COMPLETED: EXTERNALLY AIDED PROJECTS

Project 1: Study of anatomy and properties of lesser known timbers of North Eastern State of India with particular reference to Nagaland (Funding agency: Nagaland State Forest Department) [2007-2008]

Findings: Project is completed and a Hand Book on 25 Nagaland timbers is being prepared. The handbook contains information on trade name, local names, tree form, general features, gross and minute anatomy alongwith photomicrographs. Information on properties and uses wherever available is also provided.

Project 2: Investigations on the mechanisms of success of *Mytilopsis sallei* (Recluz) in managing toxic load arising out of biodeterioration control measures (Funding agency: Department of Science and Technology, Government of India, New Delhi) [2005 -2008]

Findings: *Mytilopsis sallei*, the marine fouling bivalve, collected both from Visakhapatnam and Kakinada ports responded to background levels of copper and hydrocarbon concentrations, positively. It can release the excess load of copper when transferred to clean seawater, rapidly. The bivalve can accumulate leachates from CCA treated wood according to the amount leached out. The ability to accumulate copper is more in animals collected from Kakinada than at Visakhapatnam. The animal hosts numerous microbes among which two were found to be tolerating heavy concentrations of copper. When exposed to copper and the broad spectrum antibiotic, Streptomycin, the animal accumulated less copper compared to animals exposed to copper concentrations without antibiotic, as the microbes get either killed or their activity reduced. The microbes present in the gut may be helping the bivalve in tolerating and accumulating copper at higher concentrations.

Project 3: Field performance of micro-and macro propagated planting stock of selected five commercially important bamboo species (Collaborative project – IWST, KFRI, IFGTB) (Funding agency: Department of Biotechnology) [2004-2009]

Findings: Established germplasm bank of 21 industrially important bamboo species in 0.5 ha area at Gottipura, Bangalore. Out of the 21 bamboo species, Candidate Plus Clumps (CPCs) germplasm consisted of 7 industrially important bamboo species. Established field trials of micro and macropropagated five important bamboo species in 15.0 ha area in Karnataka (Gottipura, Nallal near Bangalore and Yelwala, near Mysore) and Andhra Pradesh (Dulapally, FRC, Hyderabad). Field trials viz;(i) type of planting material (seed base, macro and micropropagated plants) in 5m x 5m spacing (ii) spacing trial (5m x 5m, 5m x 7m and 5m x 9m) and fertilizer trials (*Bambusa bambus* and *D. strictus*) in 5m x 5m spacing were established

during July – August 2005. Survival after 6 months varied from 85-100%. Minimum survival was in *D. asper* and maximum is in *D. strictus.* Micropropagated plants were comparable with seed and cutting raised plants. At the age of 40 months, maximum height (4.34 m in Bangalore and 3.92 m in Mysore and 3.38 m in Hyderabad) and collar diameter (22.25mm in Bangalore, 18.10 mm in Mysore and 16.25 mm in Hyderabad) was observed in *B. balcooa,* followed by *D. strictus* and *B. bambos*. Minimum height was observed in *D. asper* (1.83 m in Bangalore, 1.75 m in Mysore and 1.42 m in Hyderabad). Maximum culm numbers were observed in *D. asper* (15.0 in Bangalore, 11.8 in Mysore and 10.9 in Hyderabad. Effect of fertilizer was distinct and compost and inorganic fertilizer proved the best for better growth in terms of culm height and number in *B. bambos* and *D. strictus*.

Project 4: Multilocational introduction cum demonstration trials and field evaluation of six important bamboo species viz. *Bambusa balcooa, B. nutans, Dendrocalamus asper, D hamiltonii, Guadua angustifolia* and *Pseudoxytenanthera stocksii* in Andhra Pradesh, Karnataka, and Goa (Funding agency: Department of Biotechnology) [2004-2009]

Status: Established 25 ha trials (20 ha in AP and 5 ha in Goa) during 2007 and 20 ha during 2008 (in Karnataka) using six industrially important bamboo species viz; *B. balcooa, B. nutans, D. asper, D. brandisii, D. stocksii* and *Guadua angustifolia*. Mortality replacement at Buggapadu site in Andhra Pradesh was also completed. Some general observations about the species performance at Andhra Pradesh and Goa are as follows:

- Observation at ten month showed that *B. balcooa* and *B. nutans* performed better in terms of survival and subsequent growth, followed by *D. hamiltonii*.
- In general, Tissue Culture plants were performing better than micropropagated plants among various species.
- Growth performance at Agalote (Goa) was comparatively poor than that at Chintalapudi due to under storey planting.
- *D. asper* and *G. angustifolia* performance was poor at all the three sites.

Project 5: Development of Package of Practices for the management of powderpost beetles in ITC timber yards. (Funding agency: ITC, Bhadrachalam) [2007-2008]

Status: Studies were conducted in ITC timber depots at Bhadrachalam and Ongole to assess the seasonal incidence and intensity of infestation of powder post beetles on subabul logs (*Leucaena leucocephala*) stocked for paper production. The beetles were identified as *Sinoxlon anale* and *S. conigerum* (Bostrychidae) and cultured in the laboratory. Laboratory evaluation of botanicals and chemicals for the management of the pests was undertaken. Field experiments were conducted with chemicals and botanicals at ITC timber depots at Bhadrachalam.

Effectiveness of the control measures was assessed and documented. A package of practice was developed for timber storage in depots.

Project 6: Evaluation of phosphine as fumigant to control insect pests in logs, chips and sawn boards. (Funding agency: M/s. UPL Ltd) [2007-2008]

Status: Investigations to ascertain the efficacy of Phosphine as a substitute of methyl bromide for fumigation of infested wooden logs was conducted both by laboratory bioassays and field fumigation experiments. Laboratory in-vitro assays with different concentrations of Phosphine (25, 50, 100, 150 and 200ppm) were done. 100% mortality of common wood infesting insects viz. *Lyctus africanus* and *Lyctus brunneus*, *Synoxylon anale*, *S .Conigerum* and *Odontotermes* sp. was obtained at 200 ppm phosphine level after a short exposure period of 24 hrs. Field trial of fumigation with with medium and high girth infected logs of Eucalyptus and Subabul was conducted in timber depots at Rajamundry and Bhadrachalam, A.P. In the field fumigation trails using 3g and 4g/m^3 phosphine, it was found that at 3g/m^3 dose, 100% mortality of insects was achieved indicating suitability of phosphine in wood fumigation.

Project 7: Insect-plant relationships with special reference to herbivory in the mangroves of South India. (Funding agency: Minsitry of Environment and Forests) [2005-2009]

Status: Herbivorous insects belonging to 12 orders, mainly, Coleoptera Diptera, Orthoptera and Lepidoptera were documented from the mangroves of Karnataka. Total number of herbivorous species of insects recorded was 153. 29 species of flower visiting insects were recorded and details of 11 major pollinators of three major mangrove species were studied. Using digital image analysis, the damage by insect herbivory in the mangroves of Karnataka was assessed, the extent of damage differing in the young and mature leaves. Damage range in young leaves was 0.13% - 5.12 in *Rhizophora mucronata*, 0.15% - 16.29% in *Avicennia officinalis* and 2.04% - 8.4% in Sonneratia *alba*. Folivory damage in case of matured leaves was 0.62%- 4.62% of leaf area loss in *R. mucronata*, 0.51%- 27.11% in case of *A. officinalis* and 1.91%- 13.44% in *S. alba*. Insects belonging to three major orders viz. Coleoptera, Lepidoptera and Diptera were found to comprise fruit affecting insect guild. Germination study was conducted to elucidate the impact of insect frugivores in the regeneration of mangroves.