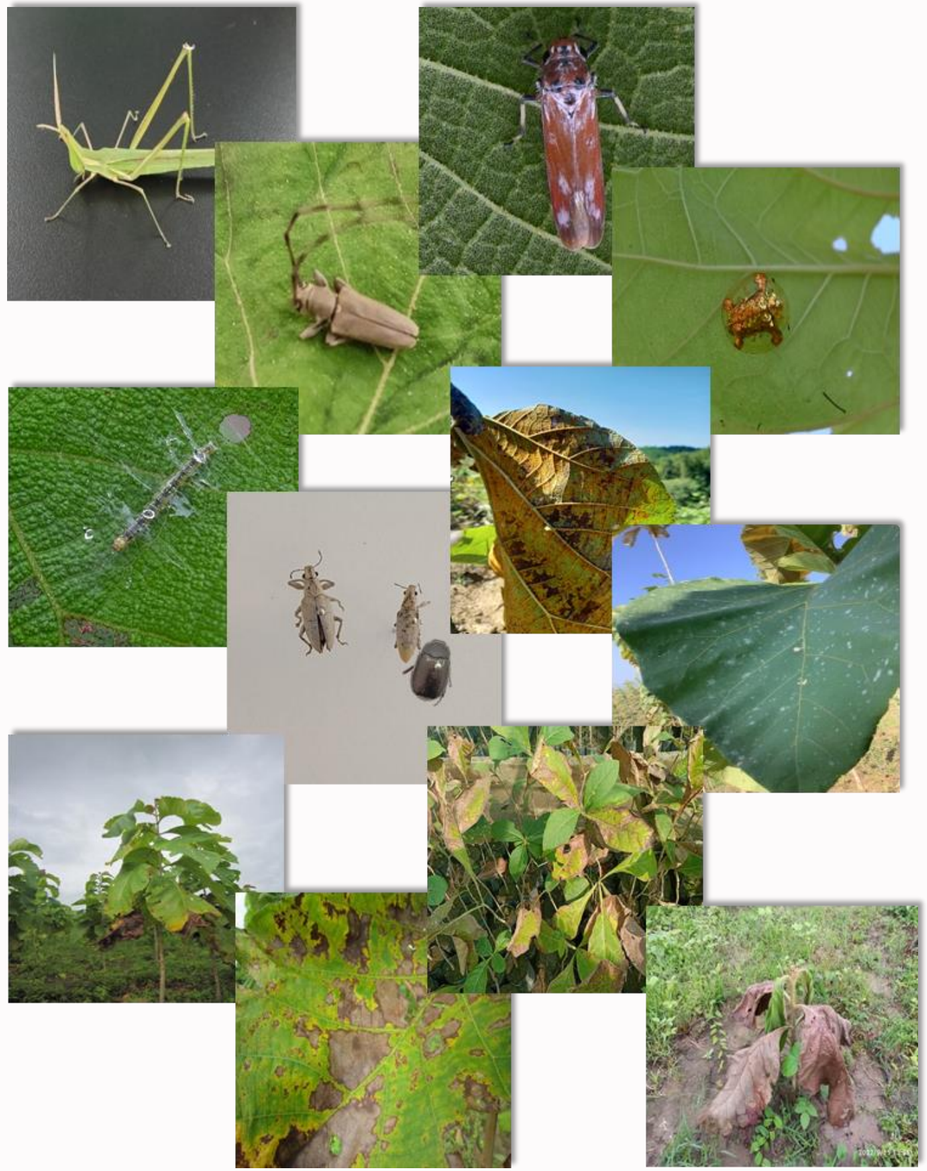
- Teak has been important to the economy of Myanmar since British Colonization.
  In Myanmar, large area of teak plantations have been establishing since 1980.

- Teak plantations often suffer severe damage from insect attack and outbreak of infestation has been occasionally reported in Myanmar. Myint and Win (2016) earlier reported that shoot borer (*Zeuzea coffeae* Nietner), leaf feeder (*Eutectona machaeralis* Walker), sap sucking bug (*Tingis sp*.), stem borer (*Acalolepta cervinus* Hope), sapling borer (*Sahyadrassus malabaricus* Moore) and termite (*Copotermes curvignathus*) infested young teak plant from an experiment conducted in Nyaung Chae Thawk Reserve Forest, Oktwin Township, Bago Region and in Pa- Lway Reserve Forest, Leway Township, Nay Pyi Taw, Myanmar.

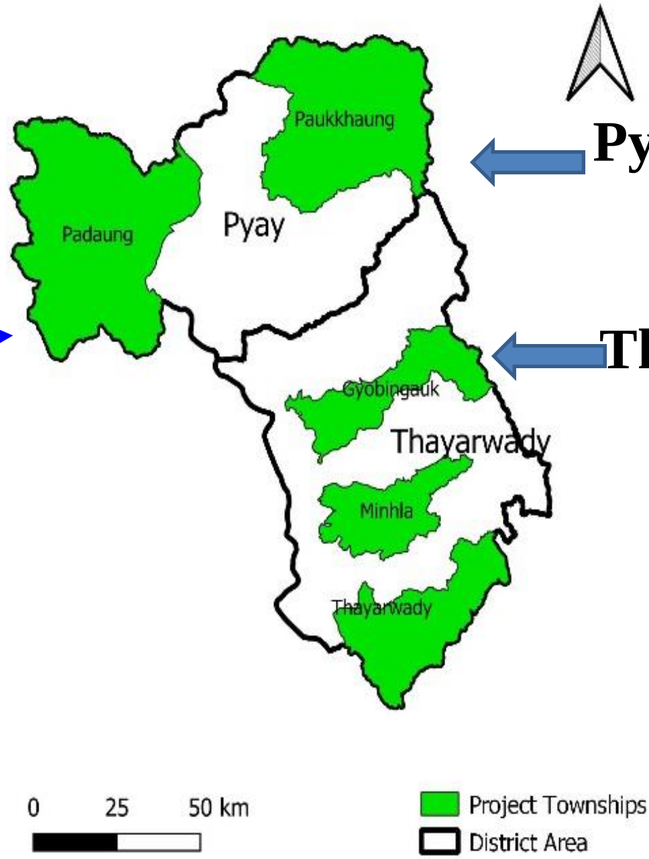
- The total number of insect pests infesting teak was not reported in forest trees protection in Myanmar. Hence, in the present investigation an attempt is being made for bringing out a systematic documentation of all the insect pests attacking teak in Bago Region as well as the occurrence of natural enemies of the major pests in this region

# Objectives

- To list the major insect pests found in young and old Teak plantations in Bago Region
- To observe the natural incidence as well as to formulate effective control measures
- To list natural enemies of major insect pests infesting Teak



# Bago Region (West)

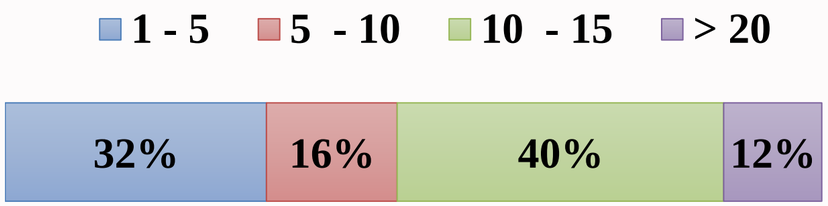




**Pyay District**

**Tharyarwaddy District**

# Pyay District, Bago Region

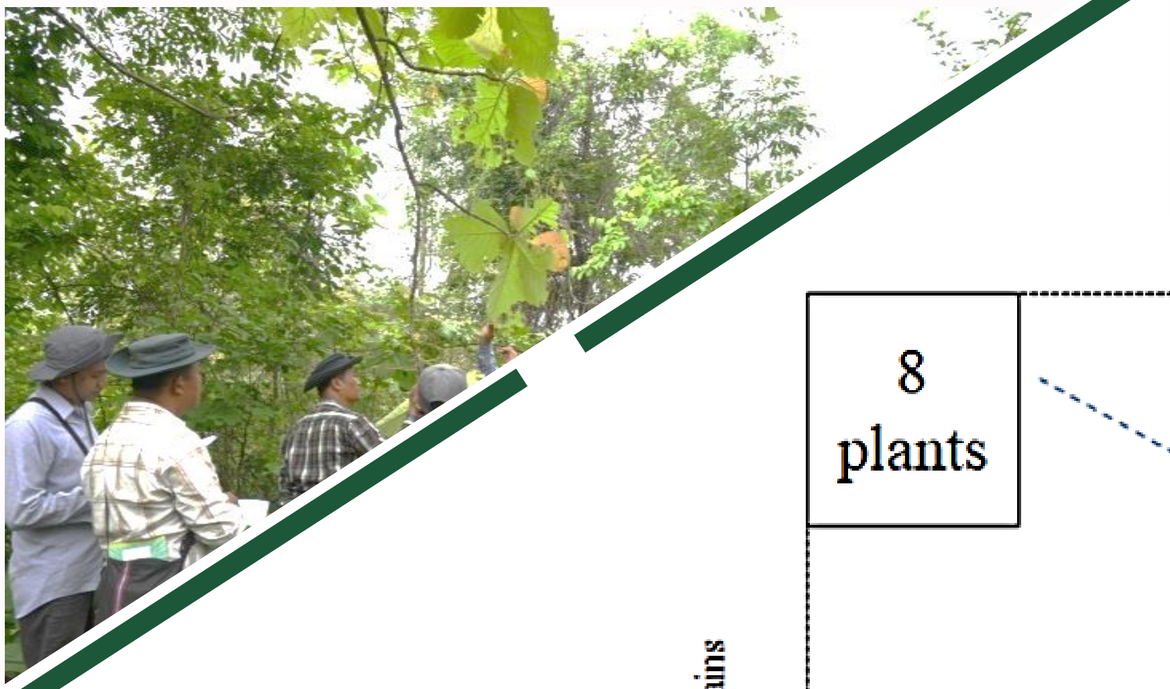
| No. | Plantation No. | Year | Location |
|---|---|---|---|
| 1 | 2/1979 | 1979 | Nawin (S) Reserve, Paukkhaung Township |
| 2 | 2/1998 | 1998 | Nawin (S) Reserve, Paukkhaung Township |
| 3 | 2/2007 | 2007 | Nawin (M) Reserve, Paukkhaung Township |
| 4 | 3/2013 | 2013 | Nawin (S) Reserve, Paukkhaung Township |
| 5 | 2/2021 | 2021 | Nawin (M) Reserve, Paukkhaung Township |
| 6 | 1/2008 | 2008 | Thayetan Reserve, Padaung Township |
| 7 | 2/2010 | 2010 | Thayetan Reserve, Padaung Township |
| 8 | 2/2012 | 2012 | Thanlaegyi Reserve, Padaung Township |
| 9 | 1/2020 | 2020 | Thani Reserve, Padaung Township |
| 10 | 1/2021 | 2021 | Thayetan Reserve, Padaung Township |




# Tharyarwaddy District, Bago Region

| Sr.no. | Plantation No. | Year | Location |
|---|---|---|---|
| 11 | 1/2008 | 2008 | Thonese Reserve, Thayarwaddy Township |
| 12 | 1/2011 | 2011 | Thonese Reserve, Thayarwaddy Township |
| 13 | 1/2016 | 2016 | Kanni Reserve, Thayarwaddy Township |
| 14 | 1/2019 | 2019 | Thonese Reserve, Thayarwaddy Township |
| 15 | 1/2021 | 2021 | Thonese Reserve, Thayarwaddy Township |
| 16 | 1/2004 | 2004 | Minhla Reserve, Minhla Township |
| 17 | 2/2009 | 2009 | Minhla Reserve, Minhla Township |
| 18 | 1/2016 | 2016 | Mokkha Reserve, Minhla Township |
| 19 | 1/2017 | 2017 | Mokkha Reserve, Minhla Township |
| 20 | 1/2019 | 2019 | Mokkha Reserve, Minhla Township |
| 21 | 1/2008 | 2008 | Bawbin Reserve, Gyobingauk Township |
| 22 | 4/2010 | 2010 | Bawbin Reserve, Gyobingauk Township |
| 23 | 5/2010 | 2010 | Bawbin Reserve, Gyobingauk Township |
| 24 | 2/2011 | 2011 | Bawbin Reserve, Gyobingauk Township |
| 25 | 1/2021 | 2021 | Bawbin Reserve, Gyobingauk Township |

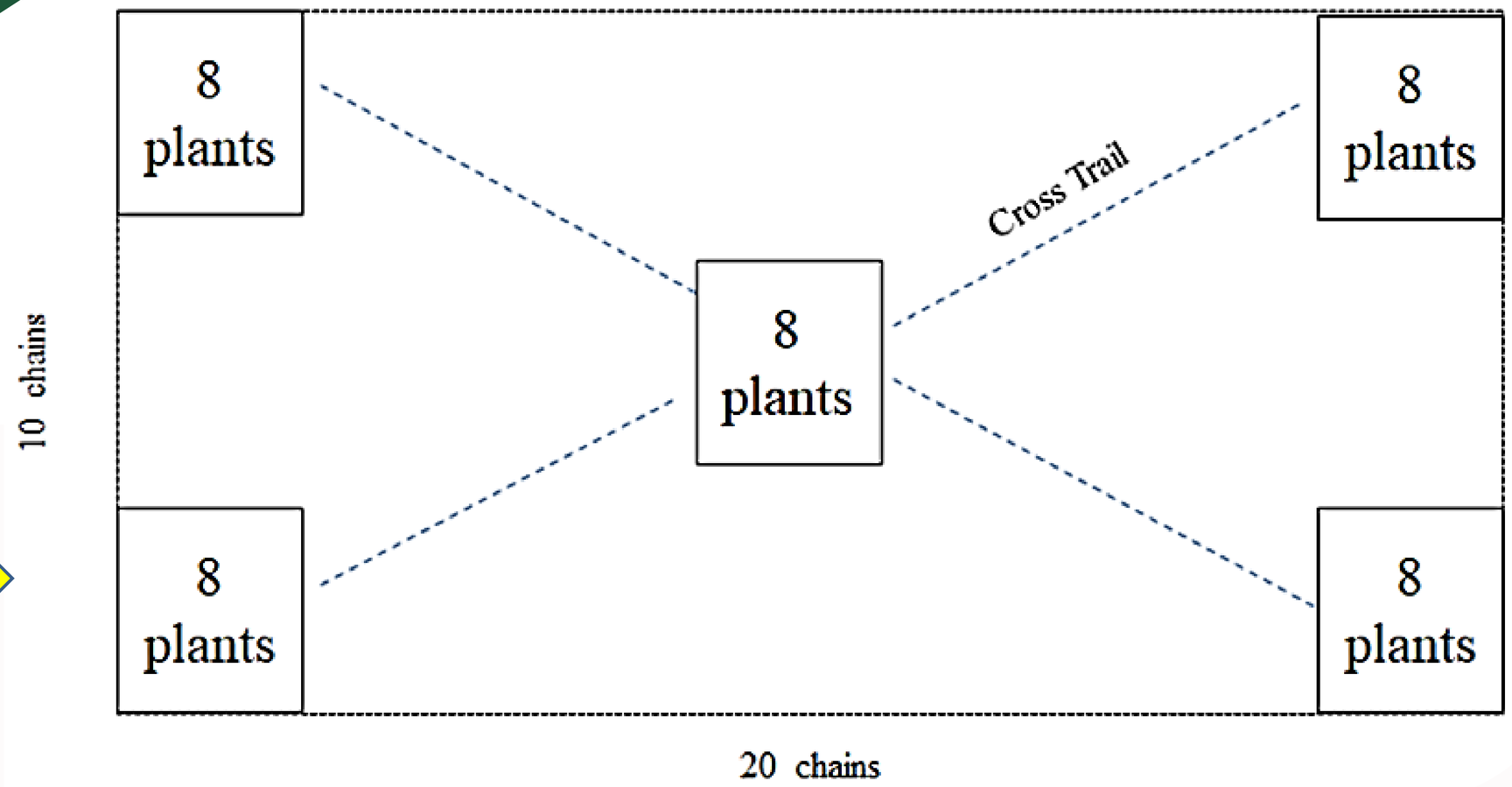
**Plantation age classes - 1 year to over 40 years**



# Field Data Collection

**August to December (Monsoon Season)**

**Layout of sample plot**




**A total of 5 sample plots (100 acres) per one plantation**

**One sample plot has an area of 20 acres**

**5 subsample plots were laid out again within each sample plots**

# Methods

01 Visual observation

Using light trap 02

03 Using Yellow sticky trap

Using insect net 04

01 Visual observation

02 Using light trap

03 Using Yellow sticky

04 Using insect net

- 40 trees/ sub-sample plot (totally 200 trees in one township) were randomly marked - monthly interval
- The total number of larva, nymphs, adults of insects and natural enemies were counted and classified.
- Not only Insect pests were counted but also damaged leaves were observed.

01 Visual observation

Using light trap 02

- One light trap was set up in each sub-sample plot one night before recording – 6 pm to 6 am
- Total number of individual pests and natural enemies trapped in light trap were counted and identified.

03 Using Yellow sticky tra

Using insect net 04

01 Visual observation

02 Using light trap

**03 Using Yellow sticky trap**

04 Using insect net

- Five yellow sticky traps were set up in each sub-sample plot at days 7 of individual pests and natural enemies sticked on yellow sticky traps were counted and identified

01 Visual observation

Using light trap 02

03 Using Yellow sticky trap

Using insect net 04


- sweep net collection was done by walking in crossing before nine o’ clock in the morning
- Total number of individual pests and natural enemies collected in insect net were counted and identified.

# Sample Collection

# FINDINGS

**Visual observation** ❖ 23 pest species and 13 species of natural enemies

**Using light trap** ❖ 26 pest species and 11 species of natural enemies

**Using yellow sticky trap** ❖ 30 pest species and 14 species of natural enemies

**Using insect net** ❖ 27 pest species and 8 species of natural enemies

# Forest Nursery

- Teak defoliator
- Teak skeletonizer
- Aphid
- White fly

Aphids

White fly

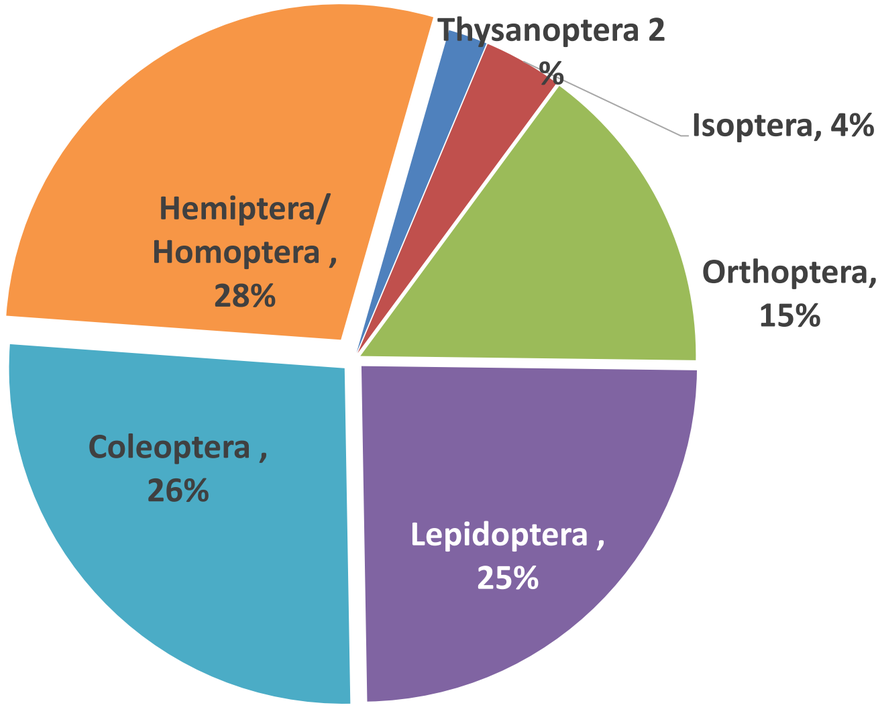
- Thrip
- Mealybug

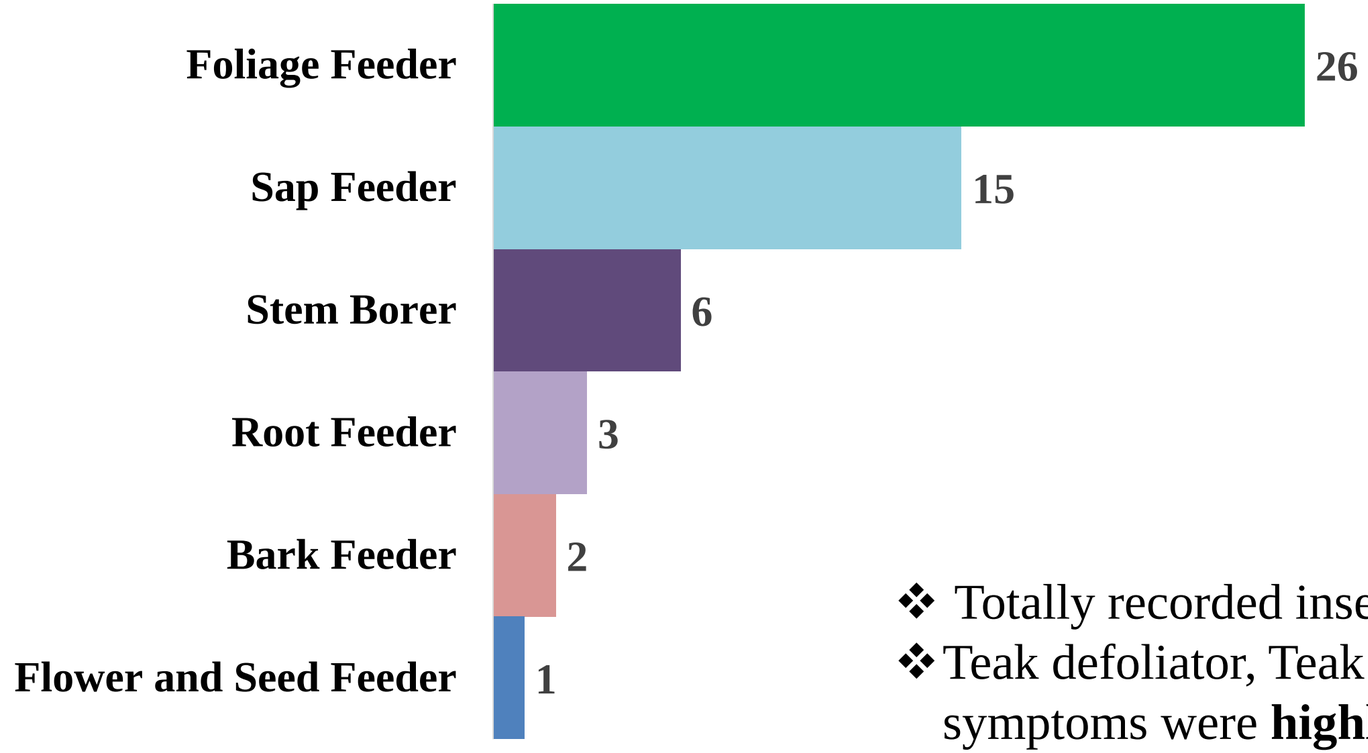
Mealybugs

Spodoptera

Thrips

# Teak Plantation

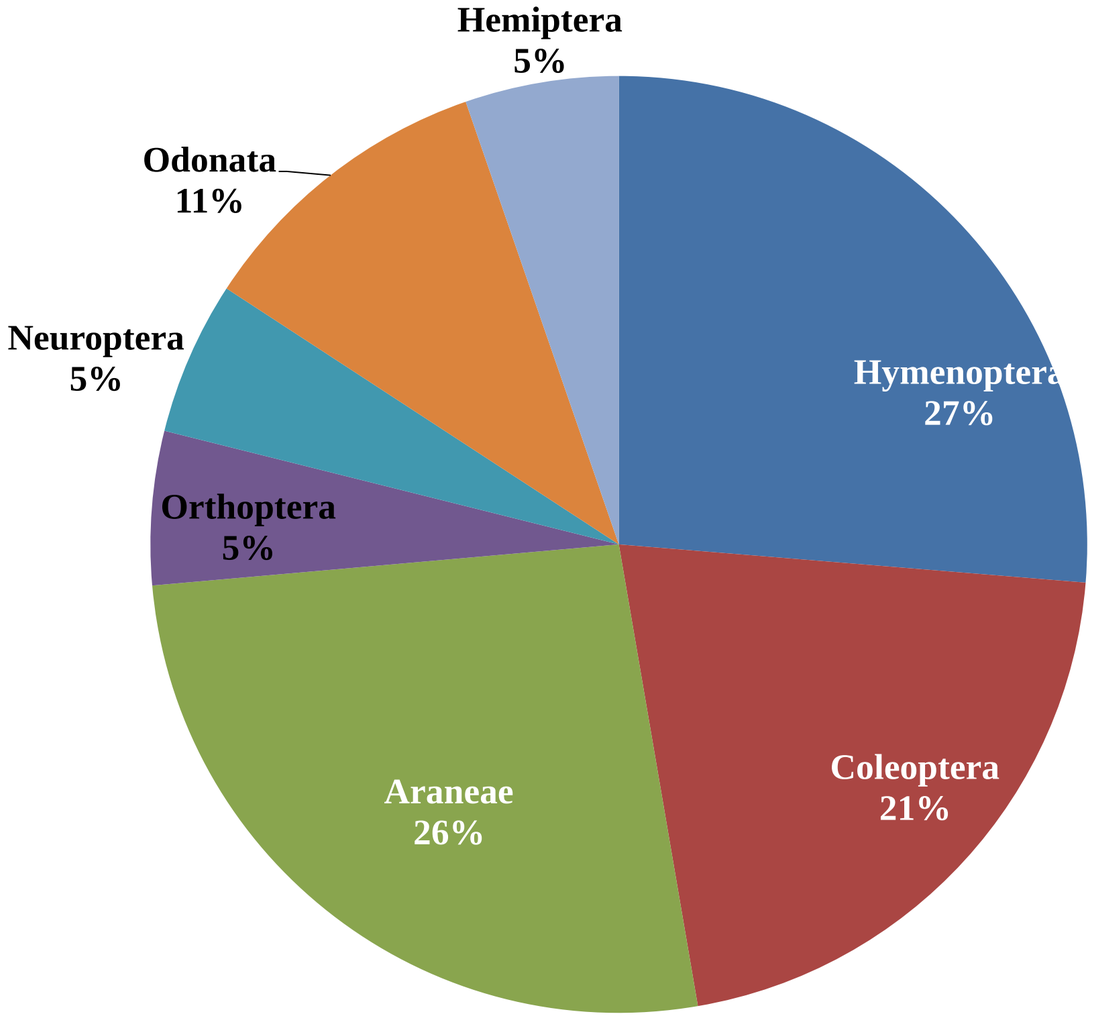



- Totally recorded insect pest species **:46**
- Teak defoliator, Teak skeletonizer damaged symptoms were **highly observed** in Bago Region, rainy season.

# Teak Plantation

- Totally recorded natural enemies species : 19
- Hymenoptera and Araneae are dominant order among the detected species of natural enemies



# Recorded Insect pests that were found in Teak

| No. | Common Name | Scientific Name |
|---|---|---|
| 1. | Aphid | *Aphis gossypii* |
| 2. | Army worm | *Spodoptera litura* |
| 3. | Ash weevil | *Myllocerus viridanus* |
| 4. | Black beetle | *Colasposoma sp* |
| 5. | Black Pumpkin beetle | *Aulacophora nigripennis* |
| 6. | Blue beetle | *Colasposoma sp* |
| 7. | Black bug | *unidentified* |
| 8. | Blister beetle | *Mylabris phalerata* |
| 9. | Butterfly | *Catopsilia pomona* |
| 10. | Chafer beetle | *Amphimallon majale* |
| 11. | Cicada | *Burmacicada protera* |
| 12. | Common hairy caterpillar | *Spilosoma obliqua* |
| 13. | Cotton stainer bug | *Dysdercus cingulatus* |
| 14. | Cricket | *Tarbinskiellus portentosus* |
| 15. | Defoliator | *Hyblaea puera* |
| 16. | Dung beetle | *Heliocopris bucephalus* |
| 17. | Golden tortoise beetle | *Aspidimorpha sanctaecrucis* |
| 18. | Green leaf hopper | *Bothrogonia ferruginea* |
| 19. | Gundi bug | *Leptocorisa oratoria* |
| 20. | Horned shield bug | *Placosternum sp.* |
| 21. | Jewel beetle | *Chrysochroa fulgidissima* |
| 22. | Lace/ sucking bug | *Tingis sp.* |
| 23. | Leaf miner | *Phyllocnistis tectonivora* |
| 24. | L. Grass Hopper | *Conocephalus maculatus* |
| 25. | L. Grass Hopper | *Pterophylla camellifolia* |
| 26. | L. Grass Hopper | *Mecopoda elongate* |
| 27. | Mealy bug | *Icerya sp* |
| 28. | Mealy bug | *Pseudococcus sp.* |
| 29. | Red borer | *Zeuzera coffeae* |
| 30. | Red Pumpkin beetle | *Aulacophora foveicollis* |
| 31. | Root borer | *Phassus signifer* |
| 32. | S. Grass Hopper | *Acrida turrita* |
| 33. | S. Grass Hopper | *Oxya chinensis* |
| 34. | S. Grass Hopper | *Oxya yezoensis* |
| 35. | Sapling borer | *Sahyadrassus malabaricus* |
| 36. | Skeletoniser | *Eutectona machaeralis* |
| 37. | Scutellaria bug | *Chrysocoris purpureus* |
| 38. | Tawny coster | *Acraea violae* |
| 39. | Teak canker grub | *Acalolepta cervinus* |
| 40. | Termite | *Odontotermes sp.* |
| 41. | Termite | *Coptotermes curvignathus* |
| 42. | Trunk borer | *Alcterogystia cadambae* |
| 43. | Tree hopper | *Leptocentrus Taurus* |
| 44. | White grub | *Holotrichia consanguinea* |
| 45. | White fly | *Bemisia tabaci* |
| 46. | Yellow peach moth | *Conogethes punctiferalis* |

# Insect pests in Teak Plantation

*Hyblaea puera (Cramer)*

*Eutectona machaeralis*

*Myllocerus viridanus*

*Leptocentrus Taurus*

*Holotrichia consanguinea*

*Aspidimorpha sanctaecrucis*

*Aphis gossypii*

*Tingis sp*

*Acalolepta cervine*

*Bemisia tabaci*

# Recorded Natural enemies of major pests of Teak

| No. | Common Name | Species | Order | Family | Type of nature |
|---|---|---|---|---|---|
| 1. | Wasp | *Apanteles sp.* | Hymenoptera | Braconidae | Parasite |
| 2. | Wasp | *Bracon sp.* | Hymenoptera | Braconidae | Parasite |
| 3. | European paper wasp | *Polistes dominula* | Hymenoptera | Polistinae | Parasite |
| 4. | Black ant | *Camponotus sp.* | Hymenoptera | Formicidae | Predator |
| 5. | Red ant | *Solenopsis sp.* | Hymenoptera | Formicidae | Predator |
| 6. | Lady beetle | *Coccinella undecimpunctata* | Coleoptera | Coccinellidae | Predator |
| 7. | Lady beetle | *Coccinella transversalis* | Coleoptera | Coccinellidae | Predator |
| 8. | Lady beetle | *Cycloneda munda* | Coleoptera | Coccinellidae | Predator |
| 9. | Spider | *Lycosa pseudoanulata* | Araneae | Lycosidae | Predator |
| 10. | Green lynx spider | *Peucetia viridans* | Araneae | Oxyopidae | Predator |
| 11. | Spider | *Oxyopes javanus* | Araneae | Oxyopidae | Predator |
| 12. | Spider | *Argiope sp.* | Araneae | Papaveraceae | Predator |
| 13. | Huntsman spider | *Olios sp.* | Araneae | Sparassidae | Predator |
| 14. | Praying mantis | *Mantisa religiosa* | Orthoptera | Mantidae | Predator |
| 15. | Green lace wing | *Chrysoperla sp.* | Neuroptera | Chrysopidae | Predator |
| 16. | Red dragonfly | *Sympetrum fonscolombiii* | Odonata | Libellulidae | Predator |
| 17. | Damsel fly | *Unidentified* | Odonata | - | Predator |
| 18. | Ground beetle | *Nebria brevicollis* | Coleoptera | Carabidae | Predator |
| 19. | Assassin bug | *Zelus renardii* | Hemiptera | Reduviidae | Predator |

# Natural Enemies in Teak Plantations

*Coccinella transversalis*

*Mantisa religiosa*

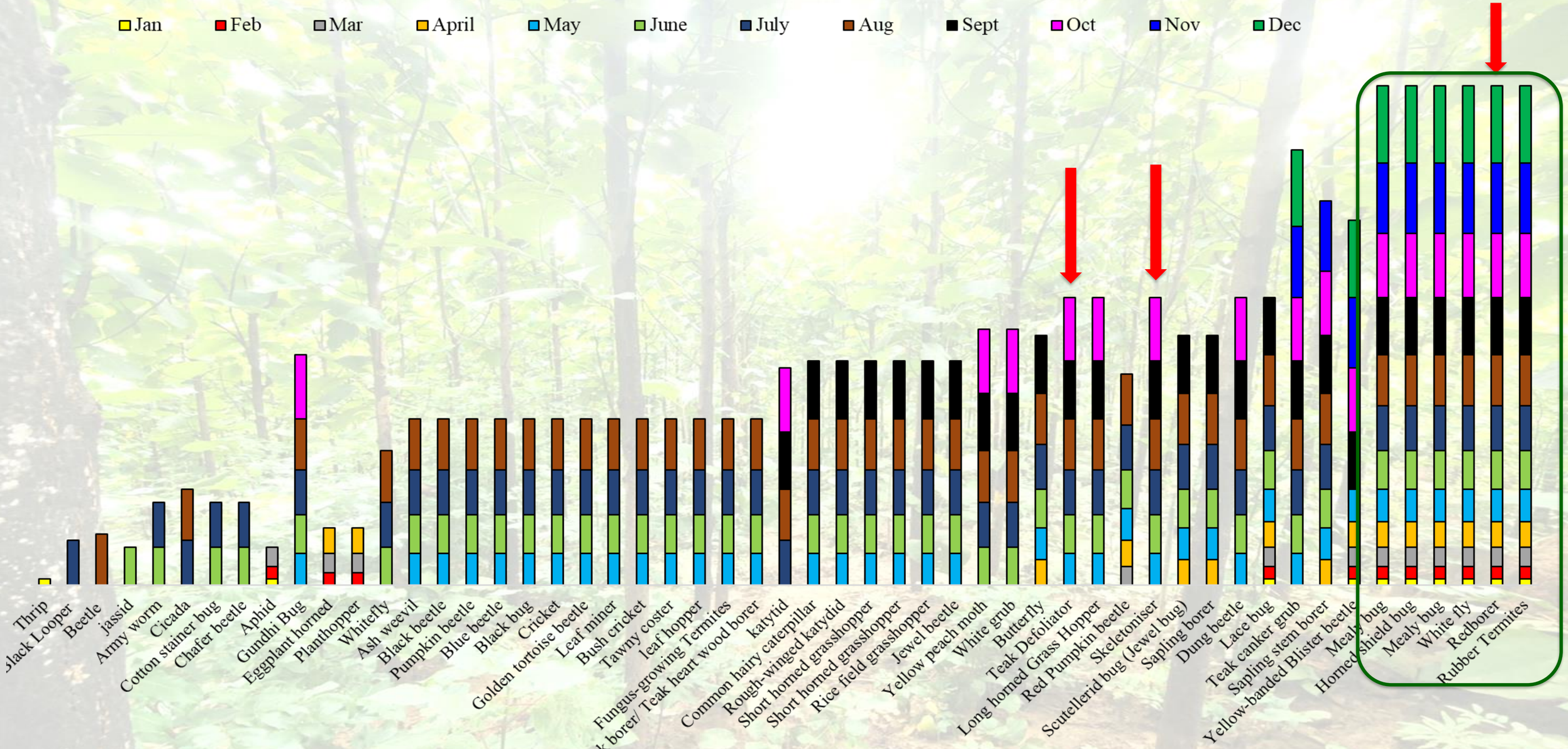
*Zelus renardii*

*Chrysoperla sp.*

*Coccinella undecimpunctaa*

*Sympetrum fonscolombii*

*Cycloneda munda*




*Insect pest that found in the Teak plantation in year round (as Pest Calendar)*

# Teak defoliator

***(Hyblaea puera)***

**Lepidoptera**

## Nature of damage

- By cutting pieces of leaves and folding them together
- Come out of the shelters to feed at night
- damaged leaves - Repeated and severe defoliation

## Control Measures

- Removal of folded leaf
- Larva and pupa were collected and destroyed in young plants
- Using light traps to catch adult teak defoliator
- Weeding, Cleaning
- Placing Trichogramma (wasp) cards

**Folded leave**

**Larva**

**Pupa**

**Adult**

# Teak skeletonizer

***(Eutectona machaeralis)***

**(Walker)**

**Lepidoptera**

## Nature of damage

- The larva feed the whole fleshy tissues of the leaf leaving all the veins,
- Skeletonizing the leaf


## Control Measures

- Larva and pupa were collected and destroyed in young plants
- Using light traps to catch adult teak defoliator
- Weeding, Cleaning
- Placing Trichogramma (wasp)cards

# Red borer
## *(Zeuzera coffeae)*

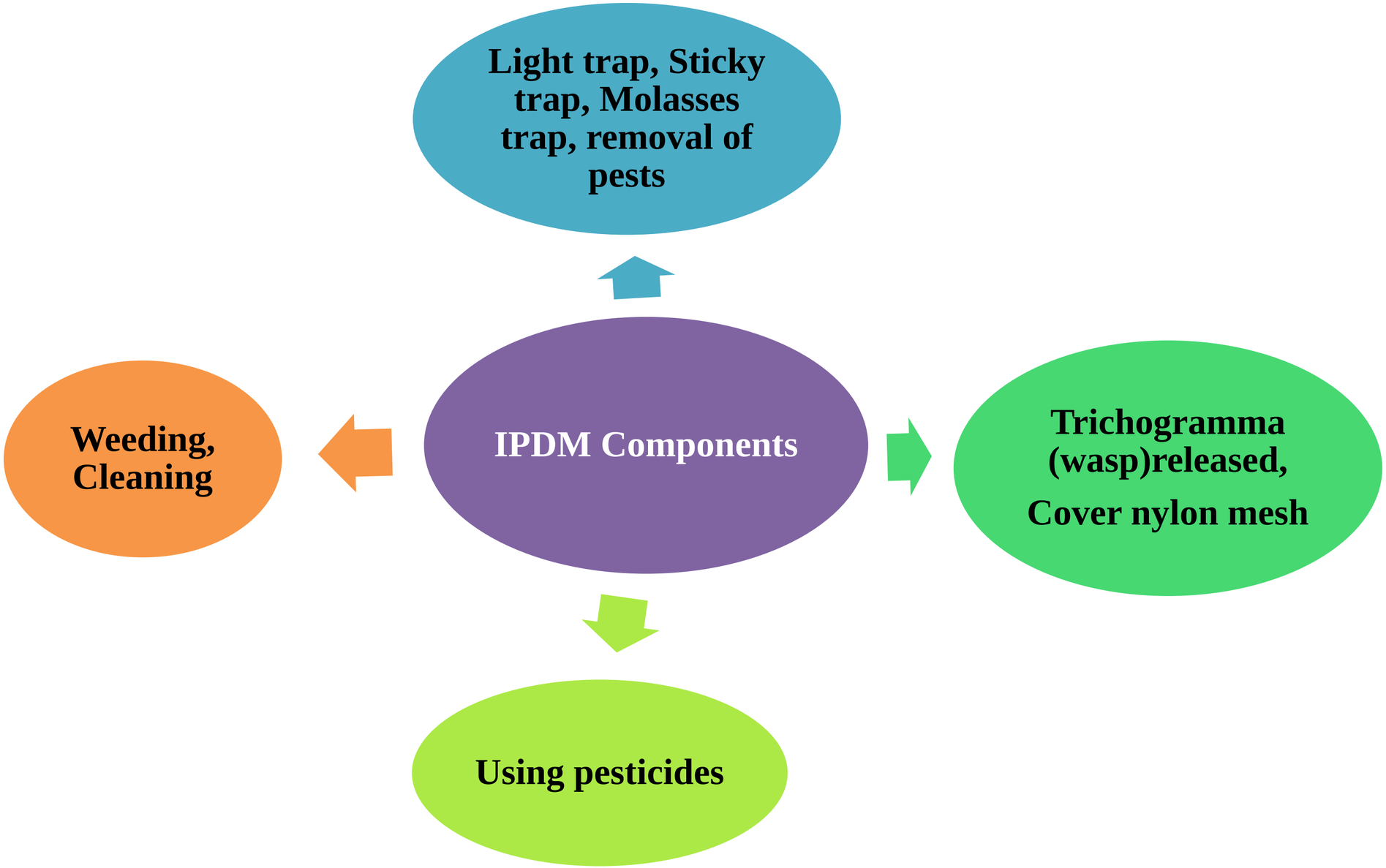
## Nature of damage

- Attack in young plants
- Branches and twigs wilt quickly and become brittle resulting in them breaking off from the plant
- Stems show dieback due to internal feeding and finally wilt

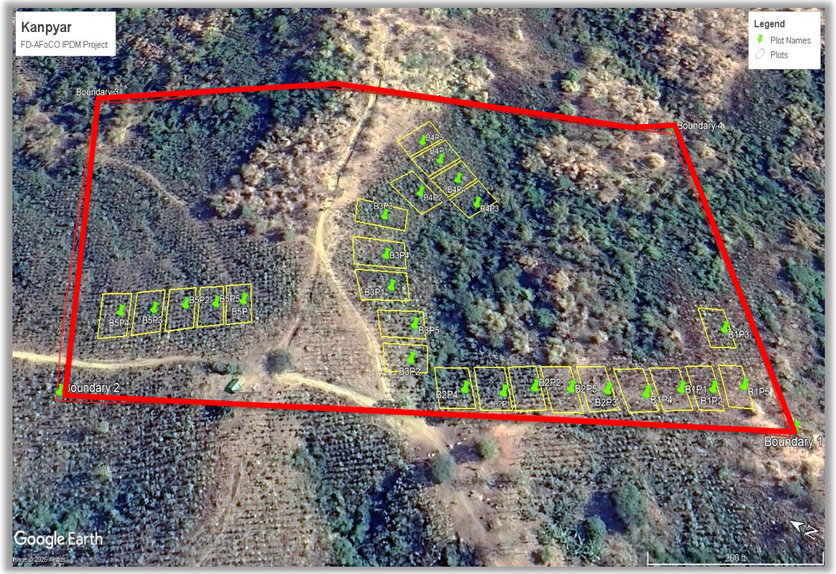
## Control Measures

- Pesticide spraying
- Removing infested parts

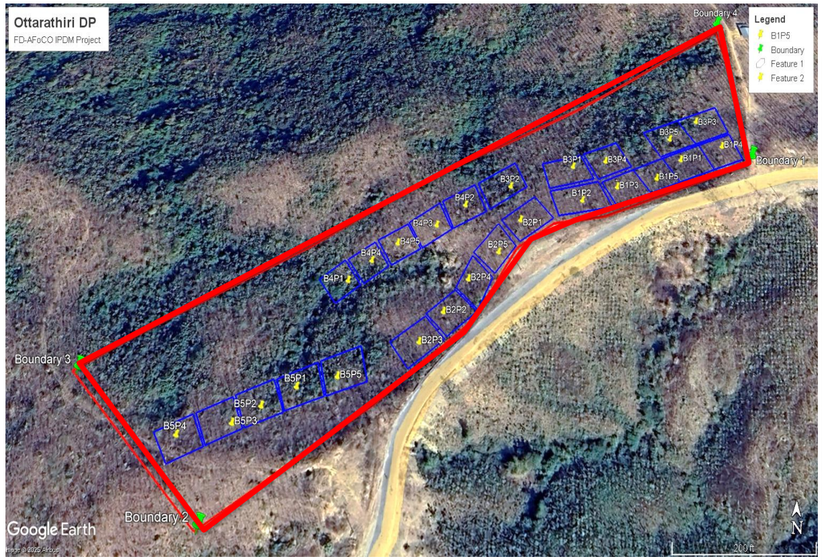
# Control Measures



# Demonstration plots








## Different Control measures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**Treatments = 5**

i. **Biological control**
(Disease –Trichoderma and Pest – Wasp)

ii. **Chemical control**
(Disease - Dithean M 45, 0.1% (or) Mancozeb 75% WP and Pest - Carbaryl and Deltamethrin)

iii. **Mechanical control** (People and materials- Silvicultural operations)

iv. **IPDM** (i + ii+ iii)

**v.Control**

# Conclusion

- Hoped to be benefit to cultivators, by getting the awareness on what sort of insect pests infest the Teak (*Tectona grandis*) and their prevalence on the specific parts of the tree.
- Therefore, necessary control measures would be taken to maintain the teak production in future.

➢ Year round incidence of pest on teak is needed to know. Therefore this survey is being continued to Post-monsoon (winter) and Pre-monsoon (summer) season from January to November.

# Acknowledgement


“Integrated Pest and Disease Management in Teak Plantations in Bago Region, Myanmar” (AFoCO/014/2020)

"Promoting Quality Timber Production in Community-based Teak and Other Valuable Species Plantation in the Tropics Project" or ITTO-BMEL Teak Project Phase II (PP-A/54-331A)

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# THANK YOU!

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