NEW PROJECTS INITIATED DURING THE YEAR 2008-2009

PLAN PROJECTS

Project 1. Population genetic analysis and characterization of *Cedrus deodara* germplasm through DNA based markers [FRI 465/G&TP-24]

Status : Methodology for the collection of samples and related parameters finalized in consultation with HFRI Shimla. Available SSR markers on Deodar were collected through available literature. Ten sets of SSR primers got synthesized and have been tested in deodar. Needle samples collected from twenty sources (1000 samples) representing Uttarakhand and H.P. DNA extraction protocol standardized. DNA extracted from 1400 samples of seven sources.

Project 2. Genetic evaluation and characterization of different clones for higher productivity and hybridization in *Dalbergia sissoo* [FRI-464/G&TP-23]

Status : Clonal trials of *D.sissoo* were taken up at two locations. Observations of clonal trials on various morphometric traits were recorded. Root suckers of second-generation selection from the clonal seed orchard of Hoshiarpur were collected for their multiplication. The germplasm in vegetative multiplication garden coppiced and cuttings obtained from coppice shoots were kept for their propagation in the mist chamber for rooting.

Project 3. Germplasm collection, evaluation and planting of Jatrpoha and Karanja for improved productivity and higher yield content. [FRI-448/G&TP-24]

Status : Plantations of *Pongamia pinnata* in the states of Uttarakhand and UttarPradesh were surveyed. A total of 84 candidate plus trees were marked. Nursery has been made ready for rooting of cuttings and raising of seedlings of desired genotypes.

Project 4: Development of cost effective housing by using pole structures. [FRI-454/ ENGG-01]

Status: To achieve a proper jointing system for joining round poles with side members as round pole, ply (shuttering grade) and wooden fish plate, a total of 158 structural joints were fabricated with metallic bolt & M.S. washers and got tested. Shutter grade ply found unsuitable to join with pole. A building plan for a moderate inexpensive pole house was designed and developed.

Project 5: Exploration of diversity in *Ganoderma lucidum* and its conservation with special emphasis on its medicinal uses. [FRI-456/PATH-30 –PLAN]

Status: Specimens of 63 fruiting bodies of *G. lucidum* were collected from Delhi (NCR), Haryana, Punjab, Uttar Pradesh, and Uttarakhand on 18 host tree species and 55 have been brought into pure culture. Morphological variations were studied for 40 specimens showing 11 sessile forms, 20 stipitate forms, 5 sub-stipitate forms, 2 imbricate forms and 2 immature forms. Anatomical variation in cuticle structure showed 31 forms with Characoderma and 9 forms with hymenioderma and context was hard in 28 forms and spongy in 12 forms. Variation in cultural characters has been studied in 14 isolates indicating three growth forms fast (7 cm in a week), moderate (6.0-6.2 cm per week) and slow (4.5 – 5.5 cm per week). Extraction of polysaccharides from the fruiting bodies of *G. lucidum* revealed glucose, galactose, arabinose and xylose sugars. DNA analysis of 10 isolates of *G. lucidum* was done using Rfu-18 and Rfu-23 primers. Rfu-23 primer gave maximum 38 bands comprising 25 polymorphic bands, 3 clusters and 4 outliers.

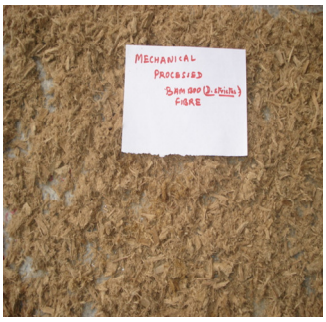
Project 6: Studies on natural resistance of imported woods against insects and decay fungi in Indian environment-FRI component of IWST collaborated project

Status: Seven imported wood samples were put to Accelerated Laboratory Tests for natural decay resistance namely. Teak (*Tectona grandis*) origin Tanzania, (II), Beech (*Fagus grandifolia*) origin France, Honnai Origin Indonesia, Teak (*Tectona grandis*) origin Australia, Ash (*Fraxinus americana*) origin France and Beech wood (*Fagus grandifolia*) origin Belgium using two white rot fungi *Pycnoporus sanguineus* and *Trametes versicolor* and two brown rot fungi *Gloeophyllum striatum* and *Oligoporus placentus.* The three samples of teak were highly resistant to all the test fungi, whereas samples of Honnai wood was not resistant to *P. sanguineus* and *G. straitum*, ash wood not resistant to *T. versicolor* and *O. placentus,* beech wood from France not resistant to *O. placentus* and beech wood sample from Belgium was not resistant to both the brown rot fungi.

Project 7: To improve white rot fungus strains accessibility in Bamboo for better delignification through mechanical process. (FRI-451/C&P-21)

Status: Raw material of Bamboo (*Dendrocalamus strictus*) was collected from Forest Research Institute, Dehradun. The bamboos were chipped and chips were air dried to the moisture content (10-12%). Bamboo chips were processed through mechanical operation to increase surface area for better treatment. Bamboo and destructured chips were characterized for chemical composition, viz. ash content, hot water solubility, cold water solubility, 1% NaOH solubility, Alcohol-Benzene solubility, Klason lignin, Holocellulose, α-cellulose, pentosans by standard TAPPI method.

Mechanical processing of chips



Bamboo chips

Mechanical processing of chips

Pure Cultures of Fungi *Schizophyllum commune* and *Coriolus versicolor* were obtained from Pathology Lab (F.R.I), Dehradun. Sub-culturing of Fungal Culture was carried out on Agar Slants, time to time, to maintain Cultures for future use. Fungi were allowed to grow on Potato Dextrose Agar media in a Petri dish for a different time periods at an optimum Temperature and Humidity. Culture was transferred from PDA Plate to Broth Medium in a flask to obtain loosely held Mycelium.

Project 8: Studies on the Termites of Family Termitidae (Insecta: Isoptera), with special emphasis on their taxonomic status, identity and distribution. (FRI-455/ FED-19)

Status: Taxonomic status of the twelve termite species has been discussed. A series of the collection of the twelve termite species was studied, morphometric measurements were taken and slides were prepared for morphological variations, original description of the species were consulted and wherever required '*type*' specimens were also studied.

Project No.9: Studies on natural dyes from *Tagetes minuta* and *Terminalia chebula*. [FRI-452/Chem-27]

Status: *Tagetes minuta* (aerial parts) and *Terminalia chebula* (fruits,wood,bark and roots) were collected. Conditions w.r.t. time, material to liquor ratio and temperatures were optimized for the isolation of dye from the aerial parts of *Tagets minuta* and fruit pericarp of *Terminalia chebula*. Dyeing trials on silk, wool and cotton using the isolated dyes were also done. The colour fastness properties & CIELAB values of the dyed fabrics were determined. Petroleum ether, acetone and

methanol extracts of the plant material were also prepared for their chemical examination. The essential oil isolated from aerial parts was analyzed by GC-MS.

Project No.10: Studies on the pectin substances from the fruits of *Diospyros peregrina* (FRI-453/Chem-28)

Status: Fruits of *Diospyros peregrina* were collected and deepfreezed at -20^{O}C to impede endogenous enzymes activity. Cell wall polysaccharides were isolated at -20^{O}C as acetone insoluble solids using homogenizer at ~ 50,000 rpm. Pectin hydrolyzing enzymes present in the cell sap degrade pectins in cell wall on extraction. For extraction and chemical characterization of pectins in cell wall preparations removal of endogenous activity is necessary. Reactions were carried out to remove the activity of pectin hydrolysing enzymes viz. pectinesterase, polygalactouranase before separating cell wall polysaccharides. Pectin fraction was isolated using CDTA and sodium carbonate.

Project 11: Wood quality assessment of selected candidates of *Eucalyptus tereticornis* of Australian origin

Status: Mechanical testing of 16 superior phenotypes of *Eucalyptus tereticornis* has been completed and also FTNIR spectra of same specimens was generated. Chemical estimation of 16 phenotypes was be also done.

Project 12: Health assessment of logs and converted timbers by vibration techniques

Status: Log of *Eucalyptus* spp. was converted into plank/sticks and testing of samples for the measurement of ultrasonic velocity and strength properties is under progress and visual observations of logs for defect detection is also in progress.

Project 13: Development of Phenol- urea- formaldehyde (PUF) wood adhesives

Status: Peeling of logs were carried out to get the veneers from poplar and sal. Preliminary experimental trials were carried out**.**

Project 14: Development of quality wood composite from lops and tops of mixed plantation species

Status: Particle preparation from lops and tops of eucalyptus and poplar were carried out. Preliminary experimental trials were carried out.

Project 15: Fabrication and performance study of vacuum based wood dryer for fast and efficient drying of timbers.

Status: A vacuum based kiln was indigenously designed and fabricated. The kiln has been installed at the Wood Seasoning Discipline, FRI Dehradun.

Project 16: Development of treatment technology for commercially important difficult to treat species. FRI-463/FPD (WP)-75

Status: Eucalyptus samples were pretreated with different pretreatments i.e. steaming, hot water, incising (5mm, 10mm) and, then, treated with CCA, CCB, Borax-Boric and ZiBOC preservatives at 4% and 8% concentration by Diffusion and Pressure treatment methods. Hot water treatment followed by pressure treatment has shown encouraging results.

Project 17: Studies on the natural resistance of imported woods against insects and decay fungi in Indian environment. IWST, ICFRE funded project

Status: Samples received from IWST, Bangalore were installed at Timber test yard, Dehradun. 1st Quarterly information shows very slight termite attack on few samples.

Project 18: Digitization of Herbarium (Dehradun Herbarium) of Forest Research Institute [FRI-450/Bot-60]

Status: 176 genera, 1129 species and 4678 specimen details have been entered into the database. 7418 photographs of plant specimens have been taken and edited.

Project 19: T**axonomic and Anatomical studies of Exotic Pinus species** [**FRI-445/BOT-63]**

Status: Collection of Herbarium material and wood samples carried for eleven species of exotic Pines. Their taxonomic and wood anatomical studies are well underway.

Project 20: Fluorescent Studies Of Indian Woods [**.FRI-447/BOT-65**]

Status: 350 species were studied for their ultraviolet properties.

Project 21: Inheritance pattern of wood anatomical traits in *Populus deltoides* Bartr. ex Marsh. [FRI-446/Bot-64]

Status: The project was initiated in April 2008. In the project samples of the parents and offsprings of F1 generation of *Populus deltoides* were collected from the field. Quantitative data on the dimensions of wood elements viz. fiber and vessel dimensions were collected from the macerated wood samples. Moreover, specific gravity was also determined for the samples of parent trees.

Project 22: Field evaluation of Tissue culture plants of Eucalyptus hybrids at seven agro-climatic sites [FRI-448/Bot-66]

Status: The first year of this ongoing project is completed and observations are as follows. The Tissue culture raised plants of Eucalyptus hybrids FRI-5 and 14 are in fifth year of age at Dehra Dun, Hissar, Hoshiarpur, Haldwani, Pantnagar, Meerut and Jodhpur. Field maintenance and collection of field data like plant height, clear bole length(CBL), diameter at breast height (dbh), branch angle etc were completed. The results across the sites shows that theplants of FRI_5 and FRI-14 were tallest at Haldwani(18.6 m) and Hoshiarpur (14.1m) respectively, while thickest dbh at Pantnagar (15.6 cm) and Hoshiarpur (15.0) respectively. Also plants of FRI-5 and FRI-14 had clear bole at Haldwani (7.4m) and Pantnagar (5.3m) respectively. The branch angle of FRI-5 and FRI-14 was in range of 45^0 - 60^0 and 60^0 – 90^0. On Hoshiarpur and Dehra Dun site FRI-14 were taller and dbh was thicker than FR!-5 where as at Pantnagar site the result was in contrast. At all these sites where both FRI-5 and FRI-14 were present, FRI-14 had most clear bole.

Project 23. Impact of ban on green felling in Deodar, blue pine, fir, spruce forests in Uttarakhand (FRI-/Silva-390/RSM-18)

Status: The project area was surveyed and data recorded on the plots prescribed for felling in 1980s. The data was recorded from the compartments of deodar, spruce, fir and blue pine forests, which were actually felled and un-felled coupes under Chakrata, Uttarkashi and Badrinath forest divisions. The field data were collected from Chakrata and Uttarkashi forest divisions.

Project 24: Silviculture studies on *Hippophae salicifolia* -A Wonder Lesser Known Plant of Uttarakhand (FRI-322/Silva-26)

Status: Survey was conducted on natural population of *Hippophae salicifolia* in Uttarkashi and Chamoli distt. The seeds of *Hippophae salicifolia* were colleted in two different seasons (October and February).Germination studies of *H.salicifolia* was initiated in field and laboratory condition. Experiment was carried out to study the effect of light and temperature on seeds of *Hippophae salicifolia*. Introduction trial was initiated to see the performance of *H.salicifolia* at Chakrata nursery.

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H. salicifolia

H. tibetiana

Project 25: Enhancement of seed longevity of *Diploknema butyracea* (FRI-466/Silvi – 42)

Status: The literature of *Diploknema butyracea* on distribution of natural population and their phenology (flowering and fruiting), ripening/maturation, biology, longevity, viability, vigour, storability and nursery technique of species were consulted. Survey conducted in Pithoragarh Forest Division for locating the population of *D. butyracea*. Fruits of *D. butyracea* were collected from Harkante population, Gurna beat, Pithoragarh Forest Division. Fruits were extracted and processed in Laboratory. Moisture contents, purity and weight of seed were determined. Morphological traits of seed were recorded. Germination, viability and vigour of seed were assessed. Sowing of seeds in nursery was done and selected the sites for soil sampling from natural population. Observations of growth parameters of seedlings were recorded.