

Externally Aided Project (EAP)

Continued EAP 2013-14

Project Sl. No.	Name of Project	PI	Thrust Area	Current Status
1	<p>Realizing genetic gain from teak seed orchards: Enhancing seed production and outcrossing through cultural and ecological interventions. (International Foundation for Science, Sweden)</p>	Dr. A. Nicodemus	Genetic Improvement and Tree Improvement	<p>This project is follow-up of an earlier IFS-funded project to evaluate reproductive success in teak seed orchards (2003-2008). Based on the results of the previous project a renewal project was started to evaluate the efficiency of different treatments on the seed production and outcrossing characters in teak seed orchards.. Three teak orchards were visited and flower and fruit production assessed in 900 trees and seeds were collected from 60 selected trees. Seeds were subjected to X-radiography to determine seed filling. Based on flowering and seed filling status 50 trees in each orchard were imposed with flower-induction treatments. Apiaries were introduced to promote cross pollination among clones. SSR-marker based estimation of outcrossing rate among orchard progeny is in progress.</p>
2	<p>Expanding carbon sinks through sustainable tree biomass energy production in semi-arid areas of Tamil Nadu, India. (AusAID through CSIRO, Australia)</p>	Dr. A. Nicodemus	Genetic Improvement and Tree Improvement	<p>This project is follow-up of an earlier IFS-funded project to evaluate reproductive success in teak seed orchards (2003-2008). Based on the results of the previous project a renewal project was started to evaluate the efficiency of different treatments on the seed production and outcrossing characters in teak seed orchards.. Three teak orchards were visited and flower and fruit production assessed in 900 trees and seeds were collected from 60</p>

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3	<p>Rapid improvement of Casuarina and Leucaena to enhance pulpwood production from farm forestry plantations. (IPMA)</p>	<p>Dr Kannan C.S. Warriar</p>	<p>Forest Genetic Resource Management and Tree Improvement</p>	<p>The official launch of this collaborative project between IFGTB and Indian Paper Manufacturers Association (IPMA) was held at IFGTB on 3rd December 2012. Convened a meeting with the scientists from CSIRO Australia at IFGTB on 1 November 2013 itself regarding the availability of superior germplasm of <i>Casuarina equisetifolia</i>. Mr Khongsak Pinyopusarerk, Mr David Bush and Mr Aljoy took part in the discussions. Dr B. Gurudev Singh, Dr A. Nicodemus and Dr Kannan C.S. Warriar represented IFGTB. Subsequent to these deliberations, obtained information on the available seedlots of <i>C. equisetifolia</i> at Australian Tree Seed Centre, CSIRO. Obtained the registration certificate from the Director of Horticulture and Import Permit and imported 39 seedlots of casuarina from CSIRO. Collected seeds of <i>Casuarina equisetifolia</i> from the IFGTB clonal trial established at TNPL with their assistance and the germination tests were completed. The Institute requested the member industries to provide details on the captive plantations of Leucaena for selection of candidate plus trees. Among</p>

				the Mills, WCPM and APPM have provided details on Subabul plantations. Based on the inputs provided by WCPM, IFGTB team visited Koppal in Karnataka and selected 265 CPTs of Leucaena from plantations covering 52 ha. Visited Andhra Pradesh and selected 167 CPTs from Prakasham district. Coppice shoots collected from 36 CPTs of Koppal region have been kept for rooting at Dandeli, Karnataka. IFGTB has obtained 22 seedlots of Leucaena from BAIF Foundation, Maharashtra.
4	A value chain on Industrial Agroforestry in Tamil Nadu. (Indian council for agricultural Research (ICAR)- (NAIP)	Dr. B. Gurudev Singh	Tree Improvement	Progeny trial of <i>C.equisetifolia</i> was established in 2 Ha. Established VMG for Eucalyptus in 1 Ha. Established Eucalyptus model clonal plantation in 20 Ha. and Casuarina in 20 Ha. Five clonal trials of Casuarina junghuhniana were established.
5	Candidate Gene Association for identification of pulping trait markers in <i>Eucalyptus tereticornis</i> (Department of Biotechnology, New Delhi.)	Dr. Modhumita Dasgupta	Genetic Improvement (Biotechnology)	<p>a. The holocellulose and klason lignin content of 42 individuals representing 15 provenances of <i>E. tereticornis</i> was determined using NIR spectroscopy.</p> <p>b. Two full length genes including cellulose synthase (<i>EtCesA1</i>) and HD Zip transcription factor (<i>EtHB1</i>) were sequenced.</p> <p>c. The 3'UTR of <i>EtCesA3</i> (~300bp) and <i>EtHB1</i> (~500bp) were sequenced in 5-8 <i>E. tereticornis</i> individuals with extreme phenotype for holocellulose content. A</p>

				<p>total of 8 and 20 SNPs were identified in <i>EtCesA3</i> and <i>EtHB1</i> respectively.</p> <p>d. Target enrichment and sequencing was done for ninety three genes involved in wood property traits in three eucalypts species (<i>E. tereticornis</i>, <i>E. camaldulensis</i> and <i>E. grandis</i>). A total of 4130 SNPs were identified for 89 genes for Et86 and Eg9 while 555 heterozygous InDels were detected for 85 genes across Et86 and Eg9.</p>
6	<p>Production of recombinant antifungal/antip est lectin from <i>Withania somnifera</i></p> <p>(Department of Biotechnology, New Delhi)</p>	Dr. Modhumita Dasgupta	Genetic Improvement (Biotechnology)	<p>a. The full length CDS with approximate size of 894bp was cloned and sequenced (GenBank Acc No. KC329532) and designated as WsMBP1. The sequence showed high similarity to CaMBL1, a mannose binding lectin from <i>Capsicum annum</i>.</p> <p>b. The lectin gene was expressed in pET vector and expressed in bacterial system and purified.</p> <p>c. The recombinant lectin was determined to have a molecular mass of approximately 31 kDa and pI of 9.4. The hemagglutination assay against rabbit, mice and human erythrocytes were also conducted and no agglutination was observed.</p> <p>d. The recombinant lectin was sequenced by nano LC-MS-MS analysis and the peptide showed similarity to mannose-</p>

				<p>binding lectin from <i>C. annum</i>.</p> <p>e. The antipest activity of the lectin was tested against <i>Hyblaea puera</i> (teak defoliator) and 65% mortality was recorded in treated insects.</p>
7	<p>High-throughput multi environment phenotyping of mapping populations of eucalypts for adventitious rooting and wood property traits.</p>	Dr. Modhumita Dasgupta	Genetic Improvement (Biotechnology)	<p>a. Phenotyping of mapping population for adventitious rooting and wood property traits was completed in parents.</p> <p>b. Phenotyping for adventitious rooting parameters in mapping population is being conducted.</p> <p>c. Additionally image analysis platform is being used to determine the root biomass and root architecture of parents and progenies.</p> <p>d. NIR Model has been developed with 600 wood samples for determining the holocellulose and klason lignin in <i>E. camaldulensis</i>, <i>E. tereticornis</i>, <i>E. grandis</i> and their hybrids.</p>
8	<p>Development of genetic linkage map in eucalyptus for adventitious rooting and wood property traits.</p> <p>(IFGTB/EAP/2010-2015 - Department of Biotechnology, New Delhi)</p>	Dr. R. Yasodha	Genetic Improvement (Biotechnology)	<p>A total of 300 SSR loci were synthesized for amplification in two species- specific mapping populations. of <i>E. tereticornis</i> X <i>E. grandis</i> and <i>E. camaldulensis</i> X <i>E.tereticornis</i>. <i>E. tereticornis</i> and <i>E. grandis</i> parents were amplified with 223 SSRs and 131 were found to be polymorphic between parents. Subsequently, 100 F1 individuals were genotyped with 25 SSR loci using three primer strategy of Schuelke (2000).</p>
9	Production and testing of	Dr. B. Nagarajan		

	control pollinated Eucalypt hybrids with improved biomass and pulp yield to support industrial forestry in Tamilnadu. (TNPL)			
10	Germplasm assemblage of genetic resources of <i>Melia dubia</i> in India. (APFD)	Dr. Rekha Warriar	FGR Management	Ongoing
11	Development of an Inter-specific hybrid <i>Corymbia torelliana</i> x. <i>C. citriodora</i> through Controlled Pollination: A Genetic Resource for Paper Pulping. (ITC)	Dr. B. Nagarajan		
12	Effect of elevated CO ₂ on active principles of commercially important medicinal plants. (IFGTB/EAP/2011-2014. National Medicinal Plants Board)	Shri. S. Saravanan	Climate change	On-going.
13	Developing yield tables for short rotation tree crops in Kerala. (Kerala Forest	Dr. C. Buvaneswaran	Forest Management (Forest Biometrics)	The present project aims to develop regional prediction models for constructing yield tables for fast growing five tree crops viz. <i>Acacia auriculiformis</i> , <i>A. mangium</i> ,

	Development Corporation Ltd)			<i>Albizia falcataria</i> , <i>Eucalyptus pellita</i> , and <i>E. grandis</i> in Kerala. Sample trees were felled and field measurements completed for all the five species. The data is being entered in Excel spreadsheets and regression analysis will be used to develop models for volume estimation. Finally, volume table will be prepared for all the five targeted species.
14	Development of Integrated Dry Land Agroforestry systems in Tamil Nadu for enhancing livelihood opportunities. (Tamil Nadu State Land Use Research Board-State Planning Commission)	Dr. C. Buvaneswaran	Forest Productivity (Social forestry, Agroforestry/Farm forestry)	Field visits were made and identified fields for establishing Agroforestry systems in all the seven taluks and one ha in each taluk. Creation of farm ponds on six farm fields have been completed in six taluks. Superior planting stocks of Casuarina, Pungam, Neem, Teak were multiplied for field planting. Superior grafts of horticultural crops like amla, sapota and mango were procured from Horticultural farm in Sundaramudayan village in Rameswaram. Out seven Agroforestry plots to be established, five Agroforestry plots have been established in five different models. The remaining two Agroforestry plots will be established during coming monsoon period. Recorded survival and growth of tree components. The soil samples collected from these agroforestry plots were analysed for important parameters. As part of maintenance works, weeding and soil working was carried out in all the five agroforestry plots. Further, casualty replacement of horticultural crops - amla, sapota was carried out in Kollankulam village in Kamudi taluk.
15	Assessment of disease problems of	Dr. V. Mohan	Managing Forests and Forest Products	Ongoing

	<p>selected fast growing native tree species in Tami Nadu.</p> <p>(Tamil Nadu State Forest Department)</p>		<p>for Livelihood Support and Economic Growth (Theme: Integrated Pests and Disease Management)</p>	
16	<p>Study on beneficial microbial interaction with trees in heavy metal contaminated sited in Tamil Nadu.</p> <p>(Tamil Nadu State Forest Department)</p>	Dr. V. Mohan	<p>Managing Forests and Forest Products for Livelihood Support and Economic Growth (Theme: Mycorrhizae, Rhizobia and other useful microbes)</p>	Ongoing
17	<p>New biocontrol opportunities for prickly acacia : exploration in India.</p> <p>(IFGTB/ EP-RP 33/2008-2014 - Department of Primary Industries & Fisheries (Australia) through Alan Fletcher Research Station, Queensland, Australia.)</p>	Dr. A. Balu	<p>Managing forests and forest products for livelihood support and Economic growth</p>	<p>Prickly Acacia (<i>Acacia nilotica indica</i>) is a weed of national significance in Australia. Natural grassland over 7 million hectares in Mitchell Grass Downs of western Queensland and 2000 km of bore drains are infested with this weed. Mechanical and chemical control measures are expensive. Since the Australian populations of <i>Acacia nilotica indica</i> are possibly of Indian origin, it was contemplated to identify potential biological control agents on the native distribution in India and exporting the same to Australia. MoU for carrying out the project was signed by the ICFRE and Meat and Live Stock Australia Ltd through its Department of Agriculture, Fisheries and Forestry, Australia and the project was initiated in May 2008. Activities relating to the conduct of extensive surveys, documentation of the pests and pathogens in the field, categorization and identification of the agents</p>

			<p>recorded from the field, conduct of host specificity studies with Asian and Australian acacias, prioritization of biocontrol agents based on the field observation and controlled condition studies and exportation of prioritized agents were achieved to the extent possible except for a part of host specificity study and further exportation of prioritized agents.</p> <p>Extensive field visits were made to the plantations located in 22 districts of Tamil Nadu and 2 districts of Karnataka and about 10 rounds of surveys carried out over a period of two years. About 104 species of insects and 14 species of pathogens infesting different parts of <i>A. niloticawere</i> documented.</p> <p>Identity of 82 species of insects and 11 species of pathogens were established upto species level. For want of competent taxonomists the rest of the specimens were identified only to the level of genus.</p> <p>Biology of 11 major lepidopteran defoliators & a species of scale of <i>Acacia niloticassp. indica</i> was studied. 10 natural enemies (parasites & predator) have been recorded on 4 of these 11 defoliators.</p> <p>Based on the field observations and lab studies 6 species of insects (1 sapsucker and 5 defoliators) , and 4 species of pathogens were prioritized for host specificity studies.</p> <p>Host specificity and feeding</p>
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				<p>efficiency studies with 4 species of insects have been completed on 11 species of Asian Acacias and 3 species of Australian Acacias under lab condition.</p> <p>Studies on population dynamics of gall and leaf rust fungi at the plantations for a period of two years have successfully been completed.</p> <p>Remaining part of the host specificity studies and collection of prioritized agents from field and raising and maintenance of stock cultures continuously in the lab will be done during the year 2013 to 2014.</p>
18	<p>Prospecting Bioactive compounds from certain flora: Bio-pesticides against papaya mealybug, <i>zarcococcus marginatus</i> Williams and Granara de Wilink in Tamilnadu.</p> <p>(DST-IV)</p>	Dr.S. Murugesan	<p>Biodiversity conservation and ecological security (Integrated pests and disease management)</p>	<p>Survey on mealy bug was conducted in teak agroforestry plantation, tapioca, eucalyptus, teak, casuarinas, <i>Ceiba pentandra</i>, ailanthus and <i>Thespesia populanis</i> plantations in Tanjore, Madurai, Dindugul and Viruthunagar, and papaya plantations and other agriculture farms at Annadhasampalayam Sirumugai and Poondi hills, recorded the pest incidence and population pattern. Mealy bug incidence was observed in the plantation adjacent to papaya plantation, where the damage is 100%. <i>Adathoda vasica</i>, <i>Meliadubia</i>, <i>Vitex negunda</i>, <i>Aristolochia bracteata</i> and <i>Pongamia pinnata</i>, leaves were collected from Sirumugai, Poondi, Mullankadu and Sadivayal, shade dried, processed and stored for further extraction, bioassays and chemical analysis. Sequential extractions were made from the processed leaves with different solvent system and the water extracts were dried</p>

				by using spray drier at PSG College of Technology, Coimbatore for further chemical analysis.
19	Contributory factors in the establishment of <i>Leptocybe invasa</i> (Fisher and aLaSalle) on Eucalyptus plantations in Tamilnadu. (MoEF-VII)	Dr. N. Senthilkumar	Biodiversity conservation and ecological security (Integrated pests and disease management)	Survey on gall infestation in eucalyptus seedlings and IFGTB clones were made at IFGTB Central Nursery and Bharathiar University and observed no gall infestation. Locally produced seedlings are found to be more susceptible to gall insect incidence rather than the clonal seedlings in the farm forestry at Kanchipuram, Chengalpet, Maruvathur, Mathuranthakam, Thiruvallur, Vizhupuram and Ulunthurpet. No incidence of gall infestation was noticed during the survey on gall insect infestation in eucalyptus plantation at Tirunelveli (150 acres), Dharmapuri, and Krishnagiri. Survey has been conducted in eucalyptus clonal plantations (C ₃ , C ₇ , C ₄₁₃ , and C ₂₈₃) at Sivagangai, Madurai, Virudhunagar and Kovilpatti Districts and observed 30% infestation in C ₇ and C ₂₈₃ clones and infestation was severe at Meenakshipuram and Sivagangai district. Eucalyptus clonal cuttings of the clones C-274, C-7, C-10, C-226 and C-413 and seedlings of Palmer River, Kennedy River, Emu Greek, Norman bay provenances are maintained in IFGTB central nursery for further chemical analysis.
20	Butterfly diversity in relation to landscape changes in the Walayar Valley, at Palakkad Gap in the Western Ghats.	Dr. K.R.Sasidharan	Biodiversity Conservation and Ecological Security	Sixty species of butterflies were recorded so far from Walayar Valley so far, during the study. The undergrowth in the Teak plantations was found to shelter good number of butterfly species, due to the availability of several nectar and larval host plants. Certain

	(Ministry of Environment and Forests, Govt. of India.)			Western Ghats endemics like Southern Birdwing were recorded from the semi-evergreen forests of the valley. The agricultural areas adjoining the forests also harboured good butterfly diversity, but less, compared to the forest ecosystem.
21	Augmentation of Medicinal plants resources for primary health care practices by the tribal communities in the Nilgiris and enabling their livelihood enhancement. (HADP)	Dr. K. Panneer Selvam	Managing Forest and Forest Products for Livelihood Support and Economics Growth	The project was initiated in Feb. 2013. Seven tribal villages were identified in Nilgiris, for establishing herbal garden. Seeds and cuttings of medicinal plants were collected for multiplication. Documentation of ITK was initiated in these villages.