ITTO-BMEL
Teak in the Tropics

Bi-monthly online

ITTO-BMEL Teak Newsletter

April 2025 - Volume 7(2)

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Teak Mekong Newsletter is now re-named as *ITTO-BMEL Teak Newsletter* to reflect changes in the start of 2nd phase of the project in November 2023 for 3 years for implementation in 6 countries of Asia Pacific and Togo in West Africa. The newsletter support and facilitates teak and other tropical species networking and information dissemination in the Asia Pacific and West Africa through ITTO member countries and partners, and support sharing lessons of the project through short news release, occasional papers, project related research and development information. The bi-monthly newsletter is released online through TEAKNET webpage www.teaknet.org and co-hosted by Kasetsart University, Thailand.

For more information,

please contact PK Thulasidas (thulasidas.teak@gmail.com) or Yongyut Trisurat (fforyyt@ku.ac.th)

Federal Ministry of Food and Agriculture

Training Workshop on "Precision Management and Control of Teak Plantation Pests"

March 13-14, 2025, Fun Wan Hotel, Li District, Lam Phun Province, Thailand

Group photo: Participants and the project team

As part of the ITTO-BMEL Teak and Other Valuable Species Plantation Project, "*Promoting Quality Timber Production in Smallholders and Community-based Teak and Other Valuable Species Plantations in the Tropics* (*PP-A/54-331A*)" a training workshop was arranged on Precision Management and Control of Teak Plantation Pests" on March 13-14, 2025 at Fun Wan Hotel, Li District, Lam Phun Province, northern Thailand.

Preamble

The ITTO-BMEL Teak and Other Valuable Species Plantation Project aims to significantly improve the production of high-quality timber from teak and other valuable species plantations established by smallholders and communities in the Asia-Pacific and West Africa. This will be achieved by promoting policies to secure high quality planting stock, adoption of best silviculture practices, access to financing to promote longer rotations,

value addition, and improved timber legality. Key activities include promoting financial schemes that invest in high-quality teak production with long rotations and providing access to voluntary carbon markets. Tapping into the carbon credit markets would provide additional incentives and support the global effort on climate change mitigation. Furthermore, it facilitates regional and international cooperation for sustainable smallholder plantations. By implementing effective policies and fostering collaboration, this project will improve the economic outcomes of smallholder and community plantations in the tropics.

Smallholder timber plantations in the tropics have the potential to provide sustainable supply chains of quality timber based on increasing forest landscape restoration initiatives as well as other ecosystem services such as carbon sequestration and soil conservation, which can benefit both the local community in the wider region. Besides enhancing rural livelihoods, the development of smallholder agroforestry systems with teak and other valuable native tree species has a huge impact on environmental conditions and the supply of timber to the local industry.

Teak (*Tectona grandis* L.f.) is a valuable native timber species found in India, Myanmar, Thailand and Lao PDR. The recent global assessment of teak resources reveals that natural teak forests cover approximately 30 million ha. However, teak plantations have been widely established across 80 tropical countries over an estimated 6.89 million hectares, nearly 80% of which is in Asia followed by 10% in Africa and 6% in Latin America and the area is increasing. Smallholder systems account for approximately one-fifth of the global teak estate and are an important source of raw material for national and international teak industries. Despite widespread plantations, the productivity of planted teak is generally low, particularly the plantations established by smallholders and local communities. This is partly due to poor quality of planting stock, inadequate silvicultural practices, limited financing to produce quality timber, and weak marketing and value chains.

Apart from all these, diseases in teak plantations is a major health issue threatening the productivity of plantations. The beehole borer, *Xyleutes ceramicus* Walker is a most important forest insect pest of teak. The pest is generally distributed throughout the natural teak forests of Southeastern Asia. Teak trees in the plantation are evidently more susceptible than those of natural teak forests and mixed plantations. The biology and ecology of this insect in Myanmar (Burma) have been recorded and reported by Beeson[1]. The borer attacks only living tree from sapling through maturity. Although, it does not kill the tree, it causes severe damage/ defect inside the heartwood of the tree and greatly reduces the quality and value of the marketable timber. Mr. Atithep Phuttapong, Chief of Mae Li Teak Reforestation in Lam Phun Province, revealed that the market value of affected teak timber would drop to 60-70% of the normal price.

A 1963-1965 study on teak plantations in Northern Thailand successfully tested the inoculation and establishment of the fungal disease *Beauveria bassiana* (Balsomo) Vuillemin on beehole larvae. The results suggest potential for biological control of this forest insect pest, but further research is needed for effective large-scale dissemination techniques. Therefore, sharing and dissemination of knowledge on pest control, in particular beehole borer in teak plantation is very crucial for the success of long-term plantation aiming to harvest good quality timber.

The specific objectives of the training workshop were therefore:

1. To educate participants on insect pests in teak plantations, especially beehole borer
2. To provide precision guidelines on how to investigate, control and mange beehole borers in order to produce good quality timber
3. Field visit and hands-on practice to investigate the affected teak tress

The target participants included interested teak smallholders in northern Thailand, RDF and FIO staff. A total of 40 individuals participated in the training organized.

Training workshop arrangements and program schedule is given below.

1. Consultation meeting among the project team, instructors and RFD staff
2. Conduct reconnaissance survey of the potential venue for lecture and field visit
3. Design training workshop program and logistic arrangement, as well as announcement for application
4. Conduct actual training workshop which included lecture and field visit
5. Training results evaluation and the level of satisfaction
6. Training duration and date: 13-14 March 2025
7. Lecture at Fun Wan Hotel, Li district, Lam Phun Province
8. Field visit at Mae Li Teak Reforestation, Li district, Lam Phun Province

[1]Beeson, C,F.C. 1921. The beehole borer of teak. Indian forest records, Teak beehole borer, 1963, 1964 (Thai).

Training Workshop Program Schedule

Day – 1 (13 March 2025)

08.00 – 08.30 h	Registration	Meeting room
08.30–08.45	Opening remarks Group photo	Mr. Suchat Kalyawongsa, PSC member
08.45–09.00	Introduction to participants and instructors	All members
09.00–09.30	Background and objectives of ITTO-BML Project	Prof. Yongyut Trisurat, Regional Project Manager
09.30–10.00	Coffee break	
10.00–11.00	Lecture 1: Introduction to insect pests affecting teak plantation	Assoc. Prof. Dr. Decha Wiwatwitaya Instructor (KUFF)
	Lecture 2: Prevention and mitigation measures of teak beehole borers	
12.00–13.00	Lunch	
13.00–14.30	Lecture 3: Investigation and evaluation of affected Teak trees	Assoc. Prof. Dr. Decha Wiwatwitaya Instructor (KUFF)
14.30–15.00	Coffee break	
15.00–16.00	Lecture 4: Precision Management and Control of Teak Borers	Assoc. Prof. Dr. Decha Wiwatwitaya Instructor (KUFF)
16.00–16.30	Summary for day 1	Assoc. Prof. Dr. Decha Wiwatwitaya Instructor (KUFF)
18.00 – 20.00	Dinner	
	Stay overnight at Fun Wan Hotel	

Day – 2 (14 March 2025)

07.00 – 08.00	Breakfast	Fun Wan Ho
08.30–9.00	Travel to Teak Plantation at Mae Li Reforestation station	By van and trucks
09.00–09.10	Introduction to Mae Li Reforestation station	Mr. Atithep Phuttapong, Chief of Mae Li Teak Re-forestation
09.10–12.30	Hand-on practice to identify affected trees and evaluate extent of damage	All participants guided by Dr. Decha Wiwatwitaya and previously trained participants
12.30 –13.30	Lunch	Mae Li Reforestation station
13.30–14.30	Summary of training workshop and award of certificate Departure of participants and ITTO-BMEL project team	Dr. Decha Wiwatwitaya and Prof. Yongyut Trisurat

Summary of the training module

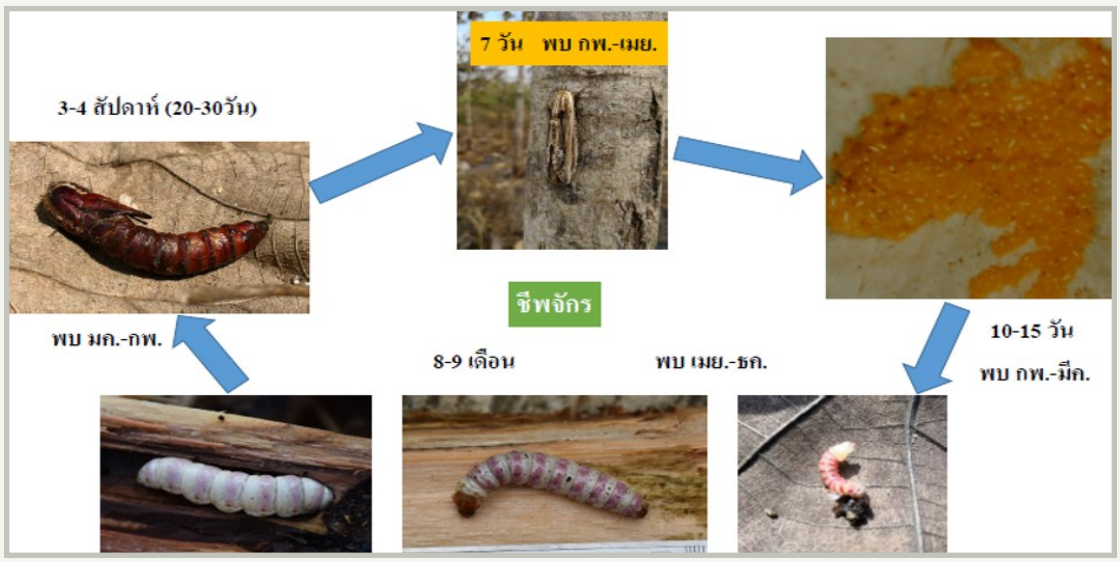
Lecture 1: Introduction to insect pests affecting teak plantation

* The resource person was Assoc. Prof. Dr. Decha Wiwatwitaya, Faculty of Forestry, Kasetsart University in Bangkok who is an an expert on pest insects and ant. Dr. Decha has studied insect pests for over 32 years (1990-present). In the last decade, his study focused on teak beehole borer, especially at Mae Li Reforestation station. He handled all the lecture classes.

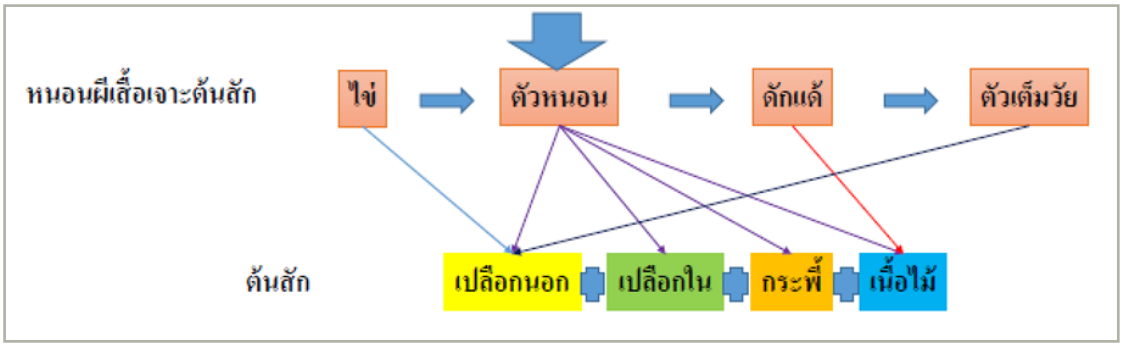
* He recommends that all participants understand first the life cycle of insect pest (egg, caterpillar, pupa and adult-butterfly), then preventive measures can be undertaken. These four stages may cover almost 2 years.

  - Stage 1- Butterflies usually lay egg in February-March and the number of eggs is about 12,000-15,000 and the success of hatching in 82%.
  - Stage 2 covers the period from April to December (8-9 months).
  - Stage 3- expands for 3-4 weeks in January – February (next year).
  - The adult stage (butterfly) is very short, covering only 1 week (February-April). It should be noted that the life cycle calendar varies from place to place.

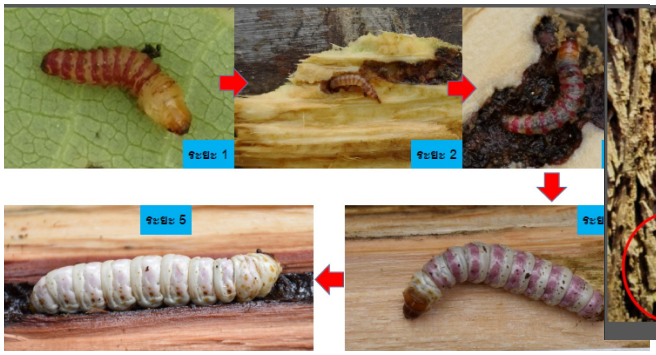
Not all caterpillars survive and can drill into trees. More than 90% are killed by predators, especially ants and environmental conditions. Based on literature, only 1% of caterpillars can drill.



Beehole borer life cycle, the caterpillar stages can be divided into 5 stages as follows:

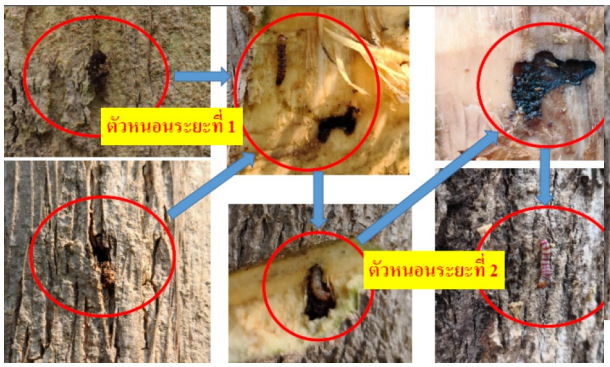


Relationship between life cycle and damaged teak wood

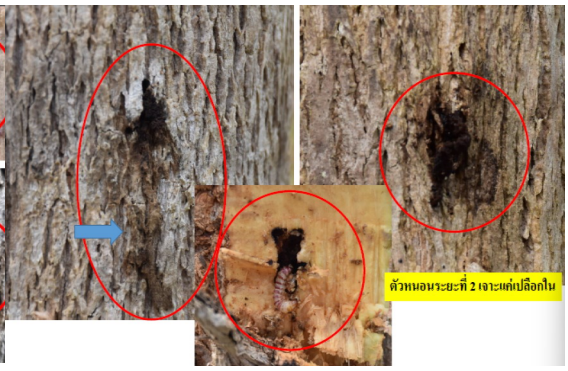


5 stages of caterpillar

Adult butterfly laying eggs (12,000-15,000) on teak bark



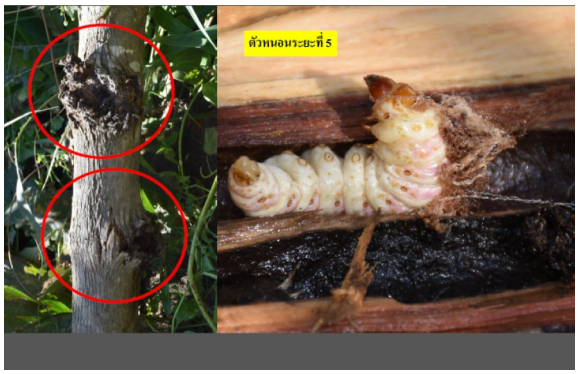
1st stage of caterpillar on teak bark (10-15 days after larvae stage) no damage



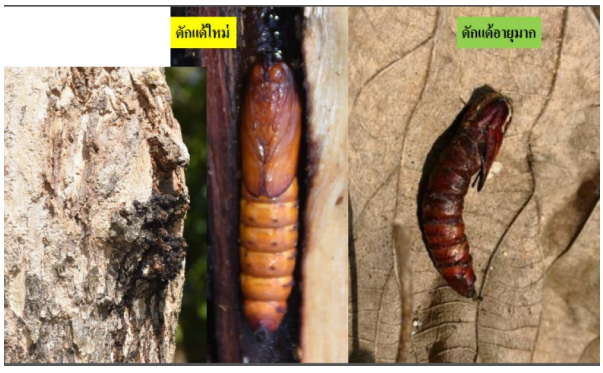
2nd stage of caterpillar inside cambium – little damage

3rd stage of caterpillar – inner bark and drilling into cambium - Moderate damage

4th stage of caterpillar – drilling in the core of heartwood – sever damage

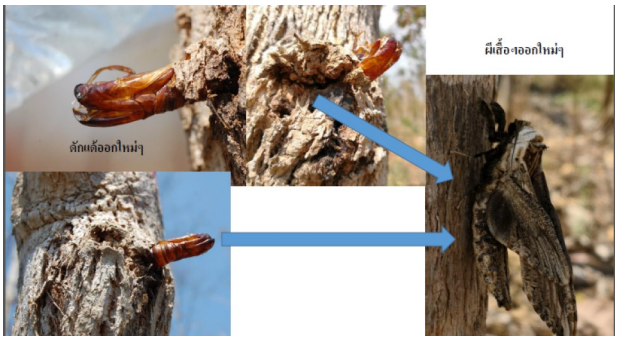


5th stage of caterpillar – drilling heartwood – sever damage



End of caterpillar stage and transform to pupa

Pupa stage

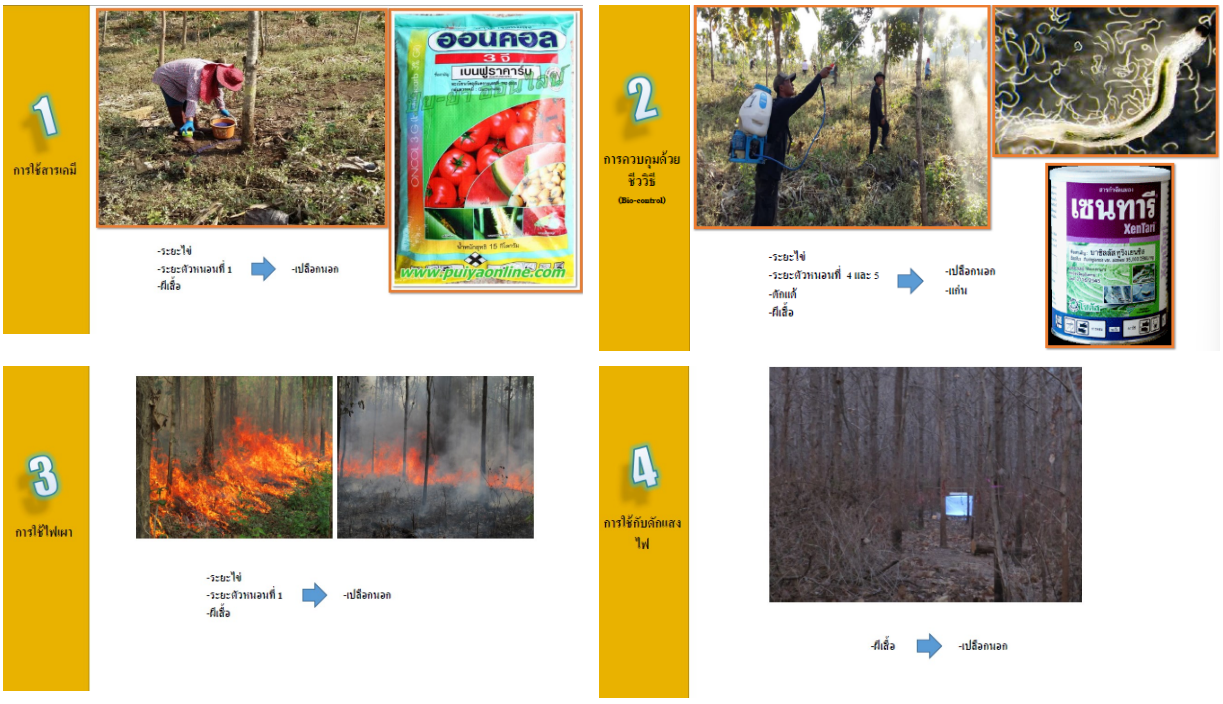


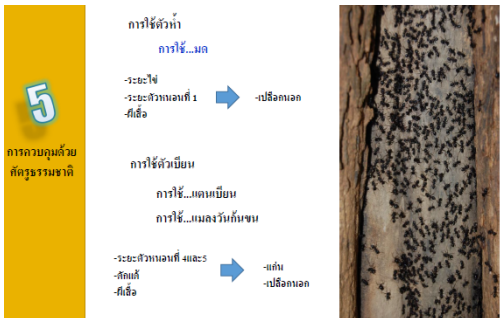
Adult stage

Lecture 2: Prevention and mitigation measures of teak beehole borers

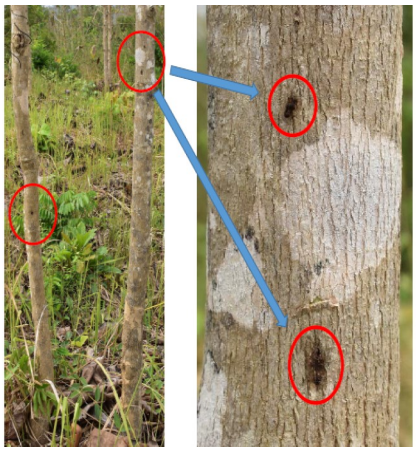
1. Beehole borer causes serious damage to teak plantations due to monoculture practice. This cultivation system lacks natural predators. In addition, climate change or long dry period may trigger the success of hatching and reduce washing capacity of eggs on teak bark. More research is recommended to prove the latter assumption.

2. Prevention and mitigation measure of teak beehole borers include a wide range of methods: 1) pesticide; 2) inoculation by fungal disease, *Beauveria bassiana*; 3) fire; 4) light trap; 5) natural predators; 6) direct mitigation (remove or kill); 7) incentive award; and 8) mixed plantations. In addition, mandatory destruction of affected teak plantations to mitigate the risk of further outbreaks of the disease such as avian Influenza Prevention strategy should be included.





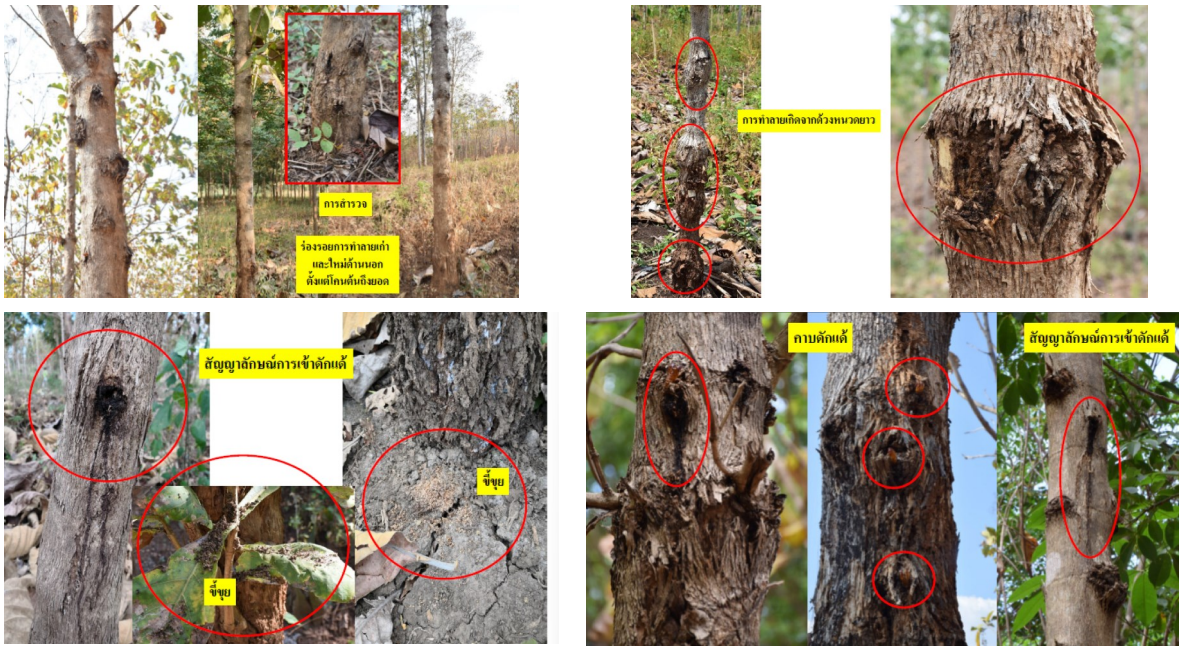
3. The application of the above methods depends on time and location (space), as well as environmental conditions in each site. For example, pesticide application is not suitable in area near human settlement. Light trap is feasible only in the adult stage (approximately 1 week in January – February). Fire management is cheap and effective during the hatching of egg and 1st stage of caterpillar. However, the zero-burn policy prohibits this method. Thus, this policy should be reviewed.



Lecture 3: Investigation and evaluation of affected teak trees

This lecture session covered 3 topics: 1) investigation; 2) evaluation; and 3) monitoring.

1. Selection of sample trees. The percentage of samples depends on time and resources. On each sample tree, the following data will be recorded: number of holes, stage of caterpillar, damage type/and extent, height and girth of sample tree, pupa evidence.



2. Data entry into sample sheets created is as shown below

การบันทึกข้อมูล

แปลงที่ 1, 2, 3, ...

(อายุสัก)

ต้นที่	dbh (ซม.)	H (ม.)	จำนวนรู	ระยะเติบโต	ลักษณะการทำลาย	จำนวนดาบดักแด้	พิกัด
1							
2							
3							
4							

ตัวอย่าง:

ต้นที่ 1 รูที่ 1 ระยะเติบโต? ลักษณะการทำลาย?

รูที่ 2 ระยะเติบโต? ลักษณะการทำลาย?

ถ้าบริเวณเปลือกใช้ถาก ถ้าเข้ากระพี้และเนื้อไม้สุ่มตัดจำนวน 5 ต้น

การแสดงผล

ระยะการเติบโตของหนอนผีเสื้อฯ

พื้นที่ (แปลง)	มค	กพ	มีค	เมย	พค	มิย	กค	สค	กย	ตค	พย	ธค
1												
2												
3												

หมายเหตุ 1. ไข่ 3. ดักแด้

2. หนอนระยะ1, 2, 3, 4, 5 4. ตัวเต็มวัย (ดาบดักแด้)

3. Classify the damage levels: low <10% of sample trees; moderate 11-30%; high > 31%. It should be noted that the damaged evidences of teak (sapling) less than 10 years old are usually less than 0.5 meter height, but teak older than 10 years, the beehole borer holes are higher than 2 meter and it is difficult to notice and mitigate the insects.

4. Monitoring the effects of beehole borers should be done regularly, either after teak trees are damaged or before damage occurs.

Lecture 4: Precision Management and Control Measures of Teak Borers

Based on the life cycle of beehole borer and evidence of damage, the prevention and mitigation measures should focus on teak tree less than 10 years old. In addition, field investigation should cover all year round starting from January. Target investigation of other stages may continue.

Training Workshop and field visit to Mae Li Teak Reforestation, Li District, Lamphun Province. There were 34 participants who submitted the completed evaluation questionnaires out of 40 participants. Besides collecting basic information of participants, the main objective of the evaluation was to assess the effectiveness and satisfaction level against the defined training objectives in order to improve logistic and content in the next training sessions.

Relationship between month (calendar) and stage of bee hole borer

Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Larvae	x	x											
Cater. 1st St.		x											
Cater. 2nd st.		x	x	x									
Cater. 3rd st.				x	x	x	x						
Cater. 4th st.						x	x	x	x				
Cater. 5th st.									x				
Pupa	x									x	x		
Adult		x	x										

Notes: shade @ Wang Chin Reforestation in Prae province; X @ Mae Li Reforestation in Lam Phun province

Relationship between month (calendar) and location of affected parts

Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Bark			x	x	x	x							
Cambium				x	x	x	x						
Wood						x	x	x	x				

Notes: shade @ Wang Chin Reforestation in Prae province; X @ Mae Li Reforestation in Lam Phun province

It should be noted that the behavior and life cycle stages of beehole borer vary from place to place according to environmental conditions (e.g., temperature, rain, wind) which have consequences on damaged areas. Nevertheless, the above table provides only general guidelines for investigation. The owners of teak plantation have to consider the above conditions carefully. Otherwise it is too late to mitigate or prevent the damage if caterpillar and pupa already drilled inside the wood.

Training Evaluation

The training results were evaluated and analyzed from questionnaires distributed to participants who attended the

Section 1. Personal information

Table 1. Gender Distribution

Gender	No. of Individuals	Percentage (%)
Male	18	52.9
Female	16	48.1
Total	**34**	**100**

The training workshop had a nearly equal gender distribution, with 52.9% male and 48.1% female participants.

Table 2. Age Distribution

Age class (years)	No. of Individuals	Percentage (%)
20-30	8	23.5
31-40	10	29.4
41-50	8	23.5
51-60	5	14.7
More than 60	3	8.8
Total	**34**	**100**

The attendees came from a wide range of age groups, with the largest group 31-40 years old (29.4%), followed by 20-30 years (23.5%) and 41-50 years (23.5%), respectively. A smaller percentage was over 51 years old (23.5%), with only 8.8% aged above 60.

Table 3. Affiliation of Participants

Affiliation	No. of Individuals	Percentage (%)
Royal Forest Department (RFD)	16	47.1
Forest Industry Organization (FIO)	7	20.5
Smallholder	11	32.4
Total	**34**	**100**

Participants were affiliated with different organizations, majority of 47.1% from the Royal Forest Department (RFD), smallholder farmers comprised 32.4%, and the remaining 20.5% came from the Forest Industry Organization (FIO).

Table 4. Educational Background

Education Level	No. of Individuals	Percentage (%)
Lower than Bachelor's degree	6	17.6
Bachelor's degree	19	55.9
Master's/PhD	9	26.5
Total	**34**	**100**

Regarding educational background, the majority (55.9%) held a Bachelor's degree, while 26.5% had a Master's or PhD degree. A smaller proportion (17.6%) had an education level below a Bachelor's degree.

Section 2. Satisfaction level and understanding

The check list questionnaire was designed and used to determine levels of satisfaction and subject understanding. There were eight questions as outlined in the Table 5 below.. Each question consists of five levels of satisfaction (very good, good, moderate, poor and very poor). The respondents selected only one answer that reflects his or her satisfaction (**Table 5**).

Table 5. Level of satisfaction and understanding

Subject	Very high (%)	High (%)	Moderate (%)	Poor (%)	Very Poor (%)
1) Receiving information prior to the training	47.1	32.4	8.8	8.8	2.9
2) Readiness of the venue (conference room, accommodation, field study site)	52.9	32.4	14.7	0	0
3) Training content on "Knowledge of insect pests affecting Plantation Pests"	67.6	32.4	0	0	0
4) Training content on "Precision investigation for Teak Borers"	70.6	29.4	0	0	0
5) Training content on "Precision Management and Control of Teak Borers"	67.6	29.4	2.9	0	0
6) Practical training in the forest plantation	52.9	35.3	8.8	2.9	0
7) Additional knowledge gained and met expectations	73.5	20.6	5.9	0	0
8) Overall training content	64.7	35.3	0	0	0

The overall satisfaction level of the training was very high. The highest satisfaction was the additional knowledge gained and met expectations, with 73.5% of participants rating it as "Very High" and 20.6% as "High". Other highly rated aspects included the training content on teak plantation pests and pest management techniques, with over 67% of respondents marking these as "Very Good". The readiness of the venue was also well received, with 52.9% rating as "Very Good" and 32.4% as "Good". However, the "Receiving information prior to the training," shows the lowest score among the 8 questions, where 8.8% rated it as "Poor" and 2.9% as "Very Poor". While practical training in the forest received generally positive feedback, a small percentage (2.9%) rated it as "Poor."

Section 3 Recommendations for improvement

Participants provided valuable recommendations for future improvements. Many participants suggested more training sessions and extend of the training duration. Some participants also expressed interest in expanding their knowledge to teak smallholders in Chiang Mai. Overall, attendees appreciated the program, found it is beneficial, and expressed a willingness to participate in future training sessions. The training organizers thank respondents for providing valuable comments, accepted their concerns and assure them improve in the next training sessions accordingly.

Conclusion

The Training Workshop on "***Precision Management and Control of Teak Plantation Pests***" organized as part of ITTO- BMEL Teak project contributed to the project Activity 1.2 strengthening smallholders and community-based teak and other valuable species plantation and management systems via training course. Beehole borer attack has been identified as a dangerous pest insect that causes severe damage inside the heartwood, reducing the quality and value of the marketable timber.

The training workshop delivered by Assoc. Prof. Dr. Decha Witwatwitaya of the KUFF covered 4 main topics:

1) Introduction to insect pests affecting teak plantation;
2) Prevention and mitigation measures of teak beehole borers;
3) Investigation and evaluation of affected Teak trees; and
4) Precision Management and Control of Teak Borers, that followed by hand-on practice at the teak plantation.

There were 40 participants from teak smallholders including the representatives of RFD and FIO in northern Thailand. Besides the participants' comments, the training instructor and the project team established a Line Group among the participants for regular communication and sharing of information. The RFD and FIO should implement nationwide control of insect pests, especially beehole borers. The zero-burn policy should be reviewed, with recommendations for early burning in high risk areas and further research on disease mitigation techniques. At the project level, a webinar on pest management and control will be organized in late 2025 with a plan of three experts from India, Myanmar and Thailand invited to share their knowledge and experiences.

Photo gallery

Opening session and lecture by Dr. Decha Wiwatwitaya


Introduction of Mae Li Reforestation Station, Lam Phun province (Mr. Atithep Phuttapong, Chief of Mae Li Teak Reforestation




Hand-on practices to identify affected trees and showing damage evidence



Damaged wood from caterpillar at 4th and 5th stages, and capture trap of adult butterfly

Participants and project team in the field trip at Mae Li Teak Reforestation

Report by
Yongyut Trisurat & PK Thulasidas
ITTO-BMEL project team

Join us for the ITTO-BMEL Teak project 2nd Webinar!

Tuesday, 22 April 2025 Time: 3:00 PM (Thailand local time)

Theme: "Quality Planting Materials for Premium Teak Production"

Via Zoom: Meeting link

The webinar series is part of the second phase of the ITTO project "Promoting Quality Timber Production in Smallholder and Community-based Teak and Other Valuable Species Plantations in the Tropics." The project, which is supported by the German government, has been under implementation since 2023 in Thailand, Cambodia, India, Indonesia, Viet Nam, and Togo in W. Africa.

5th WTC Registration now Open !

Early bird Registration Deadline 30 April 2025 !

We look forward to your participation! For any enquiries, please contact the Conference Secretariat at infowtc2025@gmail.com

For Registration:

https://worldteakconference2025.com/price/

Conference Webpage:

www.worldteakconference2025.com

Editorial Committee

ITTO –BMEL Teak Newsletter is a bi-monthly electronic newsletter of the Project Team which is intended for circulation among the stakeholders of global teak sector. The views expressed in the newsletter are those of the authors and do not necessarily reflect the views of the organization. The readers are welcome to express their opinions or pass on information concerned with teak. However, we reserves the information on the project and publishing through this newsletter for our esteemed readers.

Address all communications to:
TEAKNET Secretariat
International Teak Information Network
Peechi-680 653, Thrissur, Kerala, India
Tel: +91 487 2690396; Fax: +91 487 2690111
Email: secretariat@teaknet.org