

PROJECT COMPLETED DURING THE YEAR 2007–08

PLAN PROJECTS

Project 1: Enhancing productivity in *Casuarina* species through inter-provenance and inter-specific hybridization [IFGTB/RP-30/2003-08]

Findings: Forty families of inter-provenance and inter-specific hybrids of *Casuarina equisetifolia* and *C. junghuhniana* were produced through control pollination. Three field tests were established at Veedur (Tamil Nadu), Panampalli (Kerala) and Sriharikota (Andhra Pradesh) to test the performance of F₁ progeny. All the tests were assessed for height and survival at 6 months age. Survival was more than 90% in Veedur and Panampalli and 85% in Sriharikota. Inter-specific hybrid families showed better height growth than local seedlings and seed orchard progenies of pure species. The best inter-specific hybrid family showed 35 to 53% better height growth than local seedlot and 17 to 21% over orchard progenies. The average height of the best 5% of trees was 49 to 68% more than that of local seedlot and 29 to 32% over orchard progeny. The trials will be maintained upto 5 years age and periodic assessment of growth and form traits will be gathered for further ranking of families and individuals.



Hybrid trial of *Casuarina* showing vigorously growing interspecific hybrid trees and slow growing trees of parent species (Panampalli, Kerala)

Project 2: Status and floristic diversity of sacred groves – the only remnants of natural forests in Alappuzha District, Kerala [IFGTB/RP-35/2005-08]

Findings: Alappuzha is the smallest (1414 km² area) district in Kerala with a high population density (1492 persons per km²) and is the only district in the State without natural forests. The sacred groves of the district attract utmost attention as they are the only remnants of natural forests once present. Undertaken field survey in all the six taluks of the district covering 91 villages and enumerated 1128 sacred groves. The total area recorded under these groves was 83.55 ha. Nearly 40 per cent of the groves had sacred pond associated with it. Considerable variations were observed with respect to extent of the groves and species composition. Area of these groves ranged from 0.003 to 36 acres. Most of the groves are abode of many endemic and rare plant species. A total of 687 plant species belonging to 493 genera and 127 families have been identified from these groves. Many sacred groves in the district face threat due to the dense human population and change in socio-economic status. Break up of ancestral joint family system to nuclear families is the major reason for deterioration of these valuable resources. Sanskritisation and changes in beliefs are also attribute to this denudation. Over exploitation of the resources by 'Ulladans' a tribal community and removal of litter alongwith the seeds from the floor have also led to its retrogression to a great extent. Exotic weeds namely, *Mikania micrantha*, *Lantana camera* and *Chromolaena odorata* overgrow the native species and play a major role in degradation. Sacred groves require complete protection from human interferences and is the only way to preserve these priceless treasures of nature. 'Ulladans' should be made aware of the importance of the vegetation system and the rational and sustainable exploitation of

the resources. People who clear the grove after transferring the deities to the serpent worship temples for various developmental activities should also be sensitized to avoid further damage. Officials of Forest Department, Research Organizations, NGOs and Educational Institutions should take lead in imparting knowledge on the functional role and importance of sacred groves. They also should help in ecological restoration of the retrogressing sacred groves by way of selecting and planting suitable plant species. In general, each sacred grove was found to possess its own unique biological, ecological, cultural and economic dimensions. Financial supports / rewards to the individuals and trusts maintaining these groves will go a long way in preserving them intact for posterity.

Project 3: Studies on seed handling and storage behaviour of important NTFP species [IFGTB/RP-34/2005-08]

Findings: Suitable seed handling techniques for four important NTFP species namely, *Calophyllum inophyllum*, *Decalepis hamiltonii*, *Garcinia gummigutta* and *Sapindus emarginatus* were standardized. Fruits of *C. inophyllum* have to be picked up at yellow-green stage of fruit maturity. Seeds were found to be desiccation sensitive with a Lowest Safe Moisture Content of 15%, and studies showed that seeds can be stored for 30 days at temperature range of 10 to 20°C to prolong viability. Significant reduction in carbohydrate content and oil content could be the key factors involved in reducing viability within a period of 30 days, a tendency common in recalcitrant seeds. It is, therefore, advisable to store seeds in sealed polythene bags at a temperature range of 10 to 20°C.

D. hamiltonii seeds extracted from fruits collected during late March-April were found to be well matured and recorded 83% germination. Soaking in hot Water (60°C) for 24 hrs was found to improve germination significantly to 98% than control. Germination on paper medium followed by transplanting to root trainers with red earth, sand and FYM (1:1:1) was found suitable for this species. Low temperature storage was not favourable and ambient storage (32±1°C) was found the best. *Decalepis* seeds can be classified as intermediate in storage behaviour with more inclination towards recalcitrance. Ambient storage of fresh seeds in sealed polybags upto 2 months is advisable. Depulping *G. gummigutta* fruits to extract seeds followed by abrasion of seeds with sand and washing with kerosene were found suitable pretreatments for cleaning seeds and rendered them suitable for germination. Shade drying seeds for 2 weeks was found suitable than sun drying and seed were desiccation tolerant. Upto 6 months, seeds withstood ambient temperature whereas upto one year storage 20°C was found favourable. The seeds did not show good storage response to different pre-storage trials such as seed dusting with protectants and moist sand storage. Seeds could be classified as intermediate in nature. Thus, storing *G. gummigutta* seeds in air tight pet jars without any storage treatments is the most suitable one.

S. emarginatus seeds with initial moisture content of 8.826 % showed germination of 62.5%. Pretreatments did not improve germination. Increasing trend in carbohydrate content over a period of 12 months storage could be attributed to setting of improved desiccation tolerance in the seeds. Seeds can be classified as orthodox in nature. *S. emarginatus* seeds can be safely stored in sealed polybags at room temperature or in a refrigerator upto 9 months.



Flowering, fruiting, seeds and seedlings of *Sapindus emarginatus*