



**Volume: 4 Issue: 4**  
**October 2011**

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**Editorial**

Over the past two years, TEAKNET has been making a steady progress by way of its information dissemination and networking activities. In the recent past, the pace of progress has quickened with announcement of several conferences and workshops on teak. One such programme recently completed is the training programme on teak held at KFRI, Peechi during 31 August- 3 September, 2011. A preliminary report on the programme is included in this issue. A more detailed version will soon come out as proceedings of the programme.

Another development has been that Dr. Daniel Baskaran Krishnapillay, one of the veteran teak researchers, who has been with TEAKNET for so long a time, is leaving the Steering Committee of TEAKNET. The organization wished to issue a farewell note on him in the bulletin and complied with the same in the current issue of the Bulletin.

Not many may be aware of the massive teak planting programme initiated by Thailand to commemorate the 84<sup>th</sup> birthday celebrations of the beloved King of Thailand.

It is an attempt worth copying in other countries in the region. Although shrouded in highly religious feelings of the Thais, the programme has much scientific and social content. Mr. Jutamas Pornchai and Paiboolya Gavinlertvatana have given a description of the whole project named 'The Crown Princess's Project of Thailand' for the benefit of the readers.

TEAKNET while wishing all its readers a good time, also invites the readers to join the international conference in Costa Rica and also the TEAKNET Partner Event in China due in October- November this year.

With best wishes,  
K. Jayaraman,  
TEAKNET Coordinator



## Farewell message to Dr. Daniel Baskaran Krishnapillay, who is leaving the Steering Committee of TEAKNET



Dr. Daniel Baskaran Krishnapillay, was associated with TEAKNET since its inception. He was a member of the Steering Committee of TEAKNET for a number of years and presently he wishes to leave the committee due to his preoccupation with the Pulau Banding Foundation. TEAKNET wishes to thank him for his exemplary service and wishes him all success in his present regular occupation.

Prior to joining the Pulau Banding Foundation as its CEO effective from 1<sup>st</sup> January, 2009, he had been working at the Forest Research Institute of Malaysia. He started out there as a research officer and rose up to be a Senior Director in the Institution.

His doctoral specialization had been in the field of cryogenic storage of germplasm of tropical forest species. Over the years at the Institution, he was involved in the biotechnology aspects of forestry. In 1996, he became Director of the Division of Forest Plantation and was later promoted as the Senior Director of the Division of Biotechnology until March 2006 when he officially retired from service. He was reemployed as a contact officer and was assigned the job of Advisor to the Director General of FRIM on matters pertaining to research in biotechnology until he officially left the service in the beginning December, 2008 to take up the present position.

Dr. Daniel Baskaran during his tenure as a staff member of FRIM was actively involved in research. He has to his credit more than 100 papers published in journals and in proceedings. He has contributed chapters to a number of scientific books, edited a number of proceedings and two books. He also had been actively representing his previous Institute in various Local, Regional and International Scientific Organizations and has served as a member of the FAO Panel of Experts on Forest Gene Resources since 1976.

He has now shifted to Belum and his aspirations are to help put the Pulau Banding Research Foundation onto the international map. He hopes to utilize his research experience in biotechnology to build up collaborative research in bioprospecting of the Belum Forest with both local and international research organizations and the State of Perak to create new wealth for the State and the Nation as a whole. In addition, as Belum Tropical Rainforest is a pristine forest, his aspirations are to make this God given heaven into an ecotouristic place in par excellence with the Danum Valley Research facility in Sabah.

# Report on the International Training Programme on teak 'Innovations in the Management of Planted Teak Forests'

Kerala Forest Research Institute, Peechi, Kerala, India

31 August - 3 September 2011

**K. Jayaraman and K.V. Bhat**

Kerala Forest Research Institute, Peechi, Kerala, India

## **Background**

Teak (*Tectona grandis*) is being grown in plantations in around 70 countries across the globe although its natural occurrence is limited to India, Laos, Myanmar and Thailand. Of the estimated 142 million hectares of global plantations in 2005, about 5.82 million hectares (4%) were teak, the major producers being India, Indonesia, Myanmar and Thailand in the Asia Pacific region. Of late, there has also been much interest in planting teak in South American Countries. With such a heightened level of interest in teak, FAO has been collaborating with several countries to undertake studies, conduct workshops and promote the exchange of genetic material and information both on growing and marketing of teak and its products. TEAKNET, an international network on teak established in 1995 with the support of FAO offered a convenient platform for promotional activities on teak by the FAO. The network headquarters is currently located in KFRI, Thrissur, India. The network, with its wide pool of members, is promoting teak-related studies, workshops and meetings actively.

One major objective of TEAKNET is to generate knowledge and disseminate information on all teak-related issues. Providing a training that combines topics on innovative teak cultivation practices with recent developments that influence the teak business, such as climate change and participatory tree farm initiatives would contribute to the renewal and strengthening of the teak wood sector and rural development. This programme was thus aimed to bring the actual stakeholders of the teak sector face to face with topmost experts for exchanging information on the innovations that have been happening in the industry globally in all its dimensions.

## **Objectives**

The major objective of the programme was to familiarize the various stakeholders with the innovations in the technology of growing and utilizing teak. The programme also would bring to discussion issues like supportive policies, legal frameworks, climate change, ecological services and on the whole teak farms as an instrument for economic growth in rural Asia.

## **Organizers and sponsors**

The workshop was organised by TEAKNET in collaboration with the Kerala Forest Research Institute. TEAKNET is an international network of institutions and individuals interested in teak. TEAKNET addresses the interests of all categories of stakeholders related to teak, whether they are growers, traders, researchers or other groups with a profound interest or concern with teak. TEAKNET was established in 1995 and its headquarters was recently shifted from Myanmar to India. Financial support for the workshop was provided by FAO of the United Nations and also the Kerala State Council for Science, technology and Environment, Government of Kerala.

## **Participants and speakers**

The programme was held at the Peechi campus of KFRI and was attended by a total of 37 participants from 8 different countries including India. The participants represented a cross section of the major sets of stakeholders like growers and researchers. The list of participants is furnished in the appendix of this report. Several eminent scientists and experts in various fields of tropical timber development programmes were invited from around the world to deliver the lectures.

## **Inaugural function**

The inaugural function of the workshop was held in the forenoon of 31 August 2011. Dr. N.P. Kurian, Executive Vice President (in charge) of Kerala State Council for Science and Technology welcomed the dignitaries and the participants. Mr. M.P. Vincent, MLA, Kerala Legislative Assembly presided over the function. The workshop was inaugurated by Dr. Markku Kanninen, Director of Viikki Tropical Resources Institute, Finland and Professor, University of Helsinki, Finland who also delivered the inaugural address.

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Dr. K. Jayaraman, TEAKNET Coordinator explained the objectives of the workshop. Dr. S. Appanah, National Forest Programme Adviser, FAO, Bangkok spoke on the occasion indicating the role of FAO in promoting forestry and in particular teak in the region. Mr. P.V. Pathrose, President, Pananchery Grama Panchayath offered felicitations to the workshop. Dr. K. V. Sankaran, Director, KFRI proposed vote of thanks.

### **Technical Sessions**

The technical sessions that followed centred, in general, on the following topics:

- Supportive policies and legal frameworks for growing teak
- Choice of quality planting material for teak
- Mass production of quality planting stock of teak
- Soil management in teak plantations
- Forest-level management planning
- Health and sustainable management of teak stands
- Innovative approaches in utilization of teak wood
- Teak plantations for climate change mitigation and ecological services
- Teak farms – a strategy for growth and job creation in rural Asia

At the start of each session, the chairperson and the rapporteur for the session were introduced. The chairpersons briefly indicated the overall expectations from each session before calling on the speakers. The details of the sessions are the following.

### **Wednesday, 31 August 2011**

#### **Technical Session- I: Policy and legal framework**

**Venue: Tectona Hall, KFRI**

#### **Chair**

#### **Dr. Markku Kanninen**

Professor of Tropical Silviculture & Director  
Viikki Tropical Resources Institute (VITRI)  
University of Helsinki, Finland/CIFOR  
Indonesia

#### **Rapporteur**

#### **Dr. V. Anitha**

Scientist- EI  
Forestry and Human Dimension Division  
Kerala Forest Research Institute  
India

12.00-13.00 **Supportive policies and legal frameworks for growing teak**  
Dr. S. Appanah  
National Forest Programme Adviser  
FAO Regional Office for Asia and the Pacific, Bangkok

13.00-14.00 **Lunch break**

#### **Technical Session- II: Tree improvement and mass propagation**

**Venue: Tectona Hall, KFRI**

#### **Chair**

#### **Dr. K. Palanisamy**

Scientist -F & Head  
Forest Genetic Resources and Management Division  
Institute of Forest Genetics and Tree Breeding (ICFRE)  
India

#### **Rapporteur**

#### **Dr. T.B. Suma**

Scientist- B  
Forest Genetics & Biotechnology Division  
Kerala Forest Research Institute  
India

14.00-15.00 **Choice of quality planting material for teak**  
Dr. Jon Kehlet Hansen  
Senior Scientist (Forest Genetics), Forest & Landscape Denmark  
Faculty of Life Sciences, University of Copenhagen, Denmark

15.00-15.30 **Tea Break**

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15.30-16.30 **Mass production of planting stock of teak**

Dr. Shuchishweta V. Kendurkar  
Principal Scientist  
National Chemical Laboratory  
Pune, India

16.30-18.30 **Break**

18.30-20.30 **Cultural Programme at Auditorium, KFRI**

**Thursday, 1 September 2011**

### **Technical Session- III: Plantation management**

**Venue: Tectona Hall, KFRI**

#### *Chair*

**Dr. Manoranjan Bhanja**  
Additional PCCF,  
Andhra Pradesh Forest Department,  
India

#### *Rapporteur*

**Dr. S. Sandeep**  
Scientist- B  
Sustainable Forest Management Division  
Kerala Forest Research Institute  
India

09.30-10.30 **Soil management in teak plantations**

Dr. B. Mohan Kumar  
Associate Dean, College of Forestry  
Kerala Agricultural University  
Thrissur, India

10.30-11.30 **Forest-level management planning**

Dr. Juha Lappi  
Senior Research Methods Specialist  
Finnish Forest Research Institute, Suonenjoki  
Finland

11.30-12.00 **Tea Break**

12.00-13.00 **Health and sustainable management of teak stands**

Dr. V.V. Sudheendrakumar  
Scientist-F & Head, Department of Entomology, Forest Health Division  
Kerala Forest Research Institute  
India

13.00-14.00 **Lunch Break**

### **Technical Session- IV: Wood utilization**

**Venue: Tectona Hall, KFRI**

#### *Chair*

**Dr. K. M. A. Bandara**  
Research Officer (Tree Breeder)  
Sri Lanka Forest Department  
Badulla  
Sri Lanka

#### *Rapporteur*

**Dr. E. V. Anoop**  
Associate Professor and Head  
Department of Wood Science  
College of Forestry  
Kerala Agriculture University

14.00-15.00 **Innovative approaches in utilization of teak wood**

Dr. R.V. Rao (Retd.)  
Institute of Wood Science & Technology  
Bangalore, India

15.00-15.30 **Tea Break**

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**Group Interaction: Problems and prospects of teak growing and trade**

**Chair**

**Dr. S. Appanah**

National Forest Programme Adviser  
FAO Regional Office for Asia and the  
Pacific, Bangkok

**Rapporteur**

**Dr. R. C. Pandalai**

Scientist- F  
Programme Coordinator  
Extension and Training Division  
Kerala Forest Research Institute  
India

15.30-16.30 Group interaction/ Experience sharing

**Friday, 2 September 2011**

**Technical Session- V: Climate change and social dimension**

**Venue: Tectona Hall, KFRI**

**Chair**

**Dr. Jose Kallarackal**

CSIR Emeritus Scientist  
Kerala Forest Research Institute  
India

**Rapporteur**

**Dr. M. Amruth**

Scientist- B  
Forestry and Human Dimensions Division  
Kerala Forest Research Institute  
India

09.30-10.30 **Teak plantations for climate change mitigation and ecological services**

Dr. Markku Kanninen  
Professor of Tropical Silviculture & Director  
Viikki Tropical Resources Institute (VITRI)  
University of Helsinki  
Finland/CIFOR, Indonesia

10.30-11.30 **Teak farms – a strategy for growth and job creation in rural Asia**

Mr. Dede Rohadi  
Center for Research and Development on Climate Change and Forestry Policy,  
Forestry Research and Development Agency  
Bogor, Indonesia

11.30-12.00 **Tea Break**

12.00-13.00 **Visit to KFRI**

13.00-14.00 **Lunch break**

**Feedback Session**

**Venue: Tectona Hall, KFRI**

**Chair**

**Dr. S. Appanah**

National Forest Programme Adviser  
FAO Regional Office for Asia and the  
Pacific, Bangkok

**Rapporteur**

**Dr. K. Jayaraman**

TEAKNET Coordinator  
Kerala Forest Research Institute  
India

14.00-15.00 **Response from participants**

15.00-15.30 **Tea Break**

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## Concluding Session

**Venue: Tectona Hall, KFRI**

15.30-16.30	<b>Concluding remarks</b> : <b>Dr. S. Appanah</b> , FAO, Bangkok <b>Vote of thanks</b> : <b>Dr. K. Jayaraman</b> , TEAKNET Coordinator
19.00-21.00	<b>Farewell party at Hotel</b>

**Saturday, 3 September 2011**

A field trip was organized to Nilambur. This included a visit to Conolly's plot, KFRI Sub centre, International Teak Museum and Bio-resources Park at Nilambur.

The details of presentations and the important points that emerged during the discussions in each session are presented in the following.

### **Technical Session I: Policy and legal framework**

Dr. Markku Kanninen introduced the speaker Dr. Appanah and invited him to make the presentation. Dr. S. Appanah, spoke on 'Supportive policies and legal framework for growing teak'. He made a brief account of policies and legislation frameworks, their importance, its current standing and the need of the hour. He further explained the policy process as an *interactive process* that finally leads to further adjustments, renewal or reconfirmation taking examples from Thailand and State of Kerala, India. The highlight of the talk was on whether the existing policies and laws were in tandem with societal needs and that it is time to revisit the existing policy and legal dictum.

Subsequent to the presentation there were queries and discussion on diverse related aspects of policies. To a question on the components of political will, the speaker replied that political and economic will are closely related. Forestry has a low profile in less developed areas and hence the sector gets little political support. The situation in developed countries is the opposite. Complexity in political will and funding is another key area of concern.

With regard to the background that led to the work in Thailand and the reasons for comparison with Kerala situation, the speaker mentioned that it was because of the realisation that things have changed drastically in Thailand and the Government had approached FAO for assessing the scenario. The reason for comparison with Kerala was because the situation with regard to policies and laws of the Kerala Government are very people-oriented.

With regard to certification, Dr. Appanah replied that, besides policy and laws, certification is the key to forest governance to a large extent.

The audience was also interested to know the speaker's stand on climate change in relation to agroforestry and farm forestry. The answer was that climate change is all about money/credits. It certainly does not ensure money to people at large. Benefits are much more than carbon credits. Focus must be on the non-market benefits. Carbon is only an 'add-on'.

In response to a question on how the short-term policy framework support the long-term sustainability of plantation forestry, the speaker stated the need for revisiting the policy from implementation to the current situation. Many of the existing policies and laws are not in tandem with the changing short-term and long-term societal needs.

The session finally focused on the future scenario of policy and legal frameworks for growing teak. It highlighted the need to understand the ever changing policy landscape, ever increasing /different demands on forests, the institutional reinventions, changing roles for forestry professionals, new skills, new knowledge, new challenges and the drivers of the change exercise. The session concluded with the emphasis on the need to revisit the very premise of the policy and legal framework and make the necessary interventions as and when required to suit the short and long term societal needs.

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## Technical Session II: Tree Improvement and Mass propagation

At the start of the session, the chairperson, Dr. Palanisamy gave an overview of the theme and introduced the speakers. Dr. Hansen was the first to speak; he made a detailed presentation on 'Choice of quality planting material for teak, a question of genetic business plan'.

The participants noted that flowering time of different provenances brought together in a plantation can vary and hence expressed their concern on whether there was any solution to this. Dr. Hansen admitted that as of now, no solution exists and that it continues to remain a problem to be solved.

To a question on the difference in basal area of the clones in managed/unmanaged plantations, Dr. Hansen indicated no major differences between the two.

It was noted that in many cases, when clones from reproductively isolated areas are brought together in a seed orchard, synchrony of flowering is upset resulting in low seed productivity. A solution was sought in this case since the investments are very high for raising seed orchards. The answer provided by the chairman of the session was to first select the best site for seed production and secondly restrict the selection of genotypes to the same agro climatic zone. There is also a need to provide ideal spacing (10m X 10m), i.e., only 80-100 trees/hectare for increasing seed production.

A question was whether any of the forms of vegetative propagation can be practiced for establishing seed orchards. It was suggested that only bud grafting is practiced for clonal seed orchards. The audience was further interested to know how the clonal seed orchards could be so straight if bud grafting was followed. The speaker answered that sometimes there will be sprouting from stock and if it is not pruned at the proper time, it will overgrow scion and thus will be very straight in appearance. Molecular markers can be used to confirm whether the grown tree is a sprout of scion or stock.

In view of the problems for getting genetic material across countries, the participants were interested to know if TEAK-NET could do something for exchange of materials. However, the difficulty in exchange of genetic materials across countries under the current laws was explained; in addition, the existing scarcity of seeds for domestic use within the country was also highlighted.

The next presentation by Dr. Shuchishweta V. Kendurkar on 'Micropropagation – an effective tool for mass propagation of quality planting stock of teak' touched upon the mass propagation techniques developed at NCL. The presentation aroused much interest and the following queries and answers came up during the discussion that followed.

With regard to the cost of one propagule, the speaker replied that it worked out below Rs. 10 and the private companies should come forward to get the know-how to reduce their cost from the current rate of Rs. 85.

The next query was about the genetic fidelity of the NCL clones that were referred to. The speaker answered that the clones were collected from Forest Department and the passport data of the collected clones were available. It is possible to micropropagate superior clones in large numbers, the progeny maintains high genetic fidelity and the NCL field trial data for more than 12 years with wood density analysis validates the technology. Dr. Bhanja noted that the selection of clones should actually be based on multi-location field trials and the best performing clones should be selected for micro propagation through tissue culture.

It was observed that during the first 3-4 years, tissue culture plantlets grew fast and after that the growth slowed down. Branching was also more (12-13) in later multiplication trials and further somatic variations. Dr. Kendurkar said that if one is using minimal media there will not be any problem up to 90 cycles.

With regard to certification of tissue-culture-raised plants from seedlings, Dr. Kendurkar replied that different institutes followed different protocols. A consensus should come up among the institutes who are engaged in micropropagation activities. Dr. Bhanja noted that initial growth in first few years is due to juvenile vigour irrespective of tissue culture technique. After 20 years, if the original selection of clones is not authentic, there will only be 10-20 per cent of heartwood, which is unacceptable to people.

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### Technical Session III: Plantation management

The session started with the introductory remarks of the chair, Dr. Manoranjan Bhanja. The first presentation was made by Dr. B. Mohan Kumar on 'Soil management in teak plantations'. Chemical and biological fertilization were suggested as remedies to resolve the crisis of site deterioration in forest plantations. However, there have been very few studies on nutrition aspects of teak plantations. A limited number of replacement series studies conducted by his team indicated that N-fixing trees improved growth of associated teak and enhanced soil nutrient concentrations. The discussions that followed helped to develop the concept that site quality and drainage were as important as nutrient status in determining productivity of teak plantations. A comparison of higher productivity of teak plantations in Costa Rica over Indonesia was discussed and it was explained that non-conventional teak growing areas were intensively managed and hence showed higher productivity than conventional regions. The general consensus was that a holistic approach was required for better management of teak plantations especially when it comes to seed production.

The second presentation was by Dr. Juha Lappi on 'Forest – level management planning'. He discussed a simulation – optimization approach for forest level management. The discussion was based on the JLP and J software developed by the author. In order to execute his programmes, the first requirement was the data for several treatment units/stands. For each of these treatment units, a number of treatment schedules for a given planning period consisting of several sub periods will be generated using a simulator. A linear programming problem setting can be used to select the optimal treatment combination. The discussion that followed agreed that Dr. Lappi's J software is commendable and based on the required datasets it can help in efficient forest management.

The third presentation in the session was by Dr. V.V. Sudheendrakumar on 'Health and sustainable management of teak stands'. He dealt with the various types of insect pests in teak plantations. The commendable achievements made by KFRI in the development of an NPV formulation against teak defoliator were outlined. The viral formulation assumes importance as control of the defoliator with other natural enemies is often difficult due to the highly migratory nature of *Hyblaea puera*. The major diseases that affect teak plantations were also dealt with. The discussions that followed saw Dr. Sudheendrakumar explaining the mode, time and cost of application of the formulation HpNPV. He also explained that cytotoxic effects of formulated HpNPV were tested and no deleterious effects were found. The technical session ended with the concluding remarks by the chairman, Dr. Bhanja.

### Technical Session IV: Wood utilization

The presentation by Dr. R.V. Rao on 'Innovative approaches in utilization of teak wood' focused on the uniqueness of teak wood as well as the new and innovative approaches in the usage of teak wood with several examples. The virtue of teak wood and the shortage of teak wood even for the purposes mentioned earlier restrict creation of any innovative new solid wood product out of teak wood. However, a lot of innovations are seen in product development in furniture, household items and artefacts. Certain other products which are in current use include yacht flooring, bathroom roller, wooden mats, temple models, outdoor furniture items and handicrafts. It was also found that teak saw dust can be used as a precursor of an effective activated carbon under physical activation having microporous and mesoporous structure (pore size 0.6-100 nm). This can be employed as an adsorbent for dye removal from synthetic effluents.

The presentation also touched upon the quality of juvenile wood, smaller proportion of heartwood in short rotation teak and treatment of sapwood. The speaker pointed out the need for research to look into these aspects so that the status that teak enjoys amongst world timbers is maintained. In addition, logos specifying plantation /natural grown teak from specific country /region of origin on products was suggested.

Comparison of teak wood (for quality) from different countries so as to evolve International Grading Rules / Standards for teak was suggested by one participant. The TEAKNET coordinator mentioned about the initiatives in these lines taken by various agencies subsequent to a previous workshop at KFRI.

The question of any existing standards to identify and quantify juvenile/mature wood in planted teak was raised by one participant. The need to develop one was pointed out by the participant.

### Session on Group interaction/Experience sharing - Problems and prospects of teak growing and trade

Dr. Appanah described the objective of the session and invited comments from the participants. The discussion is narrated here in two sub-sessions.

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### **Teak cultivation**

Mr. Hugh Brown and Ms. Valerie Fumey Nassah narrated some of the local problems they faced in Ghana in growing teak. The main problems were related to the early branching and flowering observed in teak. Dr. Palanasamy opined that this probably can be rectified by accommodating more trees per hectare and minimising the spacing between trees. Trees grown in closer spacing develop straight boles and tend to prolong flowering. The fact was that, in Ghana, taungya cultivation was practiced in teak plantations which required wider spacing in teak plantations.

This was followed by a briefing on the practice of teak cultivation in Ghana by the delegates from Ghana. The spacing followed is 3 m X 3 m accommodating about 1111 seedlings per hectare and taungya cultivation is very popular. First thinning is at the 8<sup>th</sup> or 10<sup>th</sup> year, during which half of the crop gets removed and the returns considered as income. The second thinning was at the 15<sup>th</sup> year bringing down the number to 200 trees per hectare. Final felling is at the 25<sup>th</sup> year when around 150 trees per ha will be available. An average yield of 0.4 m<sup>3</sup>/tree is expected with a mean dbh of 25cm, giving rise to yield of 60 m<sup>3</sup>/hectare. After the final felling a coppice crop is allowed. Discussion followed on coppice crop management. Dr. Manoranjan Bhanja opined that the optimum spacing that can be given in teak plantation is 2 m X 2 m.

### **Teak trade**

Mr Richard John Laity opined that knowing the origin of the teak plantations in Australia is very difficult and they are not very sure about the seed source. He wanted a solution for this problem and requested TEAKNET to help. He also suggested that it is high time we have a universal grading rule for teak. For this also he sought the assistance from TEAKNET.

Eco-labelling, barcoding and such other modern innovative techniques were suggested to be resorted to for the identification problem. With regard to the grading rules, it was suggested that a restructuring of the grading rules for planted teak would have to be done. The reply given was that TEAKNET would not be able to implement uniform log grading rules. Consultants will have to be engaged to examine the existing rules and recommend a mutually agreeable set of grades. TEAKNET at this stage shall be able to bring out the issue for discussion in its Costa Rica meeting.

Detailed discussions were conducted with regard to certification of planted teak forests and the opinion was that there is tremendous potential for certification and, in fact, it was presumed that the timber from a certified plantation will fetch an enhanced income of 30 per cent.

## **Technical Session V: Climate change and social dimension**

Dr. Jose Kallarackal made opening remarks on the role of forests in the climate change mitigation through carbon sequestration and regulation of green house effect and invited Dr. Markku Kanninen for making presentation, on 'Teak plantations for climate change mitigation and ecological services'.

Dr. Markku Kanninen redefined the scope of his presentation to a wider topical area of 'Climate change mitigation and ecosystem services'. The speaker proceeded by clarifying the concepts such as ecosystem services and set of factors fueling climate change including demand for fuel, landscape fragmentation and degradation of natural and man-made ecosystems. Ecosystem services were explained at local, global, and landscape levels. Further, the link between ecosystem services and well-being was elaborated especially the kinds of services such as provisioning, regulating services and cultural services. To illustrate the possibility of monetizing of the Ecosystem Services and refinancing it for promoting local climate change mitigation measures, the case of 'payments for ecosystem services' in Costa Rica was quoted and elaborated. Vulnerability of ecosystem services was explained. Further, the ecosystem services from plantations were highlighted and this was linked to the concepts of REDD+. Carbon sequestration pattern in unmanaged, selection felling, long-rotation and shorter rotation systems was elaborated. The CO<sub>2</sub> FIX MODEL was explained in detail and further the issues relating to biodiversity management in plantations, trade-offs between management options were considered. With this, the floor was opened for discussion by the chair.

Issues such as poor availability of carbon sequestration values and possibility of circumventing the situation by snowballing with whatever available data were explained as an initial strategy. The suitability and replicability of the Costa Rican model for other localities was doubted by some of the participants.

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The second presentation by Mr. Dede Rohadi was on the 'Teak Farms-a strategy for growth and job creation in Rural Asia'. The speaker described the origins of the small holder teak farms in Indonesia and their importance in the local economy. Result of an ACIAR funded study indicating the patterns, holding size and drivers of planting were presented. According to the study, 52 per cent of the households planted teak as a source of cash, 37 percent considered planting for the tradition. However, the yield and quality of the plantation remained very low in the absence of adoption of proper silvicultural technique, lack of access to the financial aids and overall indifference of the cultivators to the long-term planning. The presentation concluded with a statement that teak farms have potential for rural poverty alleviation but in the absence of better incentive structures, this goal is far from achieved. To tackle this, a four pronged strategy including technical assistance, formation of micro-credit organisations, developing market intelligence and simplification of government stipulations were recommended.

### Feedback Session

Dr. Appanah invited suggestions on improving the state of affairs with respect to teak at the global level and also with respect to the deliberations of the programme just held.

Mr Hugh Brown enquired if exchange of seeds could be arranged by TEAKNET. It was made clear that TEAKNET as an organization is not equipped to perform such tasks but ways by which this can be facilitated can be investigated.

Mr. Richard Laity suggested that information on regulations regarding the export/import of teak wood needs to be made available to the growers and traders. Dr. Jayaraman agreed to compile this information. Mr. Laity also indicated that the teak traders could be benefited by information on price of teak. Dr. Jayaraman described the facility for TEAKNET members to advertise their products in the TEAKNET website and also the market intelligence system being executed by TEAKNET.

Dr. Bhanja suggested that success stories with teak can be shared amongst the growers. Dr. Markku Kanninen noted that failure stories are equally important as we can learn from such experiences as well. Dr. Jayaraman indicated that *Teaknet Bulletin* could be an appropriate medium for publicizing such experiences.

Dr. Chand Basha indicated the need to publicize the information on research findings on teak on a regular basis. Dr. Jayaraman indicated the availability of regularly updated bibliography on teak in the TEAKNET website.

Dr. Palanisamy indicated the need to provide travel funds for participants to attend international conferences. Dr. Appanah pointed out that such things are possible when TEAKNET is able to generate enough funds, which requires support from different agencies through membership.

Dr. Anoop wanted climatic models to be developed based on dendrochronological data collected from different countries. Dr. Jayaraman indicated that such ideas are to be pursued in the form of regular project proposals by the concerned. Dr. Appanah noted that TEAKNET shall be able to bring out such issues to the limelight but the research will have to be carried out by the institutions involved.

Mr. Rajesh enquired if TEAKNET could do something to arrest the deteriorating productivity of teak plantations in Kerala. Dr. Bhanja said, it is an internal management problem of the Forest Department and needs to be resolved at that level itself.

Mr. Rajesh also noted that all he could hear at the programme was some probability statements regarding soil management in teak plantations. Although no definitive replies were made at the moment, it was felt that Dr. Mohan Kumar who spoke on soil management had given certain clear indications on how to manage soils under teak plantations. Based on the trials by Kerala Agricultural University, he had recommended the use of subabul in teak plantations to enrich soil nitrogen and also recommended to avoid slash burning during site preparation. Regarding absence of response to fertilizers by teak, he had forwarded a few hypotheses/ possible explanations on the phenomenon.

The participants in general felt the programme to be informative and useful.

*Read more on page 11*

## Concluding Session

Dr. Appanah stressed on the need to strengthen the network so that fruitful interaction takes place between the stakeholders. Dr. Jayaraman proposed vote of thanks and the workshop ended with the announcements for the next days' programme.

### Major issues/observations brought out through the training workshop

- ◇ Forest policies have to be in tandem with societal needs. Besides forest policy and laws, certification has a key role to play in forest governance. Works on climate change put much emphasis on money and credits. The benefits are much more than carbon credits and hence the focus must be on the non-market benefits.
- ◇ Non-synchrony of flowering of trees in seed orchards results in low seed production which is a serious problem to be addressed. Restricting the selection of genotypes for raising seed orchards to a common agro-climatic zone and the use of ideal spacing (80-100 trees/ha) have been recommended to avoid the problem.
- ◇ Closer spacing was suggested to avoid early branching and flowering of teak trees in plantations in Ghana.
- ◇ A question was whether TEAKNET could facilitate exchange of genetic material across countries. TEAKNET could facilitate the process but cannot get directly involved.
- ◇ Selection of superior genotypes is a very important issue to be considered before undertaking their mass-propagation.
- ◇ Growing N-fixing trees in teak plantations and avoiding slash burning during site preparation are beneficial to the growth of teak trees.
- ◇ The productivity of teak in non-traditional areas has been found to be higher due to better management.
- ◇ Forest-level management planning based on quantitative techniques is helpful in optimizing the management of resources.
- ◇ Control of defoliator pest in teak is achievable through the use of viral formulation developed by KFRI.
- ◇ Teak is one of the most virtuous woods available for a multitude of uses ranging from making of buildings, furniture, ships/yachts, handicrafts and even its sawdust being used for production of activated carbon which has applications as an adsorbent for dye removal from synthetic effluents.
- ◇ Research is needed to explore to what extent, the sapwood of juvenile wood or heartwood of juvenile wood show dimensional stability, resistance to termite attack and repellence to water and whether treated sapwood of teak would exhibit all the unique properties of heartwood of mature teak.
- ◇ Unification of log-grading rules needs to be addressed as an international issue.
- ◇ Factors fuelling climate change were delineated and ecosystem services offered by forests were explained. Issues such as poor availability of carbon sequestration values were highlighted.
- ◇ The Indonesian experience revealed that teak farms have a potential to alleviate rural poverty but demonstrated that in the absence of better incentive structures, this goal is far from achieved. A four pronged strategy including technical assistance, formation of micro-credit organisations, developing market intelligence and simplification of government stipulations was recommended.

*Read more on page 12*

## Appendix

### Photo Gallery of the Workshop



Lighting the lamp by Dr. Markku Kanninen, University of Helsinki, Director, Viikki Tropical Resources Institute, Finland/ CIFOR, Indonesia



Welcome address by Dr. N.P. Kurian, Executive Vice President, KSCSTE



Presidential address by Shri. M. P. Vincent, MLA



Objectives of the training programme by Dr. K. Jayaraman, TEAKNET Coordinator



Message from FAO by Dr. Appanah



Felicitation by Shri. P.V. Pathrose

*Read more on page 13*

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Vote of thanks by Dr. K.V. Sankaran, Director, KFRI



View of technical Session



View of technical session



Cultural programme



Field trip: In front of the Teak Museum, Nilambur



Field trip: Government timber depot, Aruvacode, Nilambur

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# The Crown Princess's Project of Thailand

(With Highest Loyalty to His Majesty the King, growing 'Mahesak'-'Sak Siamintra' on the occasion of Thailand's beloved King's 84<sup>th</sup> Birthday Anniversary)

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The Plant Genetic Conservation Project under the royal initiative of Her Royal Highness Princess Maha Chakri Sirindhorn (RSPG), Bureau of the Royal Household was initiated in June 1992 by Her Royal Highness Princess Maha Chakri Sirindhorn. The goals of this project are to conserve the plant genetics in the country and to create a plant germplasm bank. The project ultimately was set to conserve and develop plant genetic resources for the benefits of Thai people and the world.

The project has been operational for the last 20 years in cooperation with 84 organizations and over 2,000 schools in Thailand. The activities included conservation of domesticated plants at Tambon (the smallest administrative unit consisting of several villages) level, creating awareness of the importance of local plants in daily life, herbal medicine and industries and developing curriculum in schools for students to learn and conserve the native plants etc.

## Symbolic teak trees

(i) 'Mahesak': The known biggest (GBH 10.1 m) and oldest (approx 1,500 years old) teak tree at present time is in Thailand at Nampard District, Uttaradit Province, Thailand, approx 450 km north of Bangkok. It was named by H.R.H. Princess Maha Chakri Sirindhorn.

(ii) 'Sak Siamintra' (pronounced "Sa-Yarm-Min"):

King Rama V the Great, grandfather of our present beloved King Rama IX, the Great, gave royal order to plant two teak trees at Lub-Lae district, Uttaradit Province in 1901. The H.R.H. Princess Maha Chakri Sirindhorn had great vision, and thus initiated the symbolic teak project by propagating these three symbolic teak trees, for 8.4 million saplings to be grown in all 7255 'Tambons' in Thailand.

The project was launched on April 2, 2011 the H.R.H. Princess Maha Chakri Sirindhorn's 56<sup>th</sup> birthday. The H.R.H. Princess Maha Chakri Sirindhorn had kindly given three royal ribbon cloths to tie on the three symbolic teak trees. Religious ceremonies were done by Buddhist Monk and Brahma's leaders. On the same day of April 2, 2011, all 76 provinces planted nine symbolic teak trees (5 Mahesak and 4 Sak Siamintra) each to celebrate H.R.H. Princess Maha Chakri Sirindhorn's birthday and to launch the project.



'Mahesak' teak tree, 1,500 years old with GBH 10.1m, 47.5m tall.



'Sak Siamintra' teak tree 110 years old



'Mahesak' teak tree on project launching day April 2, 2011 with H.R.H. Princess Maha Chakri Sirindhorn's Ribbons around the tree.

*Read more on page 17*

## Objectives of the project

1. To celebrate the auspicious occasion of the King's 84<sup>th</sup> birthday anniversary on December, 5, 2011.
2. To recognize the great works of His Majesty the King, 'The Father of Natural Resources and Environment Conservation'.
3. To create awareness among Thai people to possess, protect, utilize, care and develop a sustainable forest.
4. To express loyalty of 65 million Thai people to join hands to grow "Mahesak" and "Sak Siamintra" trees.
5. To conserve the oldest and the biggest teak tree in the world as well as to maintain the genetic materials of "Mahesak" and "Sak Siamintra" planted by King Chulalongkorn of Siam (King Rama V The Great)
6. To promote participation and to create awareness of all Thais and foreigners to conserve plant genetic materials and see their importance.
7. To raise fund to continue the activities of Plant Genetic Conservation Foundation under the royal initiative of H.R.H. Princess Maha Chakri Sirindhorn
8. To have an asset of community forests at community level
9. To improve the environment and social setup in all communities in Thailand
10. To be the national and international centre of research and educational activities

On May 13, 2011, on the occasion of ploughing ceremony day in Thailand, 76 Tambons, one in each province, planted 1,100 symbolic teak trees (550 Mahesak and 550 Sak Siamintra) each. A total of 84,000 symbolic teak trees were planned to be planted in 2011. Over 2 million symbolic teak trees through tissue culture micro propagation will be planted each year for the next 4 years (2012-2015). A total of 8.4 millions symbolic teak trees will be planted altogether. Each tree will be given a code that will be mapped by GPS/GIS. Growth of each symbolic teak tree will be monitored and recorded. Research, in addition, will be designed to study growth in relation to soil types and conditions, rainfall in various parts of the country, temperature and silvicultural practices through the life period of the project.



## Funding of the project

This project is designed to encourage all Thais and foreigners, corporate as well as individuals, to have an opportunity to participate in the project one way or the other. The villagers will play the role of planters and care-takers. The corporates, embassies and other agencies can contribute money for the cost of planting materials, cost of planting and cares as CSR (Corporate Social Responsibilities). The individuals are also able to contribute money as PSR (Personal Social Responsibilities) to the project. It is estimated that ฿184 (US\$ 6.00) per plant is needed to meet the cost of planting and care for 5 years. The foundation will keep ฿84 per plant for tissue culture production, administration, project management, individual tree tagging and mapping, monitoring and recording of annual growth and dissemination of the information during the project period (10 years). Another ฿100 per plant will be given to villagers as a part of planting and care costs for 5 years. Fund will be raised from the public sectors, corporate agencies and individuals throughout the project period. The specific contributors/supporters will be publicly acknowledged at the assigned planting site.

*Read more on page 18*

## Related activities

### Educational Centre

It is aimed to use these planting sites as educational centers for students, villagers and interested people. Various learning programs will be developed during the project period and thereafter.

### Research Centre

It is also planned to use these 7,255 sites distributed all over Thailand for research. Individual research projects will be designed and carried out by researchers, students and interested people. It is going to be the biggest research plots for teak that will be able to provide much valuable information. Research will include, but not limited to,

- a. Agro-forestry research
- b. Ecological research and activities related
- c. Environmental studies
- d. Social studies
- e. Economic studies in relation to teak forestry

## Expected outcomes

### Economic impact

- ◇ To have "Mahesak" and "Sak Siamintra" trees in numbers of 8,400,000 is equivalent to 13,598 hectares of forest area. In 15 years, these teak trees will be valued at least 84,000 million baht or approximately 11 million baht in each Tambon.
- ◇ These "Mahesak" and "Sak Siamintra" trees will be able to absorb carbon dioxide at least 210,000 tonnes annually, that would be worth 65 million baht per year.

### Environmental impact

- ◇ Increased forest area equivalent to 13598 hectares
- ◇ Carbon dioxide absorption by at least 210,000 tonnes per year
- ◇ Improved community landscape
- ◇ Creation of suitable environments for regular rainfall and reduction of flash flood which can damage assets and life of villagers

### Social impact

- ◇ Creation of a harmonious and reconciled atmosphere in all villagers by planting and caring 'Mahesak' and 'Sak Siamintra' together.
- ◇ Creation of jobs and additional income from this forest to the villagers
- ◇ Creation of a pleasant and good living atmosphere for the villagers to have a happy life

## Editorial Committee

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**Teaknet Bulletin** is a biannual electronic newsletter of TEAKNET brought out in March and September of every year through its website. It is intended for circulation among the members of TEAKNET and other 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 of value to teak growers, traders, researchers or others concerned with teak. However, TEAKNET reserves the right to choose the contributions for publishing and also to make necessary editorial modifications in the articles.

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