

Completed ICFRE Funded Research Projects (2009-10)- IFGTB

Project S.No	Name of Project	PI	Thrust Area	Research Findings
1	Assessment of insect pest problems of selected fast growing indigenous tree species in Tamil Nadu and Kerala. (Sep-06, 2006-2010)	Shri. R. Rajarishi, R.O.	Forest Protection (Insects pests, diseases and control)	<p>The project study on Assessment of insect pest problems of selected fast growing indigenous tree species in Tamil Nadu and Kerala helped to document and categories the insect pests problem confronted the targeted tree species in nurseries and plantations.</p> <p>(1) About 54 and 29 insect pests were recorded from various locations in Tamil Nadu and Kerala, respectively.</p> <p>(2) Based on the incidence and intensity of insect pest attack these pests were categorized in to major and minor pests. Three species of sap suckers, seven species of defoliators and two species of borers were adjudged as major pest in both the States.</p> <p>(3) Out of all the insect pests recorded during the present study eight insect pests were new records on, <i>Ailanthus excelsa</i>, <i>Bombax ceiba</i>, <i>Dalbergia sissoo</i>, <i>Melia dubia</i> and <i>Thespesia populnea</i>.</p> <p>(4) The natural enemy complex associated with the important pest in the nurseries and plantations were recorded, which include three larval and pupal parasites, seven predators and two microbes (entomopathogenic fungi).</p> <p>(5) Abiotic factors like Temperature, Humidity and Rainfall were recorded during the study period were correlated with population level infestation intensity of insect pests in nurseries and plantations raised in different locations. It was found that the temperature tends to have a significant positive correlation with <i>M.hirsutus</i> and <i>I. quadrinotata</i> on <i>A.excelsa</i>, <i>R. iceryoides</i>, <i>A.simulus</i> and <i>O. robusta</i> on <i>B.ceiba</i>, <i>M. hirsutus</i>, <i>M.discolor</i> and <i>Abirus</i> sp. on <i>D.sisso</i>, <i>M.hirsutus</i>, <i>Clovia</i> sp., <i>T. beelsoni</i>, <i>E. geminate</i> on <i>G.arborea</i>, <i>D. indicus</i>, <i>Carpophilus</i> sp., <i>A. fasciculatus</i> on <i>M. dubia</i> in Tamil Nadu and <i>M. hirsutus</i>, <i>D. pulverulentalis</i> on <i>Morus alba</i> in Tamil Nadu and Kerala. The humidity have a significant positive correlation with <i>O. robusta</i> on <i>B.ceiba</i>, <i>M.discolor</i> on <i>D.sisso</i>, <i>Clovia</i> sp., <i>O. maindroni</i>, <i>E. geminata</i> on <i>G. arborea</i>, <i>M. hirsutus</i>, <i>D. pulverulentalis</i> and <i>E. geminata</i> on <i>Morus alba</i> in Tamil Nadu and <i>M.</i></p>

				<p><i>viridanus</i> on <i>Morus alba</i> in Kerala. Significant positive correlation was also observed in the rainfall with <i>P. marginatus</i>, <i>E. narcissus</i> on <i>A.excelsa</i>, <i>E. geminata</i> on <i>T.populnea</i> in Tamil Nadu and <i>Myllocerus viridanus</i> on <i>D.sisso</i>, <i>Clovia</i> sp., <i>A. gmelinae</i>, <i>D. leucomochla</i> on <i>G. arborea</i>, <i>B. variegata</i>, <i>M. tenuicornis</i> on <i>M. dubia</i>, <i>B. tabaci</i>, <i>Oxyrhachis</i> sp., <i>S. litur</i>, <i>M. viridanus</i> on <i>M. alba</i> in Kerala.</p> <p>The study has revealed that the above mentioned fast growing indigenous tree species suffer from serious insect pests, the sap suckers <i>M.hirsutus</i>, <i>P.marginatus</i>, <i>T.beesoni</i> the defoliators <i>E.narcissus</i>, <i>A.fabriciella</i>, <i>M.discolor</i>, <i>M.viridanus</i>, <i>M.tenuicornis</i>, <i>D.pulverulentalis</i>, <i>E.geminata</i>, and the borers <i>I.quadrinotata</i> and <i>S.malabaricus</i>. Since the indigenous fast growing tree species are preferred over exotic ones by the forestry sector and tree growers, there is an urgent need for developing practical, economically viable and eco-friendly management strategies to contain these pest problems. For this reason, a follow up project has been taken up to develop species specific IPM techniques for the key pests of <i>A. excelsa</i>, <i>G.arborea</i> and <i>D.sissoo</i>.</p> <p>The present findings in this project will also greatly help the end users especially the forest department, industries and farmers who are engaged in cultivation of these species. Out come of the project may also help the tree breeders, geneticists and biotechnologists to work on the planned tree improvement programme of these indigenous fast growing tree species.</p>
2	Characterization and evaluation of allelochemical profiles of some economically important, insect pest resistant tree species. (April-08, 2008-10)	Dr. J. P. Jacob, Scientist E	Genetic Improvement (Tree Improvement)	Field screening of the available germplasm collections shows that reasonable good evidence illustrating pest resistance (highly resistant) is lacking of <i>A. excelsa</i> against defoliators <i>E. narcissus</i> and <i>A. fabricella</i> . and is altogether not clearly manifested in the families of <i>Acacia auriculifomis</i> and <i>A. mangium</i> against <i>Myllocerus</i> sp. Allelochemical profiles that interfere with pest incidence in economically important species like Casuarina, Eucalyptus and Teak identified.
3	Demonstration of agro forestry technologies for enhancement of livelihood opportunities in different agro-	S. Saravanan , Scientist-C	Forest Productivity (Agro-forestry)	This project is the first of its kind in collaboration of ICFRE with the National Research Center for Agroforestry, Jhansi and Forest College & Research Institute (TNAU), Mettupalayam, to demonstrate/popularize the successful agroforestry systems in different agro-climatic zones of Tamil Nadu, as already

	<p>climatic zones of Tamil Nadu (June 2007, 2007-10)</p>		<p>identified by the above said research organizations. The project was taken up at the suggestion of the honorary members of the Board of Governors, ICFRE.</p> <p>The agroforestry demonstration plots have been established with the tree species of <i>Tectona grandis</i>, <i>Casuarina junghuhniana</i>, <i>Melia dubia</i>, <i>Ailanthus excelsa</i> and horticultural species. Also, carried out intercropping activities under the established agroforestry demonstration plots and the economics have been worked out for various systems in different agro-climatic zones of Tamil Nadu.</p> <p>Among the various systems established in different agro-climatic zones of Tamil Nadu, the Teak + Sugarcane based system demonstrated in Northeastern zone, registered highest annual net income of ` 48, 991 (B:C ratio 2.36) followed by Casuarina + cotton based system established in Cauvery delta zone, registered ` 34, 968 (B:C ratio of 4.87). When compared to the annual net income and the B:C ratio, the income is highest in Teak based system and B:C ratio is high in Casuarina system. This is because of the reduction in the initial establishment and maintenance of the Casuarina based system compared to the Teak based system.</p> <p>In the workshop on ‘Tree cultivation under dry land farming (Farmers Mela)’, held in February 2010, the information on successful agroforestry systems were transferred to the farming communities. The same has also been transferred at the time of various training programmes organized at IFGTB on ‘Tree cultivation techniques under farmlands’.</p> <p>Seeing the demonstration plots established, many farmers have approached for further demonstration trials in their farmlands. The contacted farmers were advised to contact the local forest department officials and the forestry extension wing for availing the benefits under the tree planting scheme (Tree Cultivation under Private Lands – TCPL) of the State forest department.</p> <p>Based on the experience gained under this project and the interests showed by the farming communities in tree cultivation under this project, a new project has been proposed on ‘Introduction and evaluation of fast growing tree species under different agro-climatic zones of Tamil Nadu’ for five years</p>
--	--	--	---

				to popularize the agroforestry systems with the fast growing tree species of <i>Melia dubia</i> , <i>Neolamarkia cadamba</i> , <i>Gmelina arborea</i> and <i>Sweitenia macrophylla</i> .
4	Evolving silvicultural practices for <i>Casuarina junghuhniana</i> ssp. <i>Timorensis</i> . (Oct-05, 2005-09, Ext. upto March, 2010)	M. Maria Dominic Savio, Scientist – C	Forest Productivity (Silviculture)	<p>Casuarinas are multipurpose, fast growing and nitrogen fixing species that are adapted to even marginal lands. In India, <i>C. equisetifolia</i> introduced more than a century ago is being grown in over 8,00,000 hectares for fuel wood, poles, pulpwood and is the preferred species for shelterbelts, windbreaks and mine spoil afforestation. <i>C. junghuhniana</i> introduced into India in 1996 is gaining importance as an agro forestry species with potential use in paper and pulp industry. <i>C. junghuhniana</i> is reported to perform better than <i>C. equisetifolia</i> in a few trials. Due to its coppicing ability, which makes it a potential candidate for managing in the second rotation and beyond as a coppice crop, farmers have shown interest in this newly introduced species. In order to understand survival and growth potential of this species in different agro climatic conditions of Tamil Nadu this project was implemented.</p> <p>Under this project, seed based <i>C. junghuhniana</i>, was used to raise plantations in farmers field under 5 agro climatic conditions of Tamil Nadu, both in inland and coastal conditions, wherever applicable. The plantations were raised using seeds collected from the first generation orchards established by the Institute at three locations under varied agro climatic conditions. At the collection stage, seed parameters in terms of fresh cone weight vis-a-vis weight of seeds obtained was calculated. Weight of 100 cone and 100 seeds was documented tree wise, for the three seed orchards while number of seeds per cone was documented for Puducherry seed orchard only.</p> <p>Using the seeds, quality planting stock was raised during which trials to select best suited potting media mixture and type and size of container to produce quality planting stock was studied. Effect of microbial inoculations on the growth of planting stock was also documented. Utilizing planting stock produced, field trials were established in 8 locations spread over 5 agro climatic zones to study best suited espacement for raising <i>C. junghuhniana</i> plantations. Some of the salient findings of the project are given below:</p> <ul style="list-style-type: none"> ➤ Variation existed in per tree yield of fresh cones and fruits across the seed sources.

				<ul style="list-style-type: none"> ➤ Significant variation in fresh weight of 100 cones across the seed sources. ➤ No significant variation in the number of seeds per cone in Puducherry. ➤ Significant variation in growth parameters noticed, when seedlings were raised in different potting media combinations. ➤ Significant variation in growth parameters noticed, when seedlings were raised in different types and sizes of containers; ➤ Significant variation in growth was observed in triple inoculated seedlings over control and other treatments. ➤ <i>C. junghuhniana</i> can be grown in both inland and coastal conditions in most agro climatic conditions. ➤ Growth performance varied across the sites based on the agro climatic features of the site. ➤ Tree improvement programmes with special emphasis on stem form should be given importance. ➤ Best performing trees in the field trials to be cloned and included in future tree improvement activities.
5	Genetic improvement of <i>Acacia auriculiformis</i> through half-sib progeny selection, (Aug-05, 2005-10)	Dr. M. Hegde, , Scientist – C	Genetic Improvement (Tree Improvement)	<p>. The main objective of this project was to improve the stem form and reduce the occurrence of multiple stems in <i>A. auriculiformis</i> plantations through selections, progeny testing and establishing second generation seedling seed orchards. Considerable improvement in reducing the occurrence of multiple stem was achieved as it was reduced to below 1% in the progeny trials. Generally, 40% trees in unimproved stands of <i>A. auriculiformis</i> have multiple stems. Regarding, stem straightness genetic variation among families and seed sources was observed. There was both within family and between family variations in stem form. Only trees with better stem form have been retained in the seed orchard after thinning.</p> <p>2. The progeny trials were established in four diverse locations. Effect of location on stem</p>

				<p>form and growth was noticed. In higher rain fall area like Palode growth and stem form were better compared to trial in Manapet which is located in east coast (near to sea) with sandy soil and lower rainfall. Even among seed sources Karunya SSO was having generally poor tree form and growth compared to other areas which was mainly due to black clayey soil and lower rainfall.</p> <p>3. Among the seed sources Behalli (Springvale provenance origin) performed better in terms of stem form and growth. Some of the Panampally families also performed better. However, families originated from Mumbaru (Morehead provenance origin) and Karunya (IFGTB SSO) performed poor compared other two sources. Clear differences in Seed source performance between Panampally and Karunya was observed despite having similar genetic base.</p> <p>4. The thinned trials can now be used as second generation seed orchards and seed will be supplied to Forest Departments and other user agencies. The plantations raised from second generation seed orchards expected to have better stem form which in turn will enhance the timber utility.</p>
6	<p>Performance of selected clones of <i>Casuarina equisetifolia</i> for insect pests and diseases tolerance and their response to biofarming practices. (April-07, 2007-10)</p>	<p>Dr. J. P. Jacob, Scientist E</p>	<p>Forest Protection (Insects pests, diseases and control)</p>	<p>Bark feeder resistant <i>Casuarina</i> clones like Kenya, PNG, Philippines, <i>C. junghuhniana</i>, NT Australia, QL Australia and Fiji can be used by farmers and forest based industries for cultivation. Clone Vietnam tends to be resistant to blister bark disease pathogen <i>S. vesiculosa</i>. Temperature, RH and moisture in soil tends to play a significant role in the development and spread of the disease. Panchkavya and Dasagavya can be utilized as an organic pesticide and plant growth promoter.</p>
7	<p>Phenotypic selection, reproduction and propagation in <i>Ailanthus excelsa</i> : Perspectives for Safety Matches Industry and Farmers in Tamil Nadu (Aug-05, 2005-09)</p>	<p>D. Rajasugunasekhar, Scientist C</p>	<p>Genetic Improvement (Tree Improvement)</p>	<p>As a outcome of the project Three Germplasm bank have been established, One in Tirupati, Andhra Pradesh, Two trials in Tamilnadu (TNFD lands) namely Salem and Kanchipuram districts. In the Andhra Pradesh trial Periodical data from the germplasm has been collected and analysed. The analysis of 80 seed lots (TN, MP, Rajasthan, Utrakand and AP) showed that the early growth performance of Cauvery delta zone (TN) was found to be good compared to other seed sources. Based on the second year biometric data 40 individuals of <i>Ailanthus excelsa</i> have been marked for the future clonal propagation The top ten best performing seedlots are 65,70,74,38(SZ) 86(CDZ) 69(NWZ) 88(CDZ) 1(WZ) 7 and 8(NWZ).</p>

8	<p>Screening and identification of potential isolates of Ectomycorrhizal fungi for increased productivity of Acacia, Casuarina and Eucalyptus tree species in nursery (April-07, 2007-10)</p>	Dr. V. Mohan, Scientist-E	Forest Protection (Mycorrhizae, rhizobia and other useful microbes)	<p>Attempt was made to investigate and select suitable type of ectomycorrhizal (ECM) inoculum for growth improvement of commercially important forest plantation species in nursery. Different forms of ECM fungal inocula (Basidiospores, vegetative mycelial (vermiculite based) and alginate bead inocula) of <i>L. fraterna</i> (1 isolate) and <i>P. albus</i> (4 isolates) were applied singly to <i>A. auriculiformis</i>, <i>A. mangium</i>, <i>C. equisetifolia</i>, <i>C. junghuhniana</i>, <i>E. camaldulensis</i> and <i>E. tereticornis</i> seedlings grown in sterilized and unsterilized potting media, under nursery condition. Significant findings of the study is as follows:</p> <p>Identified the most suitable culture medium and ideal pH condition for better growth of different isolates of <i>L. fraterna</i> and <i>P. albus</i> and standardized mass inoculum production technique of these ECM fungi under <i>in vitro</i>.</p> <p>Ectomycorrhization of seedlings with different forms of inocula viz., basidiospores, vegetative mycelial (vermiculite based) and alginate bead of <i>L. fraterna</i> and <i>P. albus</i> exhibited their potential in improving planting stock of the tree species. In general, seedling growth in terms of height increment was comparatively higher in all ECM fungal treatments than the uninoculated (control) seedlings. The height increment was found maximum in <i>E. tereticornis</i> and minimum in <i>C. equisetifolia</i> seedlings.</p> <p>Vegetative mycelial inoculum of <i>P. albus</i> was found to be the most efficient inoculum which gave maximum per cent of Mycorrhizal Inoculation Effect (MIE) in <i>Acacia</i> and <i>Casuarina</i> species and basidiospore inoculum of <i>P. albus</i> was found to be the most efficient inoculum which gave maximum per cent of Mycorrhizal Inoculation Effect (MIE) in <i>Eucalyptus</i> species.</p> <p>Morphological and anatomical studies revealed that ECM fungus, <i>P. albus</i> colonizes the roots of both ECM inoculated plants of all the tree species. It was also observed that total number of myco tips (roots colonized by ECM fungi) is more in ECM inoculated seedlings of all the tree species grown in sterilized potting medium than those grown in unsterilized potting medium at all age levels.</p> <p>ECM inoculated plant samples of all the tree species revealed appreciable amount of</p>
---	---	---------------------------	---	---

				<p>biochemical parameters during the period of observation.</p> <p>Papers published in Journals and contributed in edited books: 03.</p> <p>Papers presented in International Conference: 01</p> <p>Papers presented in National Seminar/ Conference/Symposium/ Workshop/ Meetings, etc.: 04.</p>
9	<p>Selection and Conservation of Red and Sweet tamarind in southern India (April-07, 2007-10)</p>	<p>A. Mayavel, RO</p>	<p>Genetic Improvement (Tree Improvement)</p>	<p>Survey conducted in different parts of Tamil Nadu d Karnataka, Andhrapradesh and pudhucherry to identify red and sweet tamarind. About 52 red phenotypic variants and 37 sweet tamarind trees were identified. The bio metrical observation, phenology, flowering behavior and open fruit setting estimate was observed from the all identified phenotypic variants. The studies on compatibility estimation were conducted in four different places namely Natham, Karaikal, Chidanparam and Mayavaram. The control pollination was done between selected red and sweet tamarind. About Nine full sib families were produced and viable fruit set was observed. Quantification of anthocyanin and its stability status was investigated from the identified individuals of red tamarind. Vegetative multiplication of different phenotypic variants of red tamarind and sweet tamarind trees were carried out through cleft grafting. Quantification on total sugars , acidity and TSS were investigated from the identified individuals of sweet tamarind. The open pollinated fruits were collected and data collected on biometric characters. The germplasm bank consisting of 33 different red and 27 sweet tamarind was established at kurumpapatti, salem (RF). The project completion report submitted for approval of competent authority.</p>
10	<p>Studies on response of important tree species to elevated CO₂ levels under simulated temperature and moisture regimes at seedling stage. (July-08, 2008-09)</p>	<p>Dr. C. Buvanewaran, Scientist-D</p>	<p>Ecosystem Conservation and Management (Climate Change)</p>	<p>Under this project, a new facility of 'Automated Open Top Chambers' has been established to conduct climate change research with particular reference to studies on response of tree species to elevated CO₂ as well as temperature.</p> <p>As per the programme, three months old seedlings of Teak, Casuarina, Eucalyptus, Ailanthus, Neem, and Bamboo were exposed to elevated CO₂ levels in open top chambers at 600 ppm and 900 ppm for a period of three months. Simultaneously, seedlings were also kept as control in open top chambers without</p>

				<p>CO₂ enrichment. Another set of seedlings were also kept as control outside the chamber in the ambient environment. Observations on growth parameters, dry matter accumulation, basic physiological processes and photosynthetic enzymes (RuBisCO and CA) activity revealed that there exist both inter- and intra-specific variations in response to elevated CO₂ and temperature levels.</p> <p>The species-wise response in terms of height growth increment is presented to reveal the varied response of different tree species to elevated CO₂ and temperature levels.</p> <ul style="list-style-type: none"> • In Teak, greater mean height increment (19.71 cm in three months) was registered in the chamber enriched with CO₂ at 600 ppm along with control on temperature (maintained at not over 4 °C plus ambient temperature) through humidifier unit. This implies that CO₂ enrichment will enhance the growth of teak provided temperature is under control. • Neem registered highest mean growth increment of 53.92 cm in three months period when they were grown in control chamber without CO₂ infusion when compared to any other treatment. When chamber temperature is reduced and controlled through humidifier, the mean growth increment was only 35.21 cm in three months. The seedlings in chambers with CO₂ enrichment at 600 and 900 ppm without temperature control registered lesser growth increment than the seedlings in control chamber. The elevation of temperature alone with no increase in concentration of CO₂ appears more favourable for growth of neem than any other treatment. • With regard to response of Ailanthus to elevated CO₂, statistical analysis revealed that the differences exhibited in terms of growth increment of seedlings of Ailanthus were not at significant levels. However, the mean height increment was double (11.63 cm in three months) in open top chambers with CO₂ concentration of 600 ppm without any modification of temperature that of in ambient grown seedlings (7.71 cm in three months). • In Bamboo, the mean height growth attained after three months of treatment period remained same in seedlings grown both in chamber environment and in ambient conditions by registering mean height
--	--	--	--	--

				<p>growth from 39.92 cm to 49.33 cm and statistical analysis also revealed that the differences exhibited in terms of growth increment of seedlings of Bamboo were not at significant levels. It clearly indicates that CO₂ enrichment or chamber environment does not influence the growth of bamboo seedlings within this exposure period.</p> <ul style="list-style-type: none"> • Data on growth increment of Eucalyptus seedlings clearly indicated that the species respond positively to CO₂ enrichment by registering greater growth increment in the chambers maintained at 600 and 900 ppm of CO₂. Highest mean growth increment (69.20 cm in three months) was recorded for seedlings in chamber having CO₂ at 600 ppm with regulation of chamber temperature through humidifier unit and least mean growth increment (51.10 cm in three months) was registered for seedlings grown outside the chambers in ambient environment. Statistical analysis also revealed highly significant difference among treatments. • <i>Casuarina equisetifolia</i> registered greater mean growth increment (73.29 cm in three months) under high CO₂ concentrations (900 ppm). Further, the mean growth increment was the least (60.38 cm in three months) when the temperature was regulated at 4 °C plus ambient temperature. • In <i>Casuarina junghuhniana</i>, the mean growth increment was highest (77.25 cm in three months) under exposure of seedlings to highest level of CO₂ (900 ppm) and the least growth increment was recorded for seedlings grown in ambient environment (71.96 cm in three months). • There was positive response to elevated CO₂ by both the species of <i>Casuarina</i> studied. However, statistical analysis revealed that these differences exhibited in terms of growth increment of these two species of <i>Casuarina</i> were not at significant levels. This can be attributed to the huge variation that existed within each treatment which indicates that there exists greater intra-specific variation in response of both the species of <i>Casuarina</i> to the elevated levels of CO₂ and temperature rise. <p>Observations on basic physiological process that is photosynthetic rate were made under different levels of CO₂ concentrations. Statistical analysis on data on photosynthetic rate showed that there exist significant</p>
--	--	--	--	--

				<p>differences among seedlings exposed to various CO₂ concentrations in all the species studied. Greater photosynthetic rate was observed in ambient environment than in chamber environments in Ailanthus and Bamboo. On the other hand, in teak and eucalyptus, highest photosynthetic rate was registered in chamber with elevated CO₂ at 600 ppm along with temperature regulation at 4 °C plus the ambient temperature through humidifier control. High temperature regimes in chamber environment favoured greater photosynthetic rate in Neem.</p> <p>In the present study, the biochemical response in terms of RuBisCO and CA enzymes activity of different species to elevated CO₂ levels varied differently. Among seven tree species studied, in four species viz teak, bamboo, <i>Casuarina equisetifolia</i> and <i>C. junghuniana</i> the CA activity was observed to vary at statistically significant levels and brings corresponding differences in growth and dry matter accumulation. Only in one species viz. <i>Eucalyptus sp.</i> RuBisCO activity differed at statistically significant levels and it corresponds to greater growth increment as well as greater dry matter accumulation in eucalyptus under elevated CO₂ levels.</p> <p>The present study concludes that the response of different tree species to different concentration of CO₂ and under different temperature conditions is highly varying which emphasizes the need to assess all important tropical tree species individually and not to generalize the response of tree species to elevated CO₂. Further, the study also concludes that equivalent to or even greater than inter-specific variation, there exists huge intra-specific variation, particularly in <i>Casuarina equisetifolia</i> and <i>C. junghuniana</i>, which could be exploited for future breeding programme in developing climate ready genotypes having greater potential to sequester more CO₂. In this context, the 'Automated Open Top Chambers' facility created under this project can be used for evaluation of selection genotypes for greater CO₂ sequestration potential under elevated levels of CO₂ as well as temperature.</p>
11	<p>Studies on the population structure & reproduction of <i>Pterocarpus marsupium</i> in Tamil Nadu & Kerala. (Oct-05, 2005-10)</p>	M. Maria Dominic Savio	Genetic Improvement (Tree Improvement)	<p>Distribution of <i>P. marsupium</i> was studied in eastern and western aspects of Southern Western Ghats and 17 populations on eastern aspect and 9 populations on western aspect were shortlisted for study. In order to understand morphological characters and population structure of <i>P. marsupium</i> 556 trees</p>

			<p>on eastern aspect - representing 16 populations - and 195 trees on western aspect - representing 9 populations of Western Ghats - were studied for their morphological characters.</p> <p>Of 556 trees studied spread across Eastern aspect of Western Ghats - 277 trees (49.82%) were in 10 – 40 cm group while 203 trees (36.53 %) were in 40 – 80 cm group and 46 trees (8.26 %) were having dbh > 80 cm. Very few saplings, 30 trees, (5.40%) were in <10 cm category.</p> <p>Singampatti, Kuttralam, Erasakkanyakannur, Gandamanur, Agamalai, Siruvattukadu, Bolampatti, Anaikatti, Hiriya Shige, Nilgiri Eastern Slopes are 10 sites out of 16 sites studied on eastern aspect of Western Ghats that need augmentation of regeneration as data of these locations show very low regenation.</p> <p>Of 195 trees studied across western aspect of Western Ghats - 100 trees (51.28%) were in 10 – 40 cm group while 90 trees (46.15%) were in 40 – 80 cm group and 2 trees (1.03%) were having dbh > 80 cm. Very few saplings / pole trees (3 trees) were available in the <10 cm category (1.54%).</p> <p>Out of 9 sites studied in Western aspect of Western Ghats, excluding Achankovil, remaining 8 sites viz., Kalmalai, Kottur, Lady Smith, Kumaran Perur, Thodupuzha, Malayathur, Alathur and Kinnaur need steps to augment regeneration of <i>P. marsupium</i>.</p> <p>Data on population structure was collected from 17 sites spread over western aspect of Western Ghats. In all, an area covering 34 ha was studied for trees while an area of 1.7 ha was studied for regeneration in these 17 locations. In all, 912 trees were studied in 85 quadrats of 100 x 40 m indicating an average density of 27 trees per ha. For regeneration 170 sub-quadrats of 10X10 were studied indicating an average density of 37 saplings per ha. These 63 saplings were studied from 16 sub-quadrats - spread over 5 locations - while in remaining 154 sub-quadrats – spread over 12 locations - regeneration was absent. Regeneration study results indicate urgent need to augment regeneration of <i>Pterocarpus marsupium</i>. Erasakkanyakannur and Boluvampatti sites containing high density of <i>P. marsupium</i> (> 50</p>
--	--	--	--

				<p>trees / ha.) can be converted into Seed Production Areas for <i>P. marsupium</i> by adopting appropriate techniques for conversion by removal of poor performers.</p> <p>Of 912 trees studied, distribution of diameter at breast height (dbh) showed that 473 trees (51.86%) were in 10 – 40 cm group while 346 trees (37.94%) were in 40 – 80 cm group and 38 trees (4.17%) were having dbh > 80 cm. Very few saplings / pole trees (55 trees-6.03%) were available in the <10 cm category.</p> <p>Study of diameter at breast height class distribution of 912 trees studied over 17 sites showed variation in distribution of diameter at breast height amongst individual study sites were noted. The following study sites exhibited a near normal distribution of diameter at breast height class distribution – Amaravathi; Bolampatti & South Bargur.</p> <p>Distribution of diameter at breast height at Tekkumalai west, Singampatti, Chokkampatti, Agamalai, Anaikatti and Nilgiri Eastern Slopes showed more individuals with higher diameter indicating urgent need to augment regeneration. Distribution of diameter at breast height (dbh) at Sivagiri, Kuttralam, Erasakkanyakannur, Gandamanur, Siruvattukadu, Thalamalai and Kalmalai showed more individuals with lower diameter classes.</p>
--	--	--	--	--