

## **PROJECTS COMPLETED DURING THE YEAR 2006-2007 (Externally aided)**

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### **Project 1: Utilization of economic potential of Parthenium [FRI-262/Chem-13/External/2004-2007]**

#### **Sub-project (i): Preparation of composites**

**Findings:** Phenol formaldehyde resin was prepared and analysed using commercial grade phenol and formaldehyde. It was observed that the particle boards prepared at 24 kg/cm<sup>2</sup> pressure level using 14 % resin meet the IS specifications.

#### **Sub-project (ii): Preparation of alpha cellulose and handmade paper**

**Findings:** Parthenium contains 78 % holocellulose and 17.8 % lignin indicating that the plant is suitable raw material for cellulose extraction. The plant contains short fibre and fibre length lies between 0.55 mm to 1.32 mm and fibre diameter 14.94 $\mu$ . Alpha cellulose (90.82%) was isolated under optimized conditions with brightness 80% and average DP 661.5. Handmade paper was developed with Parthenium alone with an admixture of long fibre.

### **Project 2: Alkaline peroxide mechanical pulping/bleaching [FRI-331/CandP-17/External/2005-2007]**

**Findings:** Conditions optimized to produce APMP pulp from sarkanda. The technology was demonstrated at 2 kg batch level to the Executives, M/s ABC Paper (Punjab).

### **Project 3: Development of ecorestoration model for Iron Ore Mines of Bihar and Orissa [FRI-179/Eco-9/External/2001-2007]**

**Findings:** Over burden dumps, mined benches as well as degraded site (Village) have been completely stabilized and there is a distinct improvement in the soil after restoration intervention.

Steel Authority of India Limited (SAIL) appreciated the work, as restoration trials have directly cut the cost of debris removal from the colony areas of SAIL.

### **Project 4: Efficacy testing of the insecticide-Actara 25 WSG (Thiamethoxam) against termites [FRI-266/FED-18/External/2004-2007]**

**Findings:** Laboratory Testing: Laboratory testing of the insecticide Actara-25 WSG in comparison with two more insecticides, Endosulfan 35EC and Chlorpyrifos 20EC (@ 0.0125%, 0.0187%, 0.025% and 0.05%) against termites completed. Endosulfan gave comparatively better results whereas effect of Actara and Chlorpyrifos was at par statistically. Final Report of the laboratory studies of the insecticide Actara-25 WSG has been sent to the Syngenta India Ltd., Mumbai.

**Field Trial:** Comparative efficacy of the insecticide Actara-25 WSG is also being tested in the field. Monthly observations were taken on the mortality of poplar and Eucalyptus plants due to termites, *Odontotermes obesus* (Rambur) and *Microtermes obesi* Holmgren.

**Project 5: Utilization of Sisal fibre for making Composites and Handmade paper [FRI- 268/FPD-49/External/2004-2006]**

**Findings:** Fibre board prepared from Parthenium at different pressure and varying additives, meets most of the IS specifications. Handmade paper was developed with 100% Sisal cooked fibre and blended with waste paper.

**Project 6: Micropropagation of chirpine (Pinus roxburghii) and shisham (Dalbergia sissoo) [FRI- 222/ GandTP -13/ External/2002-2006]**

**Findings:** Embryogenic callus was established through immature zygotic embryos. Effect of phytohormones was studied for embryogenic callus proliferation. In-vitro shoots of Chirpine and Dalbergia sissoo were multiplied on MS medium supplemented with different concentration of cytokinin.

**Project 7: Preparation and publication of a souvenir to mark the Centenary of FRI [FRI- 342/Path-20/External/2006-2007]**

**Findings:** Uttaranchal Council of Science and Technology (UCOST) financed the project. A publication viz., FRI: Glimpses of a Century was published which gives details of 100 years of creative scientific history of FRI.

**Project 8: Technology transfer and development of a model village by skill up-gradation and capacity building of rural communities for socio-economic upliftment, SRTT funded project [FRI-297/PLO-2/External/2005-2007]**

**Subtitle: Integrated Utilisation of Lantana**

**Findings:** Training programme was undertaken and 10 participants took part in integrated utilisation of Lantana. The participants were imparted training to obtain dye from the leaves and the board from Lantana wood through trees support of Forest Products Division of FRI during November 2006. A Demonstration-cum-Display centre depicting the articles made from Lantana was formally inaugurated in the newly declared Shatabadi Van Vigyan Kendra of FRI, Dehradun. Through this Kendra (erstwhile Rangers College) the artisans/farmers can draw benefits by selling the products and multiplying the planting material by using mist chamber etc.

**Project 9: Networking forest plantations in a crowded world: Optimizing ecosystem services through improved planning and management strategies funded by E.U. under ECCP [FRI-288/RCS-1/External/2005-2006]**

**Findings:** The main results achieved from the project have been development of methodology by combining the ? Multidisciplinary Landscape Assessment? developed by CIFOR with typology of ecosystem functions as provided by De Groot (2005). Developing a model NETFOP in OSIRIS framework for the purposes of spatial data management and knowledge enquiry; review of silvicultural tools to enhance ecosystem goods and services from planted forests; assessment of ecosystem goods and services from forests in India, Netherlands and Germany; development of database for educational courses on ecosystem goods and services and studies on community participation in plantation planning and management. Principally six activities were planned for execution during the project.

**Project 10: Development of mechanism for computation and forecast of growing stock in strip forests of Haryana taking into account the year wise plantation and survival of relevant species [FRI-289/RCS-2/External/2005-2007]**

**Findings:** Interim report has been submitted to funding agency.

**Project 11: Studies on interrelationship between production level and marketing of important forestry species in Punjab [FRI-174/RSM-9/External/2000-2007]**

**Findings:** Assessment of production potential of agro-forestry species viz. poplar, Eucalyptus, drake and khair in seventeen districts of Punjab for the next ten years in intensive and extensive plantations was carried out. Total production predictions were made from 2004-05 to 2014-15 using time series analysis method of forecasting. Market mechanism and demand and supply status of wood in Punjab was studied in 103 markets spread out in 17 districts of Punjab. Inter-market comparison and price spread analysis in the market of Ludhiana, Hoshiarpur and Patiala were also carried out. Besides market mechanism of adjoining markets of Punjab viz. Sriganganagar (Rajasthan) and Yamunanagar in Haryana were also studied. The factors leading to the price fall of poplar wood were also identified and enumerated.

**Project 12: Studies on Himalayan Pines [FRI-175/Silva-12/1995-2006]**

**Sub-project 1: Seed Technology**

**Findings:** Significant variations were observed for collar diameter, plant height, apical bud breaking time, number of buds, total length of buds, length of open and close buds, type of bud cluster, number of leaders, number of main branches, length of needles, etc. in different provenances of *Pinus roxburghii*. Variations were also observed in cone and seed characters of different seed sources of *P. wallichiana*, *P. roxburghii* and *P. gerardiana*. The study showed that the observed characters are under both genotypic and environmental control.

**Sub-project 2: Nursery and planting technology**

**Findings:** Developed a technique for rapid extraction of seeds of *Pinus roxburghii*. The technique resulted in seed extraction within 4 days in Dehradun conditions as compared to three weeks time required in the conventional technique of drying the cones in the sun. Cone fresh weight, dry weight, length and 100-seed weight in *P. roxburghii* show high repeatability suggesting that the traits are strongly inherited. Much of the variation in these characters occurred within the provenance rather than across provenances. Containerized seedling technology gave better survival and growth in field trials. Use of bare root technology was not recommended for large-scale planting of *P. roxburghii*. Seedling emergence in *Pinus wallichiana* was significantly enhanced by stratification. The final report has been submitted to USDA.

**Sub-project 3: Plant physiology**

**Findings:** In USDA Pine Project, physiological studies of selected genotypes and provenances of pines adapted to stress sites were conducted.

Seeds of pines collected from the entire range of distribution from Jammu and Kashmir to Arunachal Pradesh were studied to determine the nature and extent of variation in natural populations and to select the best provenance adapted to site.

Seeds of 56 parameters of chirpine were raised at three altitudes viz., FRI 600 m, Jarmola (1600 m.) and Sandra (1200 m.). The maximum height increment and collar dia. was observed at FRI. Sixty sources of Chir Pine were screened for photosynthetic efficiency at three altitudes. Augustmuni, Kedarnath seed was photosynthetically most efficient ( $F_v/F_m = 0.77$ ).

Twenty seed sources of *Pinus wallichiana* were screened on the basis of cone, seed, seedling and early growth performance of the seedlings. Tutu, Jubbal and Bharmaur were found to be best in almost all traits studied.

UPGMA clustering of populations on the basis of four isoenzymes into 5 clusters revealed Sewai and Tutu to be divergent populations and hence could be used for future breeding programmes.

Allozyme variation in 20 populations of *Pinus wallichiana* with 16 loci revealed Trehta and Khambi Kuper with highest genetic diversity, hence be kept as biogenetic resources for conservation. Whereas, populations of Shimla and Saranan were found with different architecture. Thus could be used for future breeding strategies and improvement.

**Project 13: Sample surey to update rates and ratios of Minor Forest Products and Timber in India [FRI- 294/Stat-2 /External/2005-2006]**

**Findings:** The data as required for the project has been collected and submitted for further analysis