



Monitoring and prevention of insect pests in teak plantations

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Teak plantations

- Wood volume
- Carbon sequestration



Good wood quality



Diversity of insect pests

- Nearly 294 insects on teak (Beeson, 1941)
- 196 species in India
- More than 70 species in Thailand
- A minority is key pests (2-3 species)
- Mostly it is minor pests

Types of damages

- Foliage feeders
- Sap feeders
- Stem and branch borers
- Bark feeders
- Root feeders



Foliage feeders

- *Hyblaea puera*
- *Eutectona macharalis*



Reduced growth



defoliator



skeletonizer

-Outbreak

-Bio-control and microbial control



Root feeders

- White grub
- Termite



Put insecticide in the bottom of the hole.

seedling

Stem borers

- Teak beehole borer (*xyleutes ceramica*) → TBB
- *Zeuzera coffeae* Nietner (Cossidae)
- *Acalolepta cervinus*



Teak beehole borer (*xyleutes ceramica*)

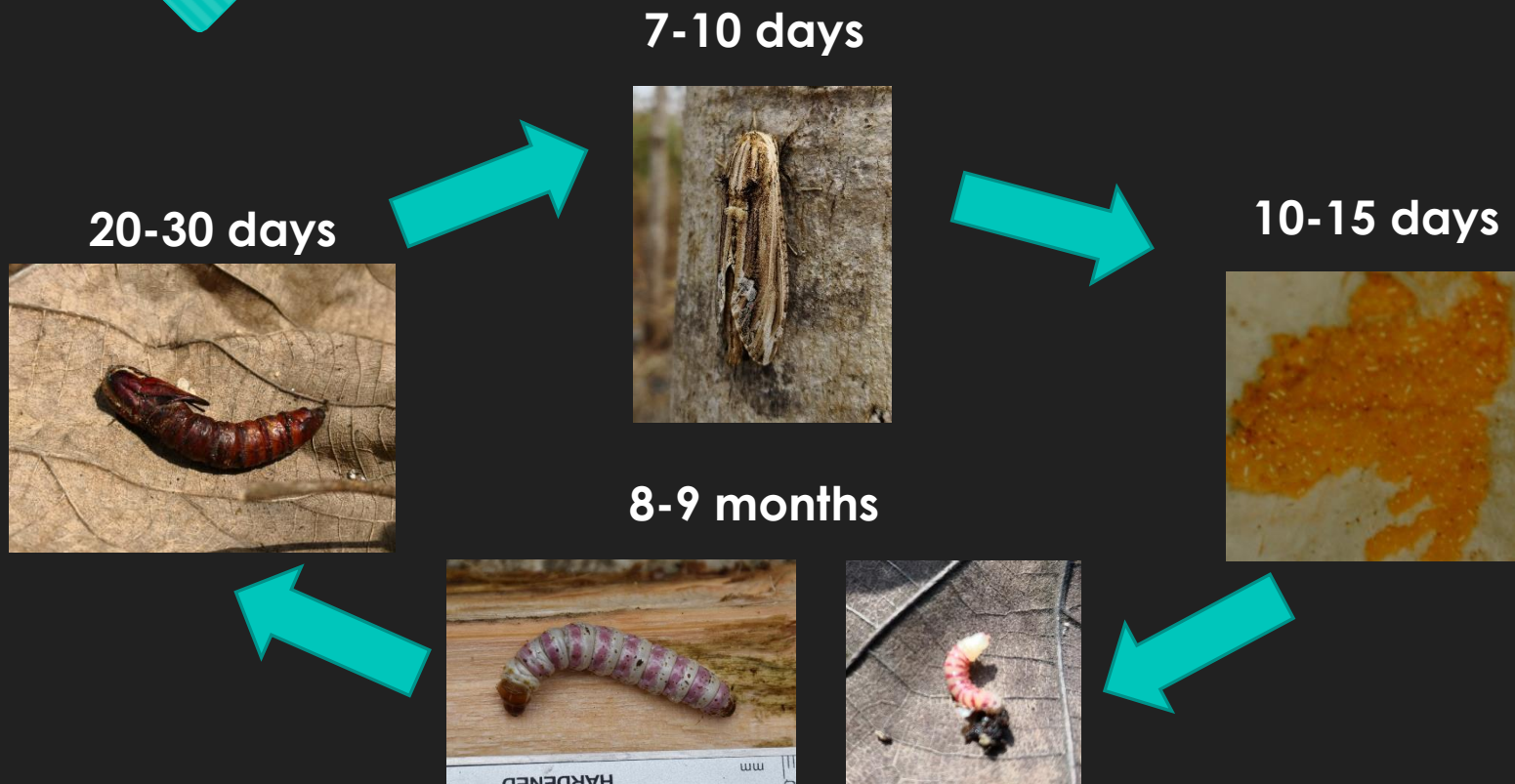
- Some teak plantations are found to be 100 percent.
- Teaks are destroyed when they are 2 years old and have a diameter of 4 cm.
- Wood volume prices are down 30-60 percent.



General information

- Life cycle of 1-2 years
- Lays more than 12,000 eggs per female
- The highest mortality rate of larvae occurs at 4–6 weeks of age.
- When the larvae have bored into the wood, the mortality rate is very low, around 0.001 – 0.02 %
- Only 1% of larvae can bore into the stem.
- Wood damage is cumulative until rotation (30yrs).
- Still can't be controlled effectively

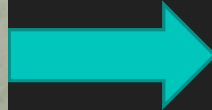
Life cycle



Larvae stages



1st



2nd



3rd



4th



5th

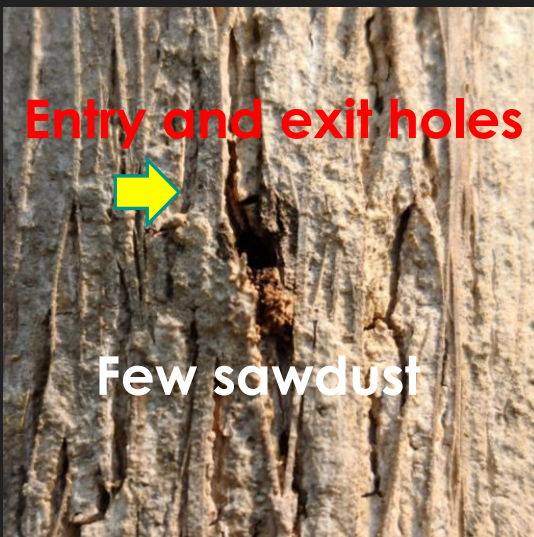
Symbol

2nd instar

Entry and exit holes



Few sawdust



Mid-inner bark



Symbol

The hole gets bigger



5

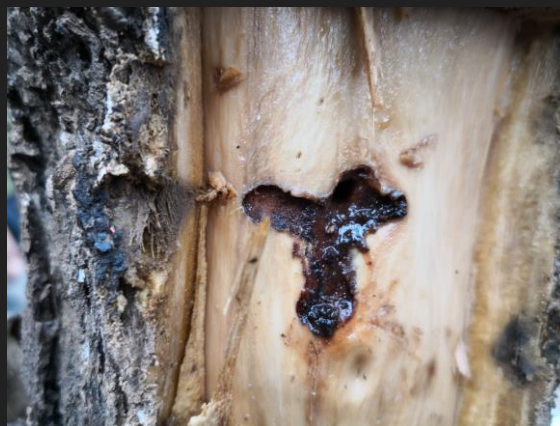
Entry and exit holes

3rd instar

The hole gets bigger



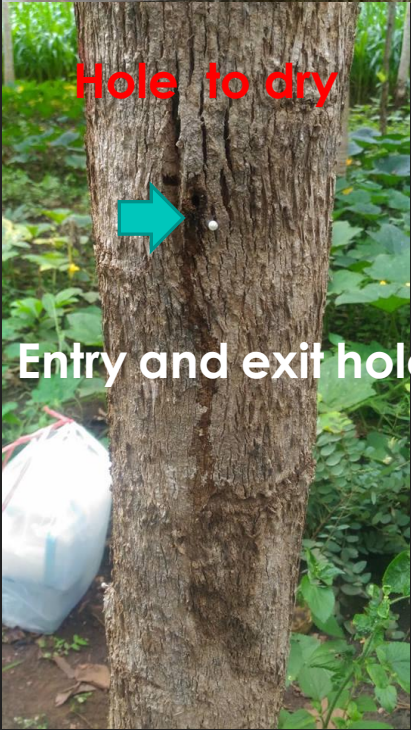
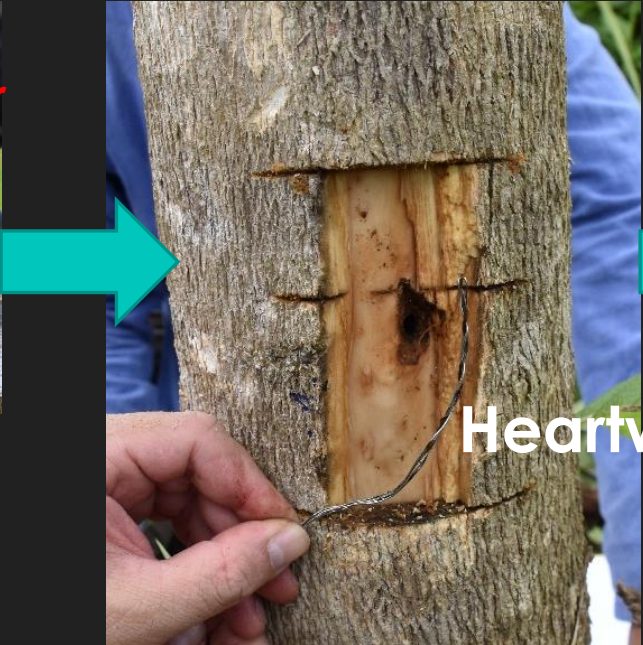
Entry and exit holes



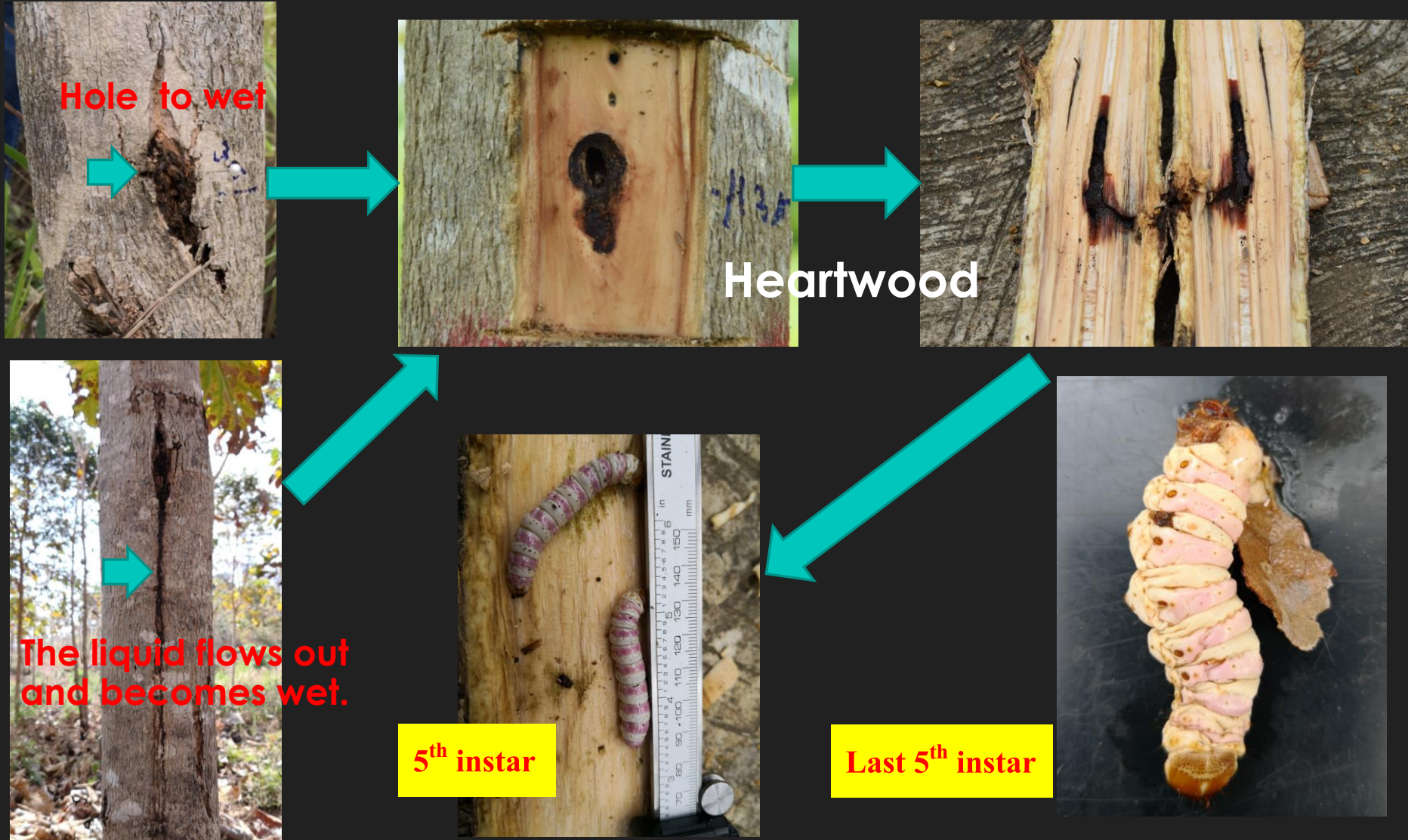
Sapwood



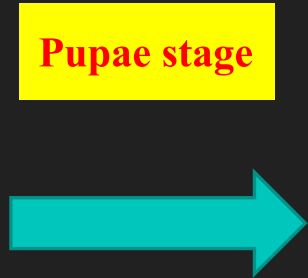
Symbol



Symbol



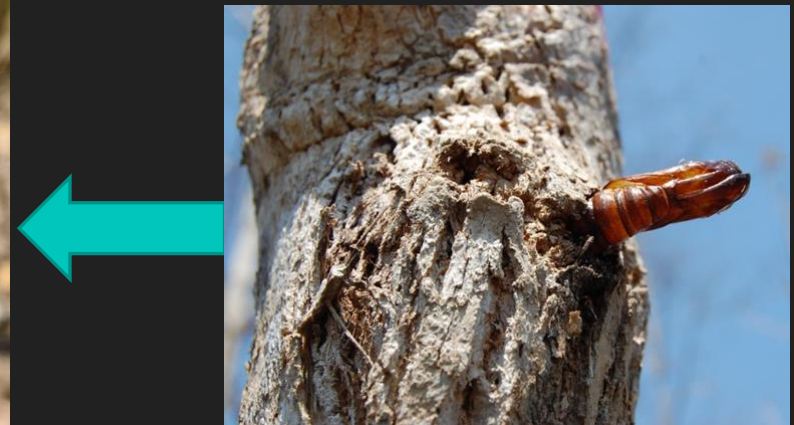
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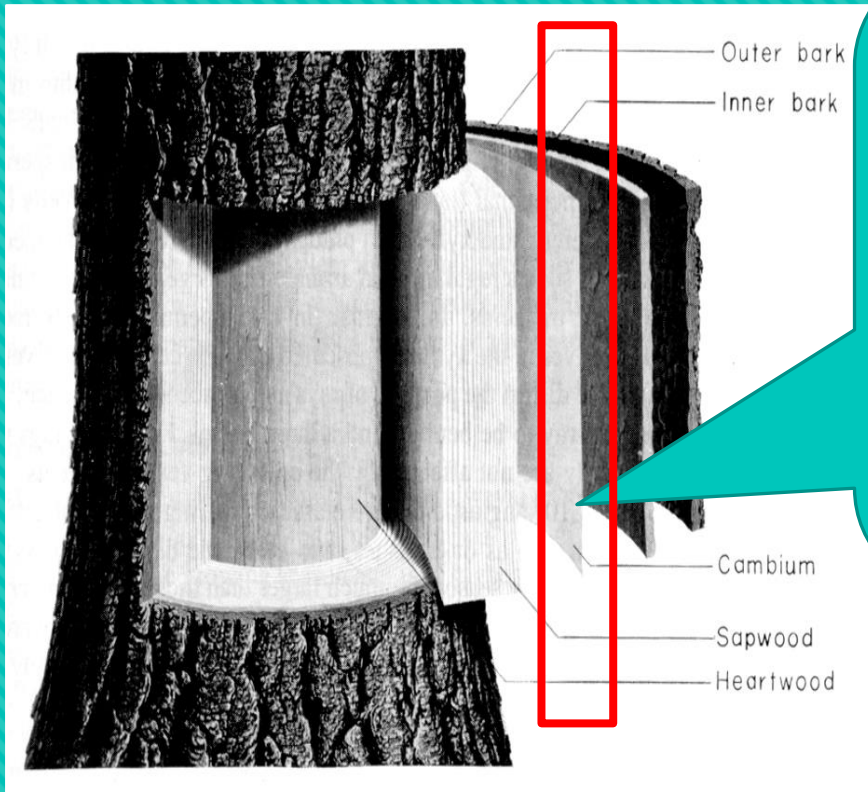
Sawdust to dry



New adult

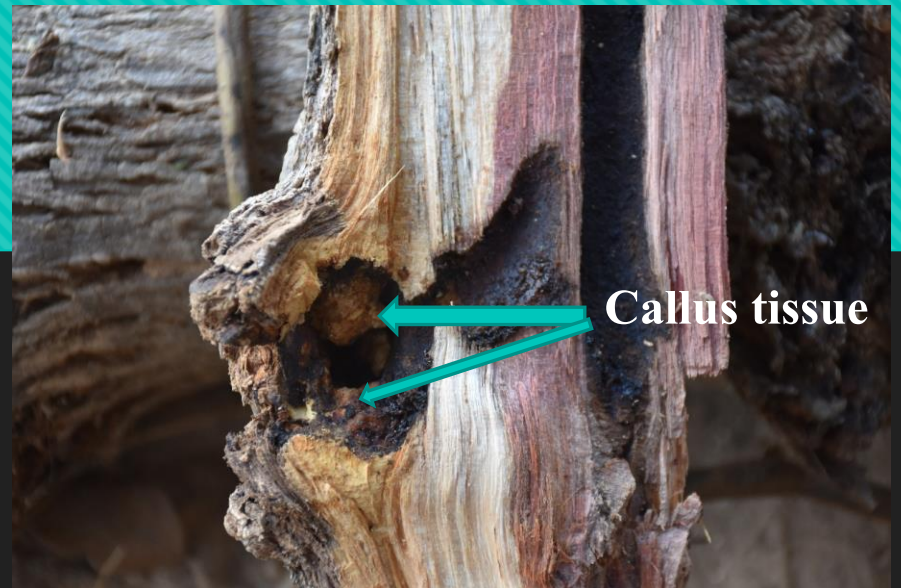


The pupa is still on the stem.



The immatures lives in the teak trunk as a larvae and pupa.

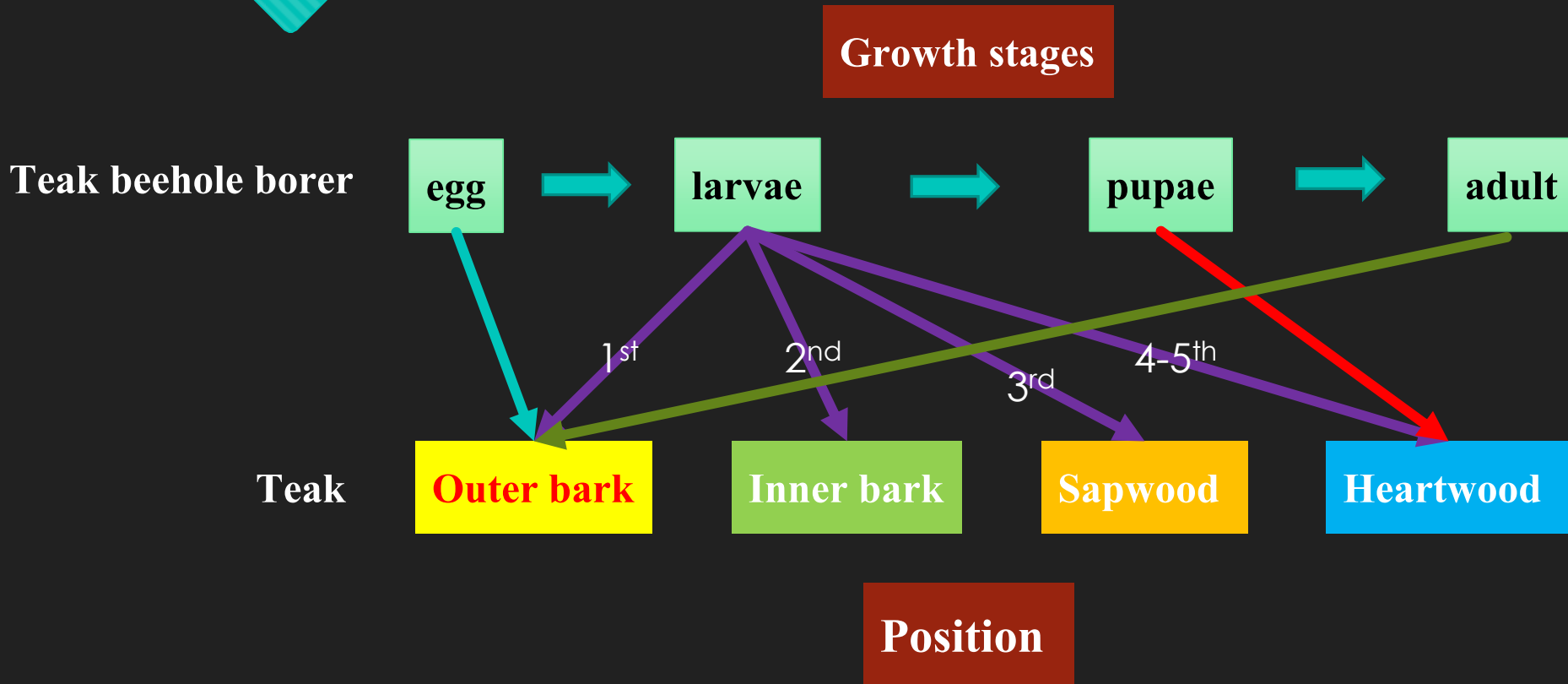
The larvae feed on the callus tissue, which is produced from the inner bark of the teak tree.



Precise control ?

- Refers to the guidelines for selecting methods that are appropriate for the growth stages (TBB) and the position (Teak) in which one lives at that time.
- Currently, teak plantations have used this method to control TBB and have seen clear results in teak trees that are 2-10 years old, causing the TBB population to decrease within 5 years if the practices are continuous.

Information



Teak plantations should be 2-10 years old.

Distribution of larvae

- Boring areas



Over plantations

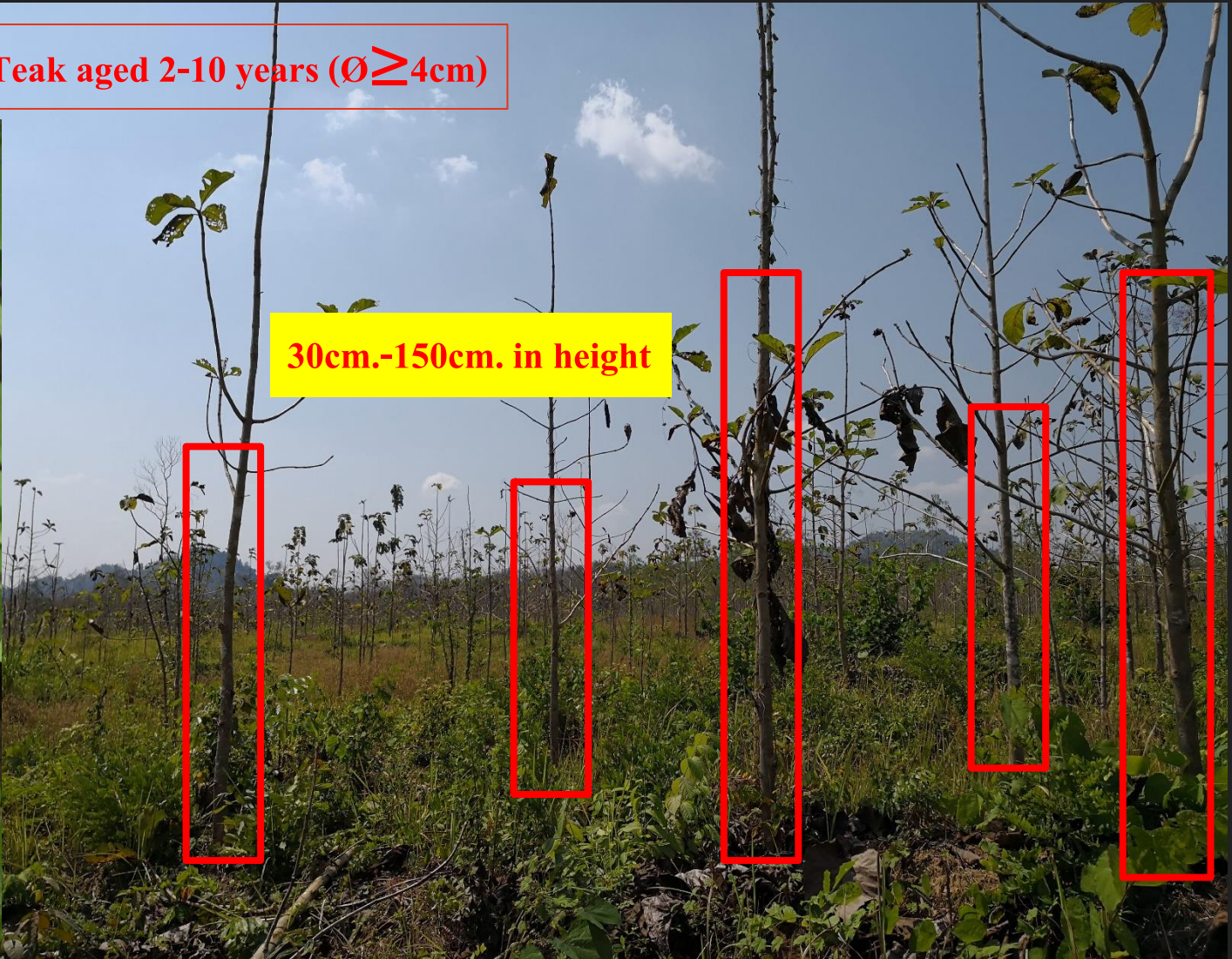
- Hole area



Lower

Teak aged 2-10 years ($\text{Ø} \geq 4\text{cm}$)

30cm.-150cm. in height



Methods for precise control

Examples:

- Using a knife to cut bark areas for 1st – 2nd instar
- Using hard wire to insert into the hole for 3rd - 5th instar
- Using bio-control for egg, 4th – 5th instar, pupae, adult
- Using forest fire for egg, 1st instar, adult
- Using light trap for adult
- Other methods suitable for different position and growth stages

Summary

Stages

Positions

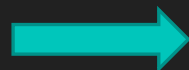
Time

Control

Eggs



Outer bark

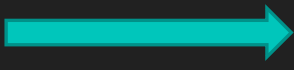


What month?

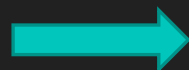


What method?

1st instar



Outer-inner bark

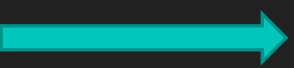


What month?

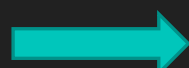


What method?

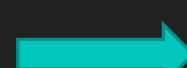
2nd instar



Outer-inner bark

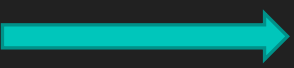


What month?

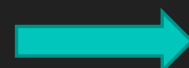


What method?

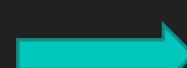
3rd instar



Inner bark, sapwood

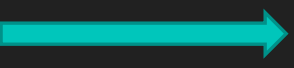


What month?

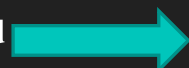


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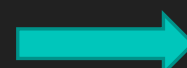
4th instar



Sapwood, heartwood

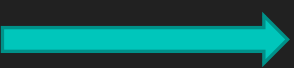


What month?

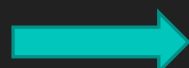


What method?

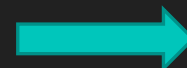
5th instar



Sapwood, heartwood

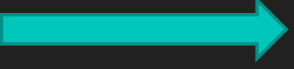


What month?

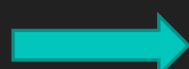


What method?

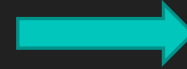
Pupae



Heartwood

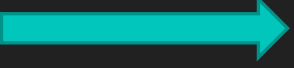


What month?

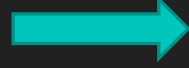


What method?

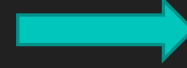
Adult



Outer bark



What month?



What method?

Future trends

- Global warming is causing more damage to both foliage feeders and stem borers.
- Teak plantations are likely to be destroyed more severely, especially wood.
- Good quality wood will be less in quantity.
- Timber volume will decrease and loss of income will increase.
- So, intensive and continuous precise control should be carried out for 1-5 years in teak plantations that are 2-10 years old.

Thank you

