ITTO-TEAK IN MEKONG

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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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Policy Brief

Genetic Conservation of Teak (*Tectona grandis* Linn.f.) in Mekong Sub-region

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"Enhancing Conservation and Sustainable Management of Teak Forests and Legal and Sustainable Wood Supply Chains in the Greater Mekong Sub-region"

(PP-A/54-331)

Summary

High potential demand of teak in global timber markets enhanced the expansion of teak plantation with short rotation of 20-25 years to return of investment in short time. The majority of seeds used in widely established teak plantations in about 70 countries across the world are from unknown sources without considering their genetic structures. This may lead to genetic erosion and reducing genetic diversity which will result in decreasing timber quality and productivity. Germplasms of teak are transferred to many countries for the establishment of teak plantation, no seed transfer guidelines or seed law of teak has not been formulated yet.

Genetically improved planting materials of teak are insufficient for the rapid and large-scale expansion of teak plantations even in its native countries, India, Myanmar, Thailand and Lao PDR. Conservation and timber production activities should be harmonized to conserve the natural genetic resources of teak while considering to meet the demand of global markets from teak plantations. Though there are some arguments of the quality of timber from plantation is comparable to timber from natural forests or old plantations, those prices cannot be compared. Price of timber from natural or old teak plantation is much higher than from plantation with short rotation. Prior to the heavy loss of irreplaceable and valuable natural genetic resources of teak, intensive and effective conservation programs as well as breeding program should be conducted with the collaboration of teak growing countries.

Introduction

Moderate estimated area of teak forests including natural and planted forest across the world was over 34 million ha including 29 million ha of natural teak forests in four countries. Prior to the drastic loss of teak from natural forests, teak plantation was started in its native countries and it was introduced to outside of its native regions since seventh century in Java, Indonesia. Teak harvesting from natural forests have been banned since 1980s apart from Myanmar to replenish the degraded natural forests. More artificial teak forests continue to expand because of its high potential demand and to supplement the decreasing supply of timber from natural sources for meeting the demand of world's timber markets. Total moderate estimated teak plantation area at the global level is 4.35 to 6.89 million ha up to 2017 which assumed to be underestimation because of unavailable data. In some countries, trend of teak plantation strategy is changed from government agencies to smallholder farmers and private companies who are interested in profits from teak plantations. In Myanmar, teak is designated as royal tree and owned by the government wherever it was grown, and no one has the permission to establish teak plantation apart from government agency prior to the private sector could establish teak plantation with government concession since 2006. Nowadays, small scale teak plantation can be managed by the smallholder farmers and planted even at the boundary of their lands. In Mekong region except Myanmar, the majority of teak plantation was established by companies and smallholders.

The first teak introduced countries used the seeds from four native countries and those plantations are used as secondary seed sources of further plantations. At present, artificial gene flow of teak has already occurred without any prohibition. Genetically improved planting materials of teak is insufficient for the large-scale plantation as the breeding program of teak is not well equipped. Currently, established teak plantations everywhere are only for production and no consideration of genetic matter due to the inadequate supply of genetically improved planting materials even in native teak growing countries.

Use of genetic resources of teak

Genetic diversity of natural populations of teak from India and Myanmar are comparatively high though Thailand and Lao teak are lower than that of plantations in native regions and landraces. Comparative genetic diversity of plantation indicated either many seed sources or high genetic diversity of original seed sources. Teak seeds from native countries, especially India, Myanmar and Thailand were introduced to many countries for plantation establishment which became secondary seed sources of further ones and breeding populations for production of planting materials. Some of the natural teak populations and many plantations with superior performance are designated as seed production areas (SPAs) of teak and intensive and timely management are needed. Compared to total estates of existing teak natural and planted forests about over 34 million ha, very minority portion is used as seed sources that indicated insufficient improved planting materials even in native countries. The majority of existing teak forest areas is mainly used for production purpose. Some natural forests and plantations are used for genetic conservation through retaining the plus trees and designating seed production areas.

Current genetic conservation activities

Genetic information of overall natural teak population is investigated using the reliable molecular markers. Highest genetic diversity in Southern India teak populations, followed by similar level of diversity in Northern India and Myanmar teak, Thailand and Lao teak have the low diversity. Significant positive correlation of genetic distance to

Fortunately, teak plantations with comparative genetic diversity of natural populations and superior performance are used for seed production areas. Natural genetic resources of teak are conserved as a means of *in situ* in the form of designating seed production areas and plus trees. As a complementary, *ex situ* approaches are practiced through the establishment of gene bank, clones bank, clonal and seedling seed orchards, and hedge garden. For the identification of better populations and elite plus trees, provenance trials and progeny trials have been established in both native teak growing regions and introduced countries as part of conservation activities. Degraded natural teak forests are replenished by teak logging ban and also conducted enrichment planting using teak in all native countries.

Though teak improvement and breeding programs have been started in India through the establishment of provenance trial in 1930s, genetically improved planting materials are still inadequate to supply the target teak plantations even in native countries. Tree improvement and breeding programs of teak are more advanced in some teak introduced countries than native countries, like Costa Rica and Brazil, where they produce mass production of clonal materials for plantations.

Key Findings

* For large-scale plantation establishment, insufficient genetically improved planting material is a problem in both native and planted teak forests due to unsynchronized flowering and no flowering of clones from different ecotypes resulted in low seed productions of CSOs, SSOs and limited seed available from SPAs due to poor management and weak efforts on breeding activities.
* Even though high genetic diversity is crucial for plantation to be resistant from the risk of insect and pest disease, adapt to changing environments and climate, high genetic diversity of CSO is positively correlated with low seed productivity due to unsynchronized flowering that suggests clones from different ecotypes should not be planted for seed production purpose.
* Priority on genetic conservation and breeding program of teak is low compared to timber production especially in teak native countries.
* No restrictions on transfer of teak seeds by seed rules or law in a country though genetic distance is positively correlated with geographic distance and it shows significant geographic variation within and among regions.
* Data record and management is weak for both genetic conservation and plantation activities of teak, eg., clones' information and seed sources. But, number, source and layout of clones in each CSO is important for effective management.
* Trend of teak plantation establishment is changed from government agencies to companies and smallholder farmers who have only economic interest, not much knowledge on management of plantations.

Recommendations

1. Concentration on genetic conservation and breeding program should be increased to promote the maintenance of genetic resources, especially in teak native countries and mass production of genetically improved planting materials.
2. More specific genetic conservation strategy harmonized with production through plantation management should be developed. Both *in situ* and *ex situ* methods should be used to ensure the maintenance of genetic diversity of natural teak forests and plantations through international collaboration of teak in native and introduced countries.
3. Zonation of teak should be designated as priority based on genetic and environmental factors such as climatic and edaphic factors. Then clone or gene banks for conservation, clonal and seedlings seed orchards (SSOs) for seed productivity should be established using germplasm from same area in respective zones. Furthermore, site selection for CSO should be carefully done to secure high seed production and isolation from contamination of outside pollen.
4. To overcome inadequate seeds from designated seed sources (CSO, SSO and SPA), shoots of seedlings derived from genetically improved seeds and from vegetative multiplication gardens should be intensively practiced for mass production of plants with more genetic gain.

5. To maximize the profits from plantation, higher genetic gain materials should be used to get more profits in short time. Though cost of genetically improved teak seedlings is high compared to other species, the gain from them is very large due to its timber value. However, it is important to realize that the genetic gain from the breeding could be lost if inadequate rotation times or over density of planting per hectares are applied.
6. Comprehensive investigation on genetic information of natural populations and plantation used as seed production areas should be conducted and the information should be applied in conservation and production of planting material of teak.
7. Continuity and recognition of the importance of conservation techniques as well plantation techniques are key factors for the success. Therefore, capacity of tree breeders, plantation owners, smallholder farmers and implementers should be promoted for the highest returns from teak plantation without occurrence of genetic erosion in short time.
8. Establishment of CSO and progeny tests should be paralleled to ensure the genetic materials which is available from plus tree even if they are lost, to reduce the time for tree breeding. By doing so, the results of progeny test indicate the final elite plus trees to be selected and mass production of genetically improved materials can be produced before reaching the final goal of breeding.

ITTO-BMEL Teak Project
4th Monthly Webinar

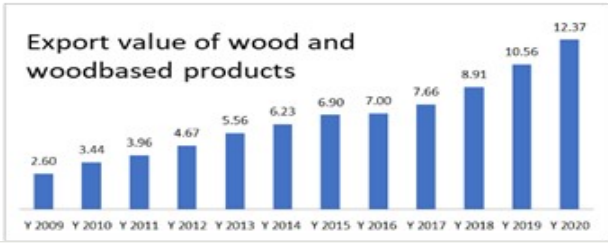
Friday, 30th April 2021

Cambodia, Lao PDR, Thailand and Vietnam Time: 2:00 –3:30 pm,
Myanmar Time: 2:30-4:00 pm, Japan: 4:00-5:30 pm

The 4th in the series of Monthly Webinars planned by the ITTO-BMEL Project team coordinated by the Kasetsart University, Bangkok was conducted on 30th April 2021. The Webinar was moderated by Prof. Yongyut Trisurat, Regional Project Leader of ITTO Teak Project, Kasetsart University, Thailand. Opening remarks was delivered by Dr. Hwan-ok MA, ITTO, Japan. The talk was delivered by Dr. Tran Lam Dong of the Vietnamese Academy of Forest Science and the National Coordinator of the project on *'Value chain analysis of Acacia timber in Vietnam and Teak Timber in Laos'*

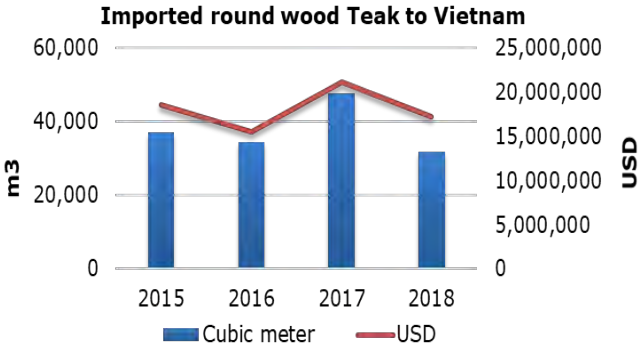
The talk was mainly concentrated on the outlook and overview of forestry sector activities in Vietnam followed by the plantation sector and teak which constitutes only few thousand hectares in the smallholders. Teak is not an important plantation species in Vietnam and the major plantation species cultivated is Acacia. Planted forests constituted about 4.4 Mha of which Acacia plantation alone occupies 2.2 Mha. Vietnam is the largest exporter of wood chips in the world.

Dr. Dong elaborated the Vietnam timber production scenario for the year 2020. Of the harvested timber of 30 million m3, Acacia and Eucalypts account for 20.5 M m3 as shown in the figure below.



Species	Area (ha)	Major product
Acacia	2.200,000	Woodchip, paper, energy pellet, veneer, small board, furniture
Rubber	900,000	Latex, small board, furniture
Pines	250,000	Resin, paper, small board, furniture
Eucalypt	200,000	Woodchip, paper, energy pellet, veneer
Bamboo	80,000	Paper, handicraft, construction
Indigenous and others	770,000	Watershed protection, NTFP, furniture, construction
TOTAL:	**4.400.000**	

Teak timber imported to Vietnam is around 40,000 cu.m /year, with price of 550 USD/m3 for round log and 750 USD/m3 for square log, on average. Mostly round wood from Brazil (~ 30%), Costa Rica (~ 20%), Panama (~ 15%) and the rest from Colombia, Ecuador and Africa. Since the cost of teakwood is higher, the common people used it for speciality furniture and the imported material is reprocessed in the country and exported.



He continued to talk about the Value Chain framework in Vietnam for the plantation timber and methodology adopted for the analysis.

The findings of VCA analysis of Acacia in Vietnam revealed that the growers still prefer short rotation plantations because of :

⇒ A high demand of woodchips;

⇒ Increased risk of hurricanes with long rotation plantations;

⇒ Increased risk of defects and borers in large sized logs;

⇒ Generally, growers are poor and older people. They can't wait for income;

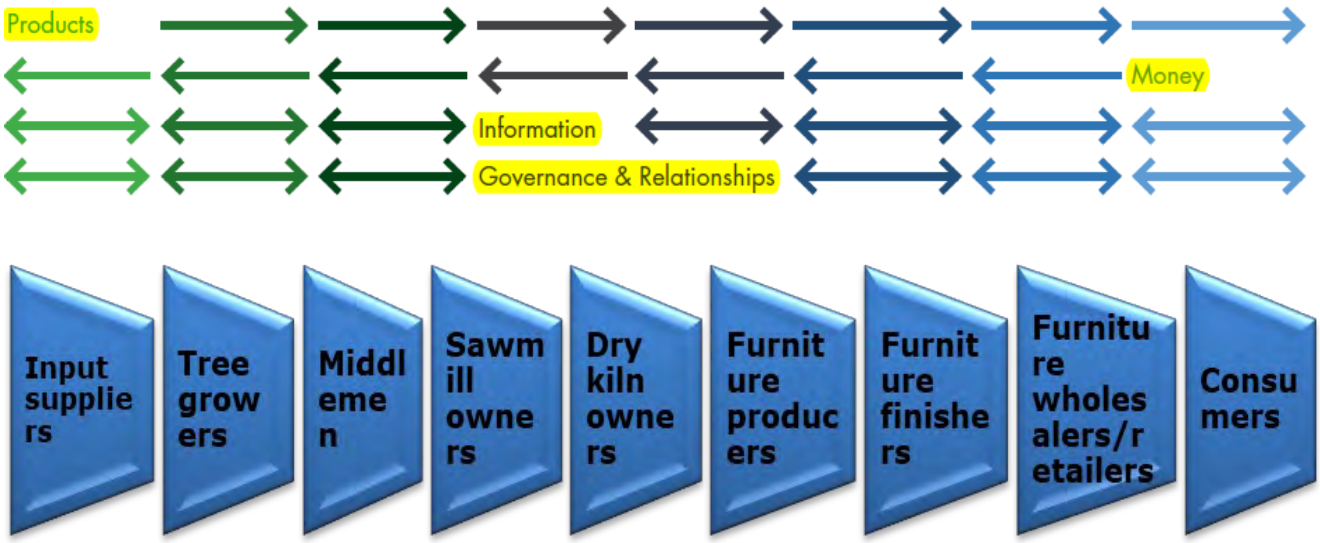
⇒ Growers sell trees as lot (plantation), so, they have poor understanding of logs size and the price relationship;

⇒ Small logs can be loaded onto regular trucks manually without expensive, heavy machinery; and

⇒ Group FSC Certification [with full cost] is hard to realise because of

- Scattered nature of smallholders; and
- Price difference between certified & non-certified logs is narrow

Value Chain Framework



Are middlemen necessary actors of supply chain ?

Middlemen gets 7 to 10% benefits and they are essential part of the supply chain because

- they are well equipped and have good knowledge and skills in predicting log volume and costs across a range of geographical areas;and
- Good relationship with downstream and upstream actors/firms, & also with local villages/commune leaders.

Hence, eliminating middlemen could be counterproductive. Instead, it will help them to improve skills and knowledge.

The VCA analysis of Teak in Lao PDR

Comparative financial analysis of teakwood value chain analysis undertaken in the Paklay District of Lao PDR recommended government interventions in the following areas:

* Improve the quality of teak seedlings and supply them to growers,
* Train farmers and encourage them to thin at age 5-6 years to produce bigger trees more quickly,
* Support sale of logs by quality and grade,
* Foster the role of traders as providers of vital services for growers and processors,
* Eliminate, or at least simplify, current registration, harvesting, transportation rules, regulations and costs, and
* Create a supportive investment environment for traders and timber processors.

The key differences of working environment of trader/ middlemen in Vietnam and Laos can be understood from the below table.

Vietnam	Laos
Up to 20 middlemen in a commune	4-5 in whole Paklay District
Profit 7—10%	Profit 3.5%
Well-equipped with many staff	Poorly equipped, and no permanent staff
Aggressive way of hunting sellers/growers	Only "on call" (when people knock the door)
Receive advance payment in some cases (high competition among PC)	Need to wait for >2 weeks after delivery of products for payment
Good relationship between MM & PC	Poor relationship between MM & PC
Working under simple regulatory environment	Working under complex regulatory environment
Trying to stick on job	Trying to exit

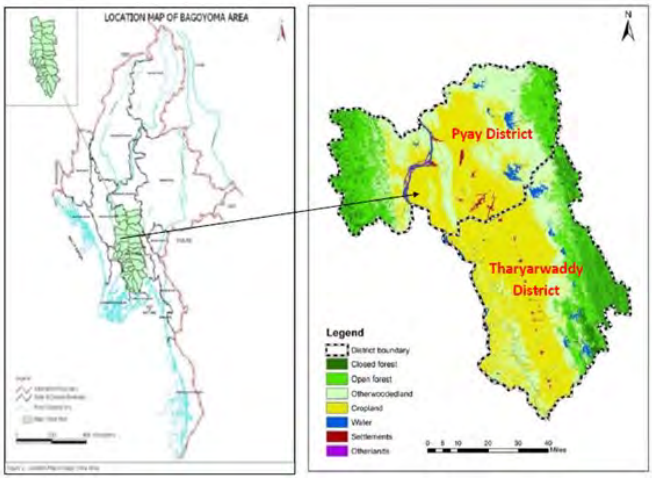
ITTO-BMEL Teak Project
5th Monthly Webinar

Friday, 28th May 2021

Cambodia, Lao PDR, Thailand and Vietnam Time: 2:00 –3:30 pm,
Myanmar Time: 2:30-4:00 pm, Japan: 4:00-5:30 pm

The 5th in the series of Monthly Webinar was held on 28th May 2021. The Webinar was moderated by Prof. Yongyut Trisurat, Regional Project Leader of ITTO Teak Project, Kasetsart University, Thailand. Opening remarks was delivered by Dr. Hwan-ok MA, ITTO, Japan. The talk was delivered by Ms. Soozin Ryang, Program Officer of Regional Education and Training Centre of AFoCO Scretariat, Hmawbi, Yangon, Myanmar on *'Integrated Pest and Disease Management in Teak Plantations in Myanmar'*. The webinar was attended over by 26 experts mostly from S-E Asian region.

Ms. Soozin talk was mainly concentrated on the AFoCO's Teak project on integrated pest and disease management (IPDM) in Bago Yoma region of Myanmar for a period of 5 years in collaboration with FRI and Forest Department.



The specific objectives are:

* To manage sustainably Teak forests through effectively integrated pest and disease management;
* To improve capacity and facilities for pest and disease research and management for Teak forests; and
* To create a network for Teak pest and disease management.

The goal was to contribute to maintaining healthy forests and the vitality of the West BagoYoma Region through exploring pest and disease lists, their possible control and prevention measures, and enhancing capacity building programs for all stakeholders.

Project Outputs

At the end of the project, the stakeholders will be able to:

1. Understand factors of outbreaks of pests and diseases (e.g. seasonal incidence, level of severity and relationship between the outbreaks of pests and diseases);
2. Launch the monitoring system for the respective type of pests and diseases;
3. Equip enhanced capacity on the systematic pest and disease management;
4. Run the upgraded diagnostic laboratory and museum in the Forest Research Institute (FRI) of Myanmar; and
5. Form the Teak Forest Pest and Disease Management Working Group in Myanmar.

At the end of the project it is anticipated that long-term measures for effective pest and disease control mechanism evolve and productivity enhancement of teak plantation and healthy teak forests become a reality.

Project Milestones

She then gave an overview of the prime activities of AFoCO and its strategic action plan.

AFoCO headquarters is based in S. Korea with 13 member countries and 2 Observers in S-E Asian region and the Regional Education and Training Centre (RETC) is located in Yangon, Myanmar which is operational since 2018.

AFoCO Strategic Plan

Prof. Yongyut Trisurat, Regional Project Manager in the final lap of the webinar presented the details of the proposed publication of *"Sustainable Management of Teak in the Mekong Region"* as an ITTO lead initiative to disseminate the project findings to the larger audience beyond project partners for the sustainable management of teak forests in the Mekong sub-region.

Upcoming Events

XV World Forestry Congress

2–6 May 2022 | Coex, Seoul, Republic of Korea

New Call for Abstracts Open !
Deadline 30 June 2021

Authors who do not had an opportunity to submit abstract in the previous call are strongly encouraged to submit during this second call for abstracts. For more details, visit Congress website: https://www.wfc2021korea.org/sub02/abstract.html

TEAKNET Side Event at WFC 2022 !
New opportunities for Teak sector in the post COVID-19 Scenario

Organisers

TEAKNET International Teak Information Network

IUFRO International Union of Forest Research Organizations

ITTO International Tropical Timber Organisation

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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