ITTO-TEAK IN MEKONG

Bi-monthly online

Teak Mekong Newsletter

August 2021- Volume 3(4)

Inside this issue

TEAK Mekong Newsletter support and facilitates teak networking in the Mekong sub-region through ITTO member countries and partners, and support sharing lessons of the project results through short news release, occasional papers, project related teak-based research and development information. The bi-monthly newsletter is released online through TEAKNET webpage www.teaknet.org and co-hosted by Kasetsart University, Thailand.

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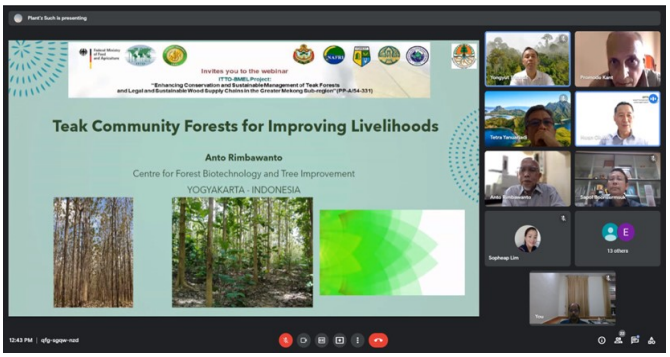
ITTO-BMEL Teak Project

6th Monthly Webinar

Tuesday, 29 June 2021

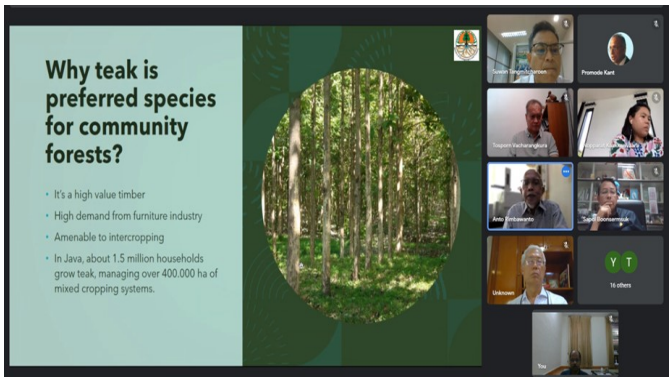
The 6th in the series of Monthly Webinar organised by ITTO-Teak project was held on 29 June 2021. Prof. Yongyut Trisurat, Regional Project Leader of ITTO Teak Project, Kasetsart University, Thailand was the moderator. Welcome remarks was delivered by Dr. Hwan-ok MA, ITTO, Japan. The lecture was given by Prof. Dr. Anto RIMBAWANTO of Centre for Forest Biotechnology and Tree Improvement, Yogyakarta, Indonesia on the topic *'Teak Community Forests for Livelihood Improvement in Indonesia"*.

Prof. Anto in his talk gave an overview of teak plantations in Indonesia with particular reference to community teak plantations. Comprehensive genetic improvement program of teak was started in 1987 with progeny trials and 120 clones were tested. Growth of improved clones at the age of 5 years was 18 cm in diameter and height 17.8 m with MAI of 14 m^3/ha/yr. Recently, they identified a superior clone named JUN claimed as fast growing teak harvestable at 8 years which is now available to farmers.

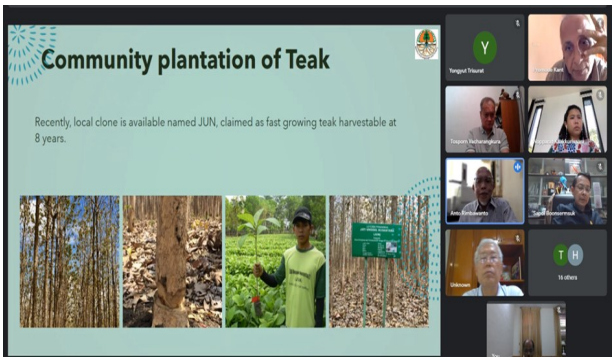


He continued to talk about teak in community forest plantation in Java. Due to its high value and demand in furniture industry, about 1.5 million households in Java grow teak, managing over 400,000 ha of mixed cropping systems. Most farmers used seeds/seedlings from unknown sources planted in their small block of land. Thinning was practiced but with the objective to harvest timber, poles and fuel wood.

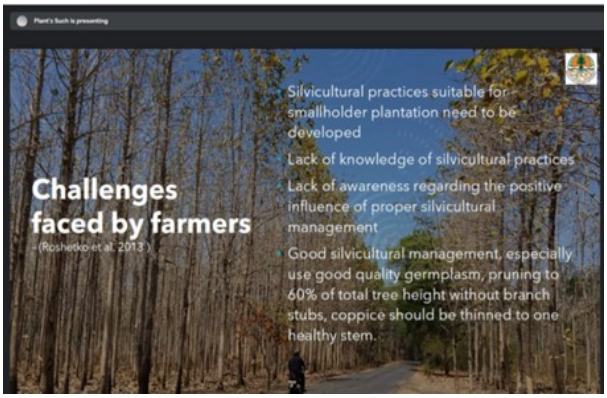
The common problem faced by the smallholder teak farmers are mainly the lack of knowledge and awareness about the positive influence of silviculturral practices on the wood quality and productivity enhancement of wood lots. Silvicultural practices suitable for smallholder plantations need to be developed for quality timber production.

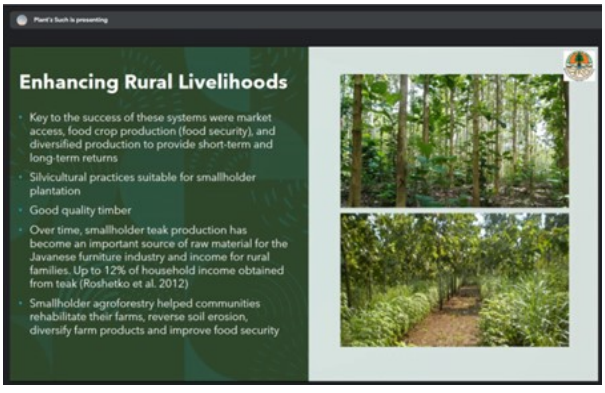


Smallholder agro-forestry helped communities rehabilitate their farms, diversify farm products and improve food security.



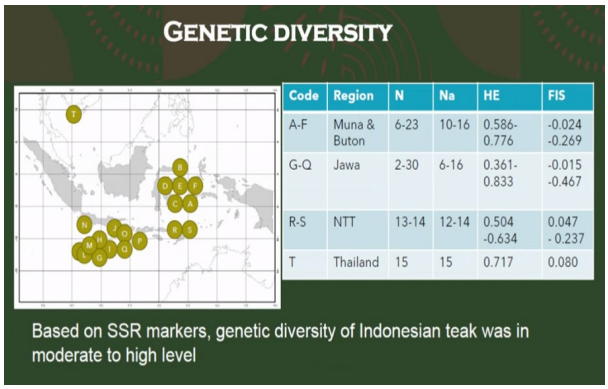
The demand for teak in Java is approx. 1.8 m^3/yr and the state owned forest plantations (Perhutani) supplies approx. 300,000 m^3 only and the rest 1.5 million m^3 is sourced from smallholder teak farms, plantations outside Java and by imports. The small-scale furniture industry of 15,000 units employs about 170,000 people generating over USD 1.2 billion per year.

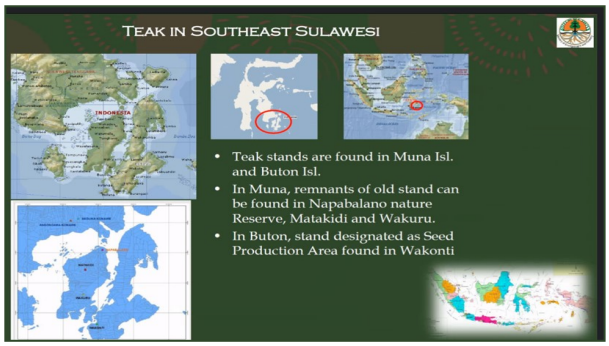




Dr. Anto further elaborated the role of DNA and molecular techniques in teak research used as an essential tool to study the genetic variation and diversity, quality control of seed orchard, true clonal identity critical for clonal forestry and assurance of legality and verification of source of origin.

In studying the teak supply chain using the molecular techniques, it was possible to accurately track the timber origin and any mismatch will reveal its incorrect identity of origin.





Genotyping studies using SSR markers, the genetic diversity of Indonesian teak populations are revealed to be moderate to high levels as shown in the pictures above.

Prof. Dr. Anto RIMBAWANTO may be contacted at rimba@indo.net.id

Propagation of teak for clonal testing: Part II (Cutting)

Ms. Chumnun Piananurak

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Clonal test is the field planting of many vegetatively propagated plants to estimate the relative performance of different genotypes. Clonal testing of 400 clones out of 500 selected plus trees in the Teak Genetic Improvement Program in Thailand has been conducted a decade ago. Clonal test of the rest of 100 plus trees is an activity proposed in the ITTO Teak Project in Mekong at a demonstration site in Maegar Silvicultural Research station, Phayao province, Thailand.

The clonal test of the rooted cuttings will be successful if the vegetative propagation material used is teak juveniles. One technique to rejuvenate the material of teak is budding or bud grafting. The progress of teak budding conducted at Maegar Silvicultural Research station is reported here as Part II (Cutting), and Part III will be reported in the future on the topic 'Preparing and Selection of Planting Sites'.

Cutting are cut off roots or leaves from the stocks and then induce the shoots and roots. The use of chemicals to help and / or provide suitable environmental conditions in the mist chamber as shown in the picture above. The new plant will be always genetically identical to the stocks in all respects, capable of multiplying large number of plants starting with a few,easy to use, fast, low cost, and no need for special techniques like grafting, persistence or tissue culture.

How to ....

1. **May:** Cut off half of leaves and terminal of the 1st shoots (see picture below).

2. **June – September:** cutting test 6 times ...

1st branch harvesting at 10-12 June 2020, rooting at 15 July 2020

2nd branch harvesting at 24-26 June 2020, rooting 22 July 2020

3th branch harvesting at 1-2 July 2020, rooting 2 August 2020

4th branch harvesting at 15-16 July 2020, rooting 9 September 2020

5th branch harvesting at 6-7 August 2020, rooting 14 September 2020

6th branch harvesting at 28-29 September 2020, rooting 4 October 2020

3. **June – September:** cutting test 6 times...(later)




4. **Tending of teak nursery**


Factors affecting rooting of cuttings

The rooting success of cuttings depends on 3 main factors: the stocks or the hedge orchard, the branch and the cuttings environment.

Schedule of Teak Clonal Test 1st Year (2019 – 2020)

Activities	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1. Budding	←	—	—	—	→							
2. Cutting								←	—	→		
3. Tending of Nursery						←	—	—	—	—	—	→
4. Contact for planting in 3 sites									←	—	—	→

2nd Year (2021)

Activities	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1. Tending of Nursery	←	—	—	—	→							
2. Preparing planting sites						←	→					
3. Hardening of seedlings							←	→				
4. Planting								←	→			

In picture: Manager, Silvicultural Research Station, Payao Province, Thailand

(First part of the article has been published in Volume 2 (3): 2020)

ITTO-BMEL Teak Project

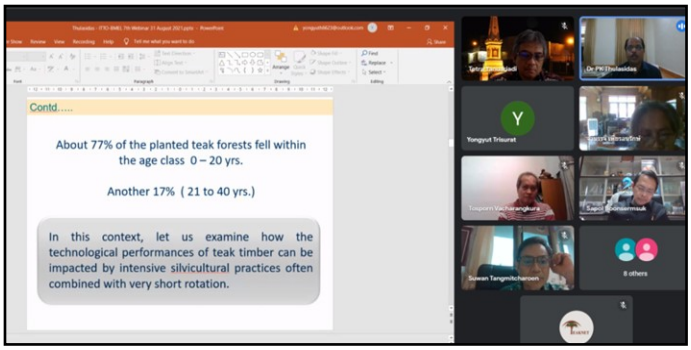
7th Monthly Webinar

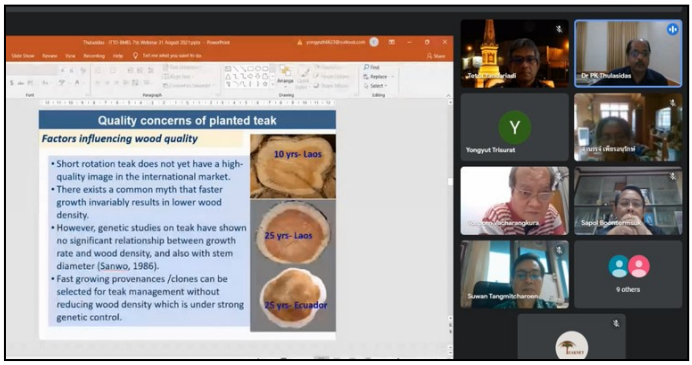
Tuesday, 31st August 2021

The 7th Webinar Series of ITTO-BMEL Project was conducted on 31st August 2021 and the talk was delivered by Dr. PK Thulasidas, Senior Scientist & Head, Wood Science & Technology Dept and Former TEAKNET Coordinator, Kerala Forest Research Institute, Kerala, India on the topic "*Wood Quality of Planted Teak: Impact on End-users' Requirements*". Prof. Yongyut Trisurat Project Team Leader of ITTO Teak Mekong, Kasetsart University, Bangkok was the Moderator and opening remarks was delivered by Dr. Hwan-ok MA, ITTO, Japan.

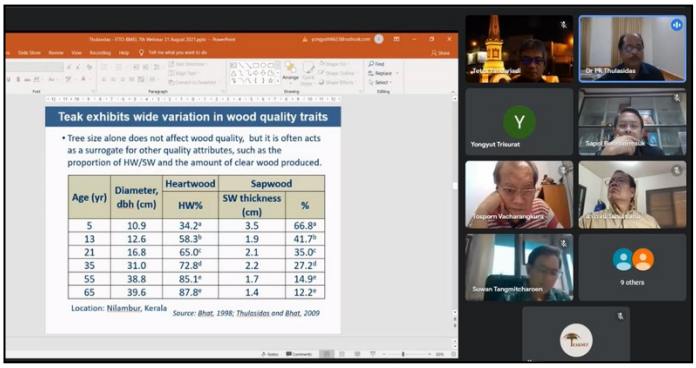
The focus of the talk was mainly concentrated in particular, the wood quality of teakwood produced and marketed from short-rotation teak plantations. For centuries teak has been the logical choice for the construction of the most engineered and exposed structures such as sea going ships and vessels besides an array of various end-uses both interior and exterior applications. The high durability coupled with high quality, aesthetic properties and easy plantation establishment and faster growth have made it one of the most potential species for planting in the tropics under sustainable forest management.

The estimated market share of teak logs <2% of total tropical roundwood production of 253.1million m^3 (ITTO, 2017-18). Mean annual increment (MAI) reported from fast growing plantations appears to be modest to the tune of 7-10 m^3/ha/yr except for Central and Latin America where most of the plantations are managed by private sector. Teak mature around 21 years of age as per recent studies.





Teak exhibits wide variation in wood quality traits. Tree size alone does not affect wood quality, but it is often acts as a surrogate for other quality attributes, such as the proportion of HW/SW and the amount of clear wood produced.

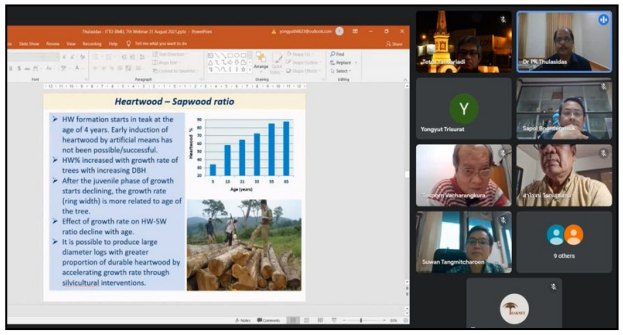


Short rotation teak is not necessarily inferior in terms of density and strength, in fact these properties are optimum at the maturity age of teak at 21 years. However, heartwood/sapwood ratio is slightly low (20-25%) and its quality attributes such as wood colour which is paler at young age of 5 to 15 years. Density being a heritable trait cannot be altered by environmental manipulations.

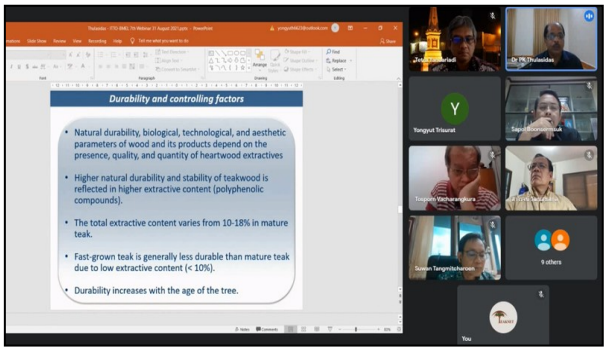
Factors influencing wood quality

Teak prices are very closely related to wood quality

Wood quality factors	Wood properties	Remarks
1. Aesthetic properties	➢ Colour ➢ Grain ➢ Texture	Constitutes Wood 'Figure'
2. Physical	➢ Shrinkage ➢ Ratio tangential /radial shrinkage ➢ Moisture Absorption (fibre saturation point)	Link to dimensional stability
3. Geometrical	➢ Heartwood/sapwood ratio ➢ Bole shape ➢ Knots characteristics	Important parameter directly related to sawn timber recovery
4. Mechanical	➢ Modulus of Elasticity (MOE) ➢ Modulus of Rupture (MOR) ➢ Maximum crushing stress (MCS) ➢ Hardness ➢ Growth stresses	Correlated with specific gravity and maturity state of wood (pith to bark variation- Juvenile nature)
5. Biological	➢ Decay resistance ➢ Insects resistance ➢ Weather resistance	Related to natural durability that links to extractive content present in heartwood



By accelerating growth of teak by suitable selection of superior germplasm with fertilization, irrigation and proper silvicultural management, clear cylindrical bole having large diameter logs with high proportion of heartwood can be anticipated. Teak grow fast in initial few years - juvenile phase of 20-25 years, and thereafter the growth is more related to the age of the tree. Heartwood percentage increased with age of the tree.



The high durability of teakwood is due to the presence of heartwood extractives (polyphenolic compounds) and the fast-grown teak is less durable because of low extractive content (<10%). In order to obtain durable heartwood for exterior applications, the tree may retained for 40 years or more, disregarding the short-term investments made.

Teak in smallholder farming systems

Teak - an important tree crop in home-garden forestry/ smallholder agroforestry systems and community plantations in many South and Southeast Asian countries like Indonesia, Lao PDR and support their livelihoods .

- Farmers plant and manage trees without any specific silvicultural practices like thinning and pruning.
- Teak timber produced is often sub-standard in quality and fetches very lower market prices.
- No scientifically based recommendations are made available to the farmers to produce quality timber from these community plantations by adopting appropriate management practices.

Breeding for wood quality

Teak exhibits geographic/ provenance variations in the timber characteristics such as wood figure and also in anatomical and mechanical properties.

- Genetic manipulation for accelerated growth can be advantageous in terms of heartwood volume per tree, specific gravity and timber strength of short-rotations teak of 20 years as revealed from phenotypically superior trees.
- Production of genetically improved quality planting stock is a pre-requisite for increased productivity of teak plantations.
- Teak clonal forestry is an option for establishing fast growing plantations of outstanding genotypes with enhanced yield and high wood quality.

Teak grown by smallholder farmers seldom undertake any silvicultural practices like thinning and pruning and as a result, the log produced are having knots and other visual defects that ultimately affects the sawn timber recovery and fetches low price in the market. They may be supported with good germplasm material and proper training in timber management and market access may be provided.

Production of genetically improved quality planting stock is a pre-requisite for increased productivity of teak plantations. Teak clonal forestry is an option for establishing fast growing plantations of outstanding genotypes with enhanced yield and high wood quality.

Contd....

- **Genetically improved planting stock may be supplied to smallholder farmers** for quality production of teak in wood lots and their livelihood enhancement.
- **The wood properties such as colour, grain, texture, wood density etc. of teak from young plantations are slightly different** and fetch lower prices in the market than the naturally grown teak or plantations of 50-60 years.
- **It has now been proven that plantation –grown small dimension teak is not inferior** to natural teak in terms of density, strength properties and shrinkage.
- **Teak can produce the timber of optimum strength and density at 20 years of age**.

Some tips for teak timber management

- **Plantation managers can aim at producing large diameter logs** with greater proportion (larger cylinder) of heartwood per tree by accelerating the tree growth in short rotations of 20-25 years.
- **Plantation grown teak does not yet have high –quality image** in international market, and it is questionable whether it will ever reach such quality at shorter rotation period, especially to achieve durability.
- **Wood quality can be improved through the selection of superior planting material**, proper site selection and best silvicultural management practices, that helps to achieve a modest yield to about 8-10 m^3/ha/yr.

Dr. Thulasidas concluded his talk by giving some tips for teak timber management in fast growing teak plantations of shorter rotation. He says that as per available records, the demand for teak timber is continue to be very high. The global trade of teakwood is just around 1.2 million m^3 out of which 1 million m^3 is targeted towards Indian markets. The rest of import is to Thailand, China and Vietnam.

Contd....

- **Fast growing provenances /clones can be selected for teak management** without reducing wood specific gravity which is under strong genetic control.
- **However, matching the provenances for specific site conditions (site matching)** and product requirement appears to be most crucial in tree improvement programme.
- **Heartwood percentage increased with growth rate** of trees with increasing DBH and the effect of growth rate on the heartwood-sapwood ratio seemed to decline with age.

Contd....

- **Higher natural durability and stability of teakwood is reflected in higher extractive content.** Fast-grown teak is generally less durable than mature teak due to lower amount of extractives.
- **it is advisable to retain the teak trees for longer rotations of above 40 years or more** in order to obtain highly durable teakwood for specially products and for external applications, disregarding the short-term investments and benefits.

The domestic annual production of teakwood in India is around 50,000 m^3 only which is insufficient to meet the domestic demand of around 57 million m^3 roundwood equivalent and is mostly met by imports.

Editorial Committee

ITTO Teak Mekong 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.

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