

## RAIN FOREST RESEARCH INSTITUTE JORHAT

The Rain Forest Research Institute was established with the primary aim to carry out research on ecology, regeneration, tending and management of forests in the seven North-Eastern States, West Bengal, Sikkim and Andaman and Nicobar Islands.

### PROJECT COMPLETED DURING THE YEAR 1999- 2000

#### Project 1 : Study of the successional changes in plant communities under shifting cultivation. (RFRI/SC/01)

**Objectives :** (a) To assess plant inventory in fallow lands as well as in natural forests. (b) To estimate nutrient inventory of the organic matter. (c) To evaluate the successional changes of plant communities. (d) To enumerate the important species / life forms occurring in different fallow. (e) To prove that the species dominance decreases with the increases of diversity in the fallow lands.

**Results :** The pattern of slash and burn cultivation during the 1<sup>st</sup> few years of succession, recorded a considerable variation in community composition *Lantana camara* and *Chromolaena odorata* along with *Saccharum arundinaceum* and *Imperata cylindrica* observed as early colonizer in abandoned fallow communities. The dominance of exotic weeds in abandoned fallow lands was noticeable because of their various mode of regeneration pattern *Chromolaena odorata* and *Imperata cylindrica* found to reduce drastically with the increase of the age of the fallow.

Grassy species like *Digitaria ciliaris*, *Fimbristylis* sp., *Paspalum conjugatum* and *Oplismenus burmanii* etc. were established just after slash and burn and found to be dominant in 1<sup>st</sup> year and 2<sup>nd</sup> year fallow. *Lantana camara*, *Saccharum arundinaceum* and *Phragmites karka* attained in a climax state from the serial stage in the course of succession. The species like *Chromolaena odorata*, *Croton caudatus*, *Mikania macrantha* and *Setaria glauca* were found in the secondary forest also. The diversity index increased gradually due to gradual establishment of perennial species as well as decline of annual herbaceous plants. Majority of the plants



A typical view of slash and burn cultivation in the hills of N.E. region

recorded in the jhum fallows are in high demand among the jhumias. A large number of species like *Costus speciosus*, *Ageratum houstonianum*, *Phyllanthus urinaria*, *Globba* sp. etc. are used as an indigenous medicine. Various wild edible plants and fodder plants were also observed. *Alpinia allughas*, *Costus speciosus*, *Geodorum densiflorum*, *Gnetum gnemon* etc. were observed as jhum affected species. Plant biomass study in the fallow vegetation showed that the total biomass increased with the fallow age.

*Lantana camara* and *Chromolaena odorata* are the highest biomass contributor in the fallow vegetation. The nutrient concentration of the species follows the order K>Ca>Mg>N>P. Phytosociological studies of the natural forest observed that *Vatica lanceaefolia* and *Elaeocarpus tectorius* alongwith *Castanopsis* sp. get priority in the dominance in the primary forest while *Hydnocarpus kurzii* and *Dysoxylum procerum* were found dominant in the disturbed forest. An endangered spectacular orchid species *Anoectochilus sikkimensis* (Jewel orchid) occurs in dense damp forest floor of primary forest.

## OLD PROJECTS CONTINUED DURING THE YEAR 2000-2001

### **Project 1: Study of seed biology of selected forest species of north-eastern India. (RFRI/TI/01)**

**Objectives:** (a) To identify the seeds as orthodox or desiccation – tolerant and recalcitrant or desiccation-sensitive seeds. (b) To study the desiccation sensitive seeds in relation to their storage. (c) To store the trials of desiccation tolerant seeds. (d) To study the maturation of recalcitrant seeds in companies to orthodox seeds.

**Achievements:** A study on seed maturation of *Gmelina arborea* and maturation index of the seed identified. Seed storage behavior of *Calamus tenuis* was identified. A desiccation study on *Dipterocarpus macrocarpus* seeds was performed to evaluate the lowest safe moisture content of seed.

### **Project 2 : Genetic improvement of *Dipterocarpus retusus* for higher merchantable biomass. (RFRI/TI/02)**

#### **Objectives :**

**Short term:** (a) To identify the Plus Trees. (b) To develop protocol for clonal multiplication of *D. retusus*. (c) Sample survey and analyses of Seed Production Area.

**Medium term:** (a) Progeny test. (b) To establish seedling seed orchard / clonal seed orchard. (c) To establish seed production area.

**Long term:** Genetic improvement of *D. retusus* for higher merchantable biomass.

#### **Achievements:**

**Plus Tree performance :** Major activities have concentrated towards Seedling Seed Orchard (SSO)/Progeny Trials (PT), Vegetative multiplication.

### **Project 3 : Genetic improvement of *Gmelina arborea*. (RFRI/TI/03)**

#### **Sub-Project : Selection and multiplication of superior biotypes**

**Objectives :** (a) To establish germplasm bank for future Tree Improvement Programme. (b) To develop vegetative multiplication garden for future multiplication. (c) To select Plus Trees from different geographical locations. (d) To propagate Plus Trees by macro propagation techniques.

#### **Sub-Project : Stability test of various clones and progenies for different characters**

**Objectives :** (a) To test quantitative characters of half-sibs. (b) To estimate genetic divergence between clones and progenies. (c) To develop index for selection of superior genotypes. (d) To identify most

promising clones with high genetic gain. (e) To test resistance in different clones and progenies for prominent diseases and insects.

### Sub-Project : Creation of Seed Production Area and Seed Orchards

**Objectives :** (a) To create Seed Production Area (SPA). (b) To develop Clonal Seed Orchard (CSO). (c) To develop Seedling Seed Orchard (SSO).

#### Achievements:

**Selection of Plus Trees:** A total of 117 Plus Trees of *G. arborea* from different locations were selected to represent maximum variability among trees of *G. arborea* at RFRI, Jorhat.

**Establishment of Vegetative Multiplication Garden:** The VMG of *Gmelina arborea* has been established at two locations, Deovan and Nahorani consisting a total of 106 clones.

**Clonal Seed Orchard :** The clonal seed orchard of 8.75 ha were established at Imphal, Jeypore, Nahorani and Deovan.

**Seedling Seed Orchards :** The Seedling Seed Orchard of 2.10 ha cum progeny trial was established at Imphal, Nahorani and Deovan.

**Fertilizer trial :** The fertilizer trial at Nahorani has been established to study the response of various fertilizers on specific clones.

**Evaluation trial :** The evaluation trial has been established at Nahorani to test the performance, stability and adaptability of various clones. The trial has been designed in such a way that it gives the information on comparative assessment in terms of growth performance, among the clones.

### Project 4 : Genetic conservation and improvement of Bamboos and Canes. (RFRI/TI/04)

**Objectives :** (a) To conserve the bamboo and cane germplasm. (b) To study the genetic improvement of bamboos and canes. (c) To survey the different bamboo and cane growing areas. (d) To select, identify and *ex situ* conservation of bamboos and canes.

**Achievements:** Survey and sample collected for *Bambusa pallida*, *B. nutans*, *B. balcooa*, *B. tulda*, *B. bambos* and *Dendrocalamus hamiltonii*.



A trial on Vegetative Multiplication of Bamboos

### Project 5 : High value merchantable biomass Production of Teak (*Tectona grandis*) through genetic improvement. (RFRI/TI/05)

**Objectives :** (a) To identify the superior stands based on phenotypic characters. (b) To select the superior trees on the basis of phenotypic traits. (c) To collect the superior Teak materials. (d) To test the genetic worth of phenotypically selected superior trees based on the performance of their progenies at different silvicultural zone. (e) To assess the genetic variance amongst the half-sib progenies. (f) To estimate the heritability of important traits. (g) To determine the interrelationship between the traits. (h) To identify the good general combiners.

**Achievements:** A number of Plus Trees of *Tectona grandis* from different locations of Assam (51) and Mizoram (15) were selected. The branch cuttings of Plus Trees of *Tectona grandis* were collected and grafted at the vegetative propagation complex of the Institute at Deovan. As many as 135 promising clones have been established in a clone / gene bank. These diversified lines would facilitate to design future hybridization programme in a proper manner. Established 0.3 ha. of VMG of Teak at Nahorani Research Station, under Golaghat District with 58 clones. Established 0.5 ha. of VMG of Teak at Deovan by planting 135 clones. Established Clonal Seed Orchard of Teak at Imphal, Manipur by planting 36 clones covering an area of 1.5 ha. Established Clonal Seed Orchard of Teak at Deovan, Jorhat by planting 36 clones covering an area of 0.5 ha. Established Clonal Seed Orchard of Teak at Nahorani Research Station, under Golaghat by planting 50 clones covering an area of 1.0 ha. Extension of Clonal Seed Orchard by planting 30 clones covering an area of 1.0 ha. Established Seedling Seed Orchard of Teak at Nahorani Research Station with 32 clones covering an area of 50 ha. Established Seedling Seed Orchard of Teak at Imphal, Manipur with 18 clones covering an area of 0.50 ha.

**Project 6 : Clonal propagation of important forest species. (RFRI/TI/06)**

**Objectives :** (a) To standardize macro-propagation protocol for *Dipterocarpus retusus*. (b) To standardize macro propagation protocol for *Gmelina arborea*. (c) To standardize macro-propagation protocol for *Michelia champaca*.

**Achievements:**

***Dipterocarpus retuses* :** The cuttings collected from the Plus Trees of *D. retusus* from different locations are kept for rooting.

***Gmelina arborea* :** The protocol of vegetative propagation through grafting has been standardized. Vegetative propagation through rooting of cuttings, branch cuttings have been collected from two years old clones and were put for rooting in mist and mist less systems of propagation. Profuse rooting is seen in most of the clones. An experiment consisting of five clones has been taken up to study the behaviour of coppice and thereafter rooting of coppice cutting. Enormous variation in coppice number and their growth were observed.

**Project 7: Introduction and genetic improvement of selected species. (RFRI/TI/07)**

**Objectives :** (a) To study genetic improvement of Teak. (b) To produce quality seeds of increased vigour. (c) To create Seed Production Area (SPA). (d) To evaluate clonal suitability of newer clones in North-East India. (e) To estimate genetic gain of clones over seed raised plants. (f) To identify most promising clones with high genetic gain.

**Achievements :** In Arunachal Pradesh, a SPA of 5 hectares at Ruskin Forest Range under Pasighat Forest Division has been selected. The enumeration of the trees and analysis of data has also been completed. The technical report has been published.

**Project 8 : Production of organic waste based quality compost for forest nursery. (RFRI/FP/04)**

**Objectives :** To develop suitable technology for production of quality compost from organic wastes.

**Achievements :** The effect of fungal inoculation and cow dung slurry application on the decomposition of a common nursery weed (viz. *Imperata cylindrica*) was studied. The microbiological analysis at different

phases and inoculation of the substrate with cowdung slurry and the uninoculated control resulted in more loss of weight as compared to the inoculated with the fungi.

**Project 9 : Management of seed and soil borne diseases of *Gmelina arborea* and *Dipterocarpus retusus* in nursery. (RFRI/FP/05)**

**Objectives :** (a) To study the planting material borne diseases. (b) To study the planting media borne diseases.

**Achievements :** Diseased samples from clonal vegetative cuttings of *Gmelina arborea*, which failed to establish as vegetative propagule in a trial, were screened for associated micro-organisms. Various fungal flora like species of *Phoma*, *Fusarium*, *Gliocladium*, *Verticillium* and some bacterial species were found associated with the samples. Amongst these, species of *Phoma* and *Fusarium* were found dominant and were frequently assigning their role in rotting of vegetative cuttings. Fresh samples from different clones of *G. arborea* also exhibited the presence of 8 fungal species and some bacterial species. Mercuric chloride (0.2%), Captan (0.2%) and Bavistin (0.02%) were found effective in reducing the number of fungal species from the vegetative cuttings *in vitro*. The study on pest infestation status of *D. retusus* seeds collected from Holongapara Reserve Forest showed 68% seeds damaged by various pests.

**Project 10: Integrated disease management in seedlings and plantations. (RFRI/FP/06)**

**Objectives :** (a) To assess the disease appraisal and assessment of losses. (b) To study the epidemiology of the diseases and their chemical and biological control. (c) To identify the resistant clones / planting material. (d) To evolve integrated disease management for important forestry tree species.

**Achievements :** Disease appraisal in bamboo nurseries and plantations raised in the campus of RFRI, Jorhat revealed 4 diseases of bamboo viz. Branch necrosis and tip die-back in *Bambusa bamboos* and *Dendrocalamus strictus* caused by *Fusarium* spp. and leaf blight of *D. hamiltonii* caused by *Bipolaris maydis*. The disease subsided to some extent after spraying of Bavistin @ 0.1%. *Corynespora* leaf spot of *Gmelina arborea* was another important disease recorded in 5-8 months old seedlings in the Institute nursery for the first time in this host from India. Screening of fungicides *in vitro* revealed Indofil M-45 and Bavistin as most effective one giving 100 per cent inhibition on growth of the fungus. Out of the five botanicals evaluated for their efficacy as fungitoxicant, ginger, turmeric extract were found to be comparatively more effective.

**Project 11 : Development of VAM as biofertilizer for some economically important forest plant species of Assam and Arunachal Pradesh. (RFRI/FP/07)**

**Objectives:** To develop VAM as biofertilizer.

**Achievements :** Soil and roots collected from Silchar, Jorhat and Nagaon were analyzed and VAM spores were isolated and maintained using trap plants. The spores isolated from the samples collected were applied in the nursery with *Gmelina arborea* for their efficiency.

**Project 12: Isolation and evaluation of Rhizobium from leguminous forest trees in nurseries of three districts of Assam. (RFRI/FP/08)**

**Objectives :** (a) To isolate and identify the Rhizobium strains from leguminous forest tree species. (b) To evaluate tile efficiency of isolated strains to fix atmospheric nitrogen. (c) To test tile selected isolates in

nurseries and plantations. (d) To mass culture the efficient Rhizobium strains. (e) To prepare carrier based inoculants to use tile efficient Rhizobium as biofertilizer.

**Achievement :** Various biochemical test, aqua culture and leonard jar test were performed 42 strains were authenticated among these, 8 were isolated from *Acacia auriculiformis*, 13 from *Dalbergia sissoo*, 7 from *Albizia procera* and 14 from *Samanla saman*. Growth study of individual strain was observed and found some strains were fast growing and some relatively slow growing. Efficiency of the isolated strains were evaluated by conducting pot culture experiment in both sterilized and non-sterilized soil. Significant effect of treatments was observed in sterilized soil. The combine application of Rhizobium inoculum and different dosage of fertilizer Non seedling growth of *Albizia procera* were studied. The result concluded that high dosage of fertilizer nitrogen inhibits the ability of nitrogen fixing potentiality of Rhizobium in soil.

### **Project 13 : Control of nursery pests with synthetic and microbial insecticides. (RFRI/FE/07)**

**Objectives :** (a) To develop suitable technology for production and utilization of microbial insecticides, preferably baculovirus to control key and potential pests of forest trees in the nursery. (b) To explore the purification, identification, quantification, and determination of lethal potency of the Nuclear Polyhedrosis Viruses (NPVs) available in the northeast India specially in Assam. (c) To study the bioassay experiments taking a key pest as model. (d) To use eco-friendly systemic insecticides and plant products to control pests in the nursery.

**Achievements:** Larvae of *Discophora tollia* were collected from the plantation of *Bambusa tulda* and were reared in laboratory condition. A cluster of larvae was found infected by virus, hanging from the leaves with heads down and curved, abdomen swollen and pulpy and the colour became black. Survey was carried out in Institute's Gmelina nursery regularly for key and potential pest of *Gmelina arborea*. During the course of study, *Calopepla leayana*, *Prioptera macculipennis* and *Alcidodes gmelina* were found as major pest attacking the Gmelina plants. Biology of *Prioptera macculipennis* was studied.

### **Project 14 : Effect of *Bacillus thuringiensis* (bt) on *Calopepla leayana*: A. monophagous pest on *Gmelina arborea* and generation of transgenic *G. arborea* containing bt gene. (RFRI/FE/08)**

**Objectives :** (a) To study if *Bacillus thuringiensis* may be introduced as an effective biopesticide on *Calopepla leayana*, a monophagous pest of *Gmelina arborea*. (b) To introduce of bt gene in the genomic DNA.

**Achievements :** *Bacillus thuringiensis* is a gram-positive soil bacteria, which has been proved to be a safe, environmentally friendly biopesticide in agricultural crops specially against the lepidopteran insect pests and also some Coleopterans. Bioassay text of two sub species of *Bacillus thuringiensis*, sub sp. Galleriac and Hurstaki. The pesticidal effects where not only compared to that of control set, but also to that of a known effective chemical pesticide Monocrotophos. The experiments were performed in the laboratory condition as well as in nursery condition (*in vivo* and *in situ*). Sub-species galleriac was found to be a moderate pest killer, while kurstaki was found to be very effective (potency is almost compared to that of Monocrotophos) against *Calopepla leayana*, specially upto 3<sup>rd</sup> instar larval stage. A 50 times dilution of the said strain may reduce the larval infestation almost upto 70% as observed upto 72 hrs. of incubation.

**Project 15 : Biological control of *Calopepla leayana* (Coleoptera: Chrysomelidae) a major defoliator of *Gmelina arborea*, Phase II: Mass production techniques of *Brachymeria excarinata* (Hymenoptera: Chalcidoidea), its pupal parasitoid. (RFRI/FE/09)**

**Objectives :** (a) To develop artificial diet for the host insect pest, *Calopepla leayana*, and alternative host, if any. (b) To search for an alternative host of *Brachymeria excarinata*, may be some lepidopterous insect, whose rearing on artificial diet is comparatively easy. (c) To develop rearing techniques of *Calopepla leayana* on its natural host. (d) To develop technology for mass production of *Brachymeria excarinata*, a potential pupal parasitoid of *Calopepla leayana*.

**Achievements :** *Gmelina arborea* nursery was established in the campus for rearing of *Calopepla leayana*. A bed of *Gmelina* with 36 plants, in three rows of 12 plants each, was covered with nylon light green coloured mosquito net fitted over a bamboo frame work. Freshly laid oothecae were collected from the field and placed near the growing points of the plants with the help of cellophane tape. It is estimated that 36 plants, when stocked with 150 oothecae, could produce about 3000 pupae. In BOD at 10 degree C, pupae survived for about two months, whereas 15 adults emerged after 10 days. A general purpose artificial diet based on Singh (1983) was prepared with some modifications. Both the diets gave unsatisfactory results. Rice leaf roller, *Cnaphalocrocis medinalis* (Guenee) has also been recorded as host of *Brachymeria excarinata*. The Rice leaf rollers were collected from the rice fields and reared in the laboratory. Their pupae were placed before mated *B. excarinata* for oviposition, but the parasitoids did not oviposit in them.

**Project 16 : Standardization of nursery techniques for selected Bamboo species of N.E. India. (RFRI/SF/01)**

**Objectives :** (a) To develop a package of practices. (b) To develop a reliable method of propagation from cuttings. (c) To develop and maintain a wide genetic base. (d) To select superior genotypes. (e) To improve the productivity of bamboo plantations.

**Achievements :** The treatment of NAA 50 ppm showed best performance in shoots production, shoot height, collar diameter and nodes number. Media containing rice husk was found not suitable. Sand based media were found most suitable for macroproliferation of *B. arundinacea* seedlings. Rhizome of seedling of *Dendrocalamus hamiltonii* was found to be effective than other propagule size for macroproliferation. Rhizome with two noded seedling may be recommended for successful macroproliferation of *B. arundinacea*. Rhizomatous swelling is very much essential for survival and rooting of branch cutting. Low conc. of IBA did not show any effect on rooting of branch cutting.

**Project 17 : Fertilizer response studies in nursery for some important tree species of N.E. region. (RFRI/SF/02)**

**Objectives :** (a) To fulfill the national mandate of achieving 33% of forest cover, the technology can meet the future enormous demand of supply of seedlings within a shorter span of time. (b) To study the effect of different doses of NPK fertiliser on growth and biomass production of some indigenous species. (c) To reduce the development period of producing seedlings of healthy stock with sturdy root system for transplantable size. (d) To minimise the cost of production of seedlings. (e) To study the suitable potting media for production of healthy seedlings.

**Achievements:** Based on the studies standardised the optimum doses of N.P.K. 60 & 90 ppm both for N & P on growth and biomass production as well as identified suitable media as 1:1:1 by volume (soil :

sand : O.M.) for the species in question. Also container standardization, standardization of plantable seedling edges, which are in the process of finalization.

**Project 18 : Study of the changes of morphological physical and chemical properties of soil under Shifting Cultivation. (RFRI/SC/02)**

**Objectives :** (a) To assess the soil nutrient inventory in Shifting Cultivation cycle, fallow lands as well as natural forest. (b) To measure the nutrient fluxes as well as pools so that nutrient status of the soil can be prepared. (c) To analyse the nutrient cycles using ideas from system ecology.

**Achievements :** A significant increase of pH value was noticed after burning the forest. Soil in both primary and secondary forests was more acidic as compared to fallow land. Soil conductivity increases sharply after burning the slash, which indicates the high concentration of available nutrient present in soil. The value of conductivity decline significantly during cropping and harvesting period. This decline continues upto 2nd year and after that it increase with the age of fallow and reaches at a maximum level in natural forest. However at the end of 2<sup>nd</sup> year cropping a gradual increase of organic carbon was noticed through the early successional fallow and reached the maximum in the 4<sup>th</sup> year fallow. Total nitrogen sharply decline through volatilization at the time of burning operation. In the initial period of fallow cycle, the level of nitrogen concentration declines significantly due to poor growth of vegetation and low litterfall. A significant difference of available phosphorous was found between primary and secondary forest. Highest amount of exchangeable calcium and magnesium were recorded in primary and secondary forests respectively.

**Project 19 : Biorejuvenization of degraded land at Nahorani.**

**Objectives :** (a) To assess the biorejuvenization of degraded land with forest tree plantation. (b) To study the ecorestoration of degraded land. (c) To improve the soil fertility status improvement. (d) To monitor the soil physico-chemical and biological changes due to vegetation cover.

**Achievements :** It is found that the soils of the studied area are acidic in nature. Soils are low to medium in soil organic carbon.

**Project 20 : Survey and Evaluation of Selected Species for Energy Plantation in North East Region of India. (RFRI/EF/01)**

**Objectives :** (a) To survey fuelwood species used in domestic and industrial sectors in the region. (b) To evaluate tree species for their energy production per unit area per unit time. (c) To develop nursery technology of selected species for their mass multiplication. (d) To develop plantation technology of selected tree species of sustainable optimum biomass production.

**Progress made:** To know the demand and choice of species of the people, a survey was conducted in the villages around Jorhat, Assam based on the landscape and only 10 per cent of the families of a village were surveyed. A questionnaire was prepared. A total of 80 villages constituting six blocks were surveyed for the consumption and utilization of fuelwood in the Jorhat district. In addition to these, three tea gardens and three wards of urban area were also included. A huge quantum of information has been collected. A cafeteria of 20 fuelwood species has been raised in the Nahorani Research Station of the RFRI, Jorhat. Based on data, it is observed that *Mallotus albus*, *Tephrosia candida*, *Anthocephalus cadamba*, *Chukrasia tabularis* etc. are better opted for fuelwood production programme. Energy production

efficiency of this species is under investigation. The growth patterns of the species were studied. This experiment is also being done in the Nahoroni Research Station of the RFRI, Jorhat. Here, two species namely, Moz (*Albizia lucida*) and Gamhari (*Gmelina arborea*) were taken up to find out the optimum spacing. A significant height and collar diameter were obtained under different fertilizer treated energy plantation.

**Project 21: Ecological monitoring of biological diversity and strategy of conserving thereof in the Kaziranga National Park of Assam. (RFRI/EE/01)**

**Objectives :** (a) To evolve eco-restoration efforts for maintenance of biological diversity in different ecosystems and communities. (b) To assess the present status of biological diversity and its conservation efforts. (c) To assess the organic productivity in the grassland and Savanna ecosystems in the park.

**Progress made:** The project will enhance the sustainable management of the park while conserving the biological diversity in intact.

**Project 22 : Evaluation of current status of Tropical Moist Forest for their sustainable utilization. (RFRI/EE/02)**

**Objectives :** (a) To Prescribe silvicultural practices for better sustainable management of forest on the basis of sound ecological principles. (b) To examine the current conservation status of Dipterocarps in NE India. (c) To evaluate changes in Silviculture and composition of Tropical Moist Forest. (d) To evaluate plant bio-diversity. (e) To evaluate regeneration status of important species.

**Progress made:** Enumeration of 1 ha area has been completed. There are 16 permanent plots which have been laid out at Namdapha Tiger Reserve. Besides these all seedlings of *Dipterocarpus retusus*, *Shorea assamica* and other major associates have also been tagged and numbered. Ground vegetation were evaluated. Along with the laying of permanent plots, litter fall, litter decomposition and soil nutrient studies have also been initiated. A logged over area has also been selected near Deomali (Arunachal Pradesh) and enumeration of vegetation done over 1400 sq. m. (0. 14 ha).



Ecological studies in the Rain Forest

**NEW PROJECT TAKEN UP DURING THE YEAR 2000-2001**

**Project 1: Integrated nutrient management in Shifting Cultivation soil through green manuring and inorganic fertilizers. (RFRI/SC/04)**

**Objectives :** (a) To improve the soil fertility through green manure. (b) To minimize the soil erosion through adoption of management practices. (c) To study the effect of green manure on soil fertility. (d) To increase the crop yield through green manuring. (e) To assess the economic performance through conventional cropping. (f) To evolve sustainable utilization of jhum lands.

**Project 2 : Resource enhancement and processing of Cane and Bamboo species suitable for handicrafts. (RFRI/EF/02)**

**Objectives :** (a) To develop inventory of bamboo and cane species used in handicraft industry in Assam and Manipur States of northeastern India. (b) To assess the requirement of species of bamboo and canes used by the artisans for handicrafts. (c) To explore the feasibility of utilisation of other species of cane and bamboo, which are not currently in use, for handicrafts. (d) To adopt suitable macro-propagation techniques for selected bamboo species used in handicrafts in Assam and Manipur States of North-Eastern India. (e) To develop packages for nursery and Silviculture techniques for cane and bamboo species used in handicrafts. (f) To establish a live collection of important cane and bamboo species used in handicraft industries in Assam and Manipur of North-Eastern India. (g) To establish plant multiplication nurseries using conventional propagation techniques for bamboo species suitable for handicrafts in Assam and Manipur States of North-Eastern India. (h) To distribute planting stock to farmers, NGOs and others interested in bamboo cultivation. (i) To set up the demonstration plots in farmers land and forest land for the cultivation of different bamboo and cane species by involving individual farmers, farmers club and NGOs in Assam and Manipur States of India. (j) To support participant groups from Assam and Manipur with technical inputs needed for cultivation, management and utilisation of bamboo and cane, using appropriate communication media and techniques. (k) To establish demonstration plots for promoting bamboo and cane cultivation by a wider audience of farmers and other target groups. (l) To organise field day and farmers visit to familiarise with cane and bamboo cultivation. (m) To organise a series of specialised training in cultivation, harvesting and processing of bamboo and cane. (n) To document and disseminate information on cultivation, management and utilisation of bamboo and canes.

**Progress made:** The Proforma supplied by KFRI for survey purpose was modified to collect additional information. Preliminary survey was conducted in Jorhat and Golaghat districts of Assam. A list of the registered bamboo and cane societies / artisan group has been prepared. About 5000 seedlings of *Bambusa bambos* and 4000 seedlings of *Calamus tenuis* have been raised and maintained in the multiplication nursery. Macroproliferation technique gave poor success rate in *Ochlandra travancorica*. Other technique like culm cutting was adopted for *Bambusa tulda*, *Bambusa nutans* and *Bambusa pallida*.



Participatory plantation programme for farmers

## **EXTENSION**

### **Facilities generated and service rendered :**

**Library and Documentation – Computer facilities – time spared and revenue earned:** The Library of the Institute is housed in a beautiful building equipped with good collection of book, National and International Journals, Back Volume, CD-ROM Data base, LIBSYS etc.

### **Activity in progress:**

Local Area Network (LAN) has been initiated for installation under Windows 2000 Environment. Facilities like file sharing, e-mail & internet (100 hrs. dial-up connection), Tree CD search, CPS, Indian Forester PDF documents will be made available through LAN.

✓ **Other Extension Activities are reported in the Introduction - Forestry Extension, ICFRE.**

## FINANCIAL STATEMENT DURING 2000-2001

<b>I. PLAN</b>		<b>EXPENDITURE (RS. IN LAKH)</b>
A.	REVENUE EXPENDITURE	
	(a) Research	10.64
	(b) Administrative Support	4.57
	(c) Others specify	0.56
B.	LOAN AND ADVANCES	
	(a) Loan Advances (Conveyance)	2.27
	(b) House Building Advance	1.47
C.	CAPITAL EXPENDITURE	
	(a) Building & Roads	- -
	(b) Equipments, Library Books	- -
	(c) Vehicles	- -
	(d) Others specify	- -
<b>TOTAL FOR PLAN (A+B+C)</b>		<b>19.51</b>
<b>II. NON-PLAN</b>		
A.	REVENUE EXPENDITURE	
	(a) Research	- -
	(b) Administrative Support (Salary)	- -
<b>TOTAL FOR NON-PLAN</b>		<b>- -</b>
<b>III. FUNDED PROJECT</b>		
A.	World Bank Project	52.34
	UNDP Project	1.58
	IDRC Project	1.14
	Energy Plantation Project	14.08
<b>TOTAL FOR FUNDED PROJECT</b>		<b>69.14</b>