



CHAPTER VIII INSTITUTE OF FOREST PRODUCTIVITY RANCHI

The Institute of Forest Productivity under the Indian Council of Forestry Research and Education is mandated for steering the forestry research in the states of Jharkhand, Bihar, West Bengal and Sikkim having total actual forest cover of about 38002 sq. km, which is 14.1 percent of total geographical area. Six agro-ecological zones and eight main forests types are covered within its jurisdiction.

PROJECTS COMPLETED DURING THE YEAR 2003-2004

NIL.

PROJECTS CONTINUED DURING THE YEAR 2003-2004

The following Projects / Sub-projects have been started from the prioritized research projects of the NFRP during the year 2002-03:

Project 1: Soil vegetation interaction with special reference to nutrient cycling in some selected plantations under different edaphic conditions [IFP-9/SLR/P-III/2002]

Principal Investigator - Dr S. Nath

Status: Alluvial soils favored the growth of *A. indica*, *D. sissoo*, *G. arborea* and *T. grandis* while *A. auriculiformis*, *A. mangium* and Eucalyptus performed better in lateritic soils of greater depth and loamy texture. Most of these species performed poorly in coastal areas due to the influence of salinity. The influence of vegetation on soil attributes was found prominent under *Tectona grandis*. Though growing in a contiguous area, *T. grandis* favoured

neutralizing tendency of soil pH and also in increasing organic carbon, available P and K, total Ca and Mg contents in soil while *A. auriculiformis* and *A. mangium* failed to do so.

Litter fall study: Plantations *A. mangium*, produced maximum amount of litter with the removal of also maximum amount of N, P and K through litter fall. *A. auriculiformis* and Eucalyptus showed similar trend but *D. strictus* produced least quantity of litter and nutrient removal



P-treatment on *Acacia mangium* at Midnapore under project "Soil Vegetation interaction with special reference to nutrient cycling in some selected plantations under different edaphic conditions"

Nursery trial results: The results indicate that when applied singly, growth of *Acacia auriculiformis* was influenced by 50 to 60 mg N/Kg pot soil in terms of shoot length, leaf number and shoot, leaf and total organic matter production. Phosphorus on the other hand required at the dose of 50 to 60 mg P as SSS. While applied in combination, for higher growth



and biomass production lower level of NPK was sufficient for *A. auriculiformis* though these higher levels consistently enhanced the overall growth. The combined levels at 75 mg N, 10 mg P and K per kg soil favoured maximum growth and biomass at harvest time in pots under lateritic soil condition.

Economic dose was 40 mg N/kg soil. N treatment also encouraged leaf chlorophyll content of both the species, maximum values with the said level of N. Though P and combined NP and K have increased N level in leaf of *A. auriculiformis*, K failed do so. For Eucalyptus P & K did not improve appreciable N uptake.

Field trial: Field trials have been laid out in order to study the role of N and NP and K fertilizers at different doses on growth and performance of seed origin *Acacia auriculiformis*, *A. mangium* and Eucalyptus plantations of 4 to 5 years and also 4 years old Clonal plantation of *Eucalyptus* sp.

Sub-project 1: Development of biofertilizers and standardization of their application in relation to productivity of forest tree species under degraded lateritic soil condition [IFP-3/BGT-SP-3/P-1/2002]

Principal Investigator - Dr S. Nath

Status: Distribution of Microorganisms - Survey was conducted to collect rhizosphere soil, root and nodules to isolate and quantify VAM fungi, *Azotobacter* spp. and *Rhizobium bacteria*. The following VAM fungi spp (Glomus – 5 species, *Gigaspora* – 2 species, *Sclerocystis*, and *Acaulospora* species) were found associated with bamboo, teak, sal, *A. auriculiformis* and *A. mangium*. Pure culture of 18 *Rhizobium* and 21 *Azotobacter bacteria* have been identified.

(a) Survey for growth parameters, nodulation character and occurrences etc.

- (b) Laboratory analysis for soil attributes, isolation of *Azotobacter*, VAM fungi and Nodule bacteria.
- (c) Laboratory Trial for Standardization of *Azotobacter* inoculation techniques.
- (d) Laboratory and Nursery trial with nodule extract (*Rhizobium*) and rhizosphere soils for efficiency determination.
- (e) Nursery trial with VAM in combination with *Rhizobium* and mineral nutrients.

New Nursery Experiments Laid out during 2003-04

Standardization of Application of *Azotobacter* on non-legumes (*Eucalyptus*) and *Rhizobium* in legumes (*A. auriculiformis*) and screening of efficient strain was performed by laying experiments in CRD pattern. Two biofertilizer applications have been completed. Initial observations showed that Rice husk, Compost, FYM, decomposed bamboo litter were found favourable for growth of the above two species with biofertilizers.

Sub-project 2: Follow up activities and maintenance of PSIP assets developed under FREE Project [IFP-19/BGT-SP-8/P-1/2002]

Principal Investigator - Dr S. Nath and Shri A. Sinha

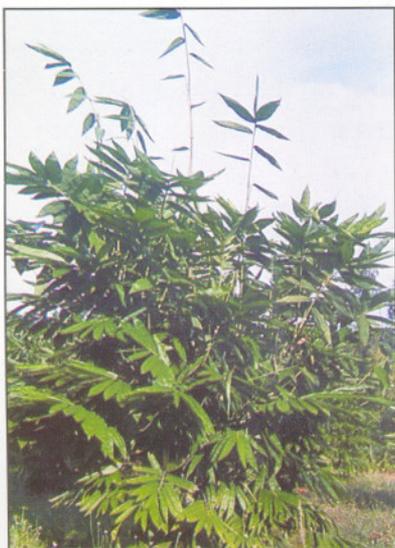
Status: Mandar Centre - Subsidiary silvicultural operations for improvement of the plants have been done in the SSO of *Gmelina arborea* (8 ha.), *Dalbergia sissoo* (9 ha.) and VMG of *Paulownia fortunei* (4 ha.) at Mandar, Sosai and Chandwa respectively. Stock improvement by casualty replacement in Gamhar and *Paulownia* sp. has been completed. In SSO of *Gmelina arborea* weeding, hoeing, and fertilization have been completed. Site cleaning, weeding, fertilizer application in VMG plots of *Paulownia fortunei* at Chandwa have been carried out.

Midnapore Centre - Subsidiary silvicultural operations for improvement of the plants have been done in the SSO of *Acacia* sp. (10.0 ha.) and *Eucalyptus* sp. (17.5 ha.), CSO of *Eucalyptus tereticornis* (5.0 ha.) and VMG of *Bamboo* sp. (6.0 ha.) at Midnapore Centre of the Institute and site cleaning, fertilizer application has been done.

Sub-project 3: Multilocational field trial of tissue culture raised plantlets of *Dendrocalamus asper* [IFP-4/BGT-SP-4/P-I/2002]

Principal Investigator - Dr Animesh Sinha

Status: 200 numbers of plantlets of *D. asper* were produced through tissue culture in first and second phases. Standardized methods for shoot multiplication, sub-culturing, root initiation, primary and secondary hardenings of plants were followed, though with some minor modifications in developed protocol. Pre-monsoon and post monsoon field plantations with spacing of 5 m x 5 m in Split-Plot Design have been completed at Mandar and Midnapore Research Centres for their survival and performance. Field Plantation has resulted in 85 percent survival



One and a half year old *Dendrocalamus asper* - Field trial of tissue culture raised bamboo

Sub-project 4: Genetic improvement of *Eucalyptus* through progeny trial and hybridisation [IFP-7/BGT-SP-7/P-1/2002]

Principal Investigator - Shri H.C. Sindhu Veerendra

Status: Polybag seedlings were planted for field trial. Collar diameter, height and number of branches of all the plants have been recorded and their performances evaluated.

Phenology studies to find out pollen receptive time were carried out and it was noted that 8 a.m. to 10 a.m. was ideal time for artificial pollination. Peak flowering time was observed to be sometime between April and July.

Project 2: Studies on variability of bamboo species, their performance, conservation and economics with reference to Bihar, Jharkhand and West Bengal [IFP-10/BS/P-IV/2002]

Principal Investigator - Dr S. Nath

Status: Survey was conducted at multiple sites in Jharkhand, Bihar, North and South-West Bengal (Table 1). Altogether 14 species have been identified so far and attempts have been taken to identify the remaining 7 species. Variability of the species has also been encountered during the survey for *Bambusa balcooa* (3 Nos.), *B. tulda* (2 Nos.), *Dendrocalamus* (3 Nos.) and *Gigantochloa* sp. (2 Nos.).

Superior bamboo clumps (CPC) were identified; rhizomes and culm cuttings were collected, propagated, and planted in Sukna and Medinipur, W. Bengal. Ground flora was also studied to explore the possibility of cultivating medicinal plants under bamboo.



State/Location	District	No. of Villages Surveyed	No. of species encountered
Jharkhand	Latehar and Ranchi	24	9
Bihar (north)	Araria	10	7
W. Bengal (north)	Terai Darjeeling	10	9
W. Bengal (south)	East and West Medinipur	25	14

Rhizomes and culm cuttings of the superior clumps of the following species have been planted in nursery.

Species of Midnapore	No. Planted	Species of Sukna	No. Planted
<i>B. balcooa</i> (var. short)		<i>Arundinaria hookeriana</i> (Sinji)	3
Guri vulki	22	<i>Bambusa balcooa</i> (Bara bans)	2
<i>B. balcooa</i> (var. giant)		<i>B. nutans</i> (Makla)	5
Hedua vulki	4	<i>B. striata</i> (Yellow)	3
<i>B. striata</i> (Yellow)	30	<i>B. tulda</i> (Jawa)	1
<i>B. tulda</i> (Jawa)	14	<i>D. sikkimensis</i> (Bhalu)	1
<i>B. vulgaris</i> (Basni)	37	<i>Melocana bambusoides</i> (Muli)	1
<i>B. nutan</i>	20	<i>Pseudostachyum polymorphum</i> (Nal)	5
<i>B. gigantea</i>	10	Baijanthi lathi	3
		Ban bans	4
Total	137	Total	28

Project 3: Planting Stock Improvement in relevance to Chotanagpur plateau area and South-West Bengal.

Sub-project : Standardization of suitable potting media and root trainer size for improved planting stock production of some mandate species of Jharkhand and southern West Bengal [IFP-1/BS-SP-1/P-I/2002]

Principal Investigator - Dr P.K. Das

Status: Seedling height and collar girth were measured. After 90 days average seedling

height of *D. sissoo* among all the treatments was found maximum 38.3 cm in 350 cc hykopot followed by 31.0 cm in 250 cc hykopot and 28.5 cm in 150 cc hykopot. *G. arborea* seedling have been raised in 204 treatment hykopots and growth data i.e. height and collar dia have been measured.

Potting media trial has been carried out under *Dalbergia sissoo* and *G. arborea*. Seedling growth (height, collar diameter and root biomass) was found better in 350 cc hykopot in comparison to hat 250 and 150 cc hykopot.

Project 4: Cultivation and extension of Lac on new non-traditional hosts.

Sub-project 1: Exploration of lac cultivation on non-traditional host *Flemingia* spp. and its possibility in sustainable plantation forestry [IFP-13/NWFP-SP-1/P-VII/2002]

Principal Investigator - Dr B.N. Diwakara

Status: Twelve experimental plots were laid out soil working and manure application was done in control condition and understory of *Dalbergia sissoo* and *Acacia auriculiformis* plantations



Flemingia macrophylla shoot proliferation after 2 months of pruning under project "Exploration of Lac cultivation on non-traditional host *Flemingia* spp. and its possibility in sustainable plantation forestry."

Seedlings of *Flemingia macrophylla* and *Flemingia semialata* were planted in control plot and understory of *Dalbergia sissoo* and *Acacia auriculiformis* plantations.

Sub-project 2: Trials on composting for specific afforestation needs and development of cost-effective packages [IFP-2/BS-SP-2/P-I/2002]

Principal Investigator - Dr P.K. Das

Status: Compost preparation has been carried out (aerobic method) from locally available

organic raw materials - Rice straw, Acacia leaf-litter and Ghanto (*Schrebera swietenoides*) shrub. Vermicompost was prepared within 46 days from cow dung – rice straw mixture and cow dung – Acacia leaf litter mixture. For vermicompost the weight output of production was 60 percent.

CRD design has been followed for field trial of Compost. Survey was carried out and field trial on *G. arborea* has been taken up.

120 days was taken up for preparing compost from rice straw and rice husk mix (5:4) with 1 percent urea in the below ground chamber. Production cost of compost found Rs.4/- per kg.

Application of compost @ 100 g. per pot (containing 10 kg. Soil) showed better growth performance under *G. arborea* and *D. sissoo* seedlings than that of FYM. Again increase in height and collar diameter of seedling was found with the increase of compost dose from 25 gm. per pot to 100 gm per pot.

Some Results:

- (i) Total wt. of raw material decomposed : 3440 kg (dry wt)
- (ii) Total wt. of Compost Prepared : 2085 kg (dry wt.)
- (iii) Compost volume out put to input ratio varies : 29.2 to 47.60 %
- (iv) Compost weight out put to input ratio varies : 36.6 to 64.6 %



R & D Activities on Lac (Annual Programme)

Programme: R&D and Extension Activities in Nucleus Brood Lac Farms and Market data collection and dissemination [IFP-18/ERM/P-XII/2002 (R&D and Extension on Lac)]

Principal Investigator - Shri P. Anand

Status: Seasonal Operation such as pruning, inoculation, broodlac selection, spraying, phunki removal and harvesting have been carried out in the N. B. Farms as per scheduled. To promote Lac cultivation, broodlac was distributed among local villagers as per details given below:

Farm	Villages	Nos. of villagers	Broodlac distributed(in kg.)
(A) N.B. Farm Chakidih	Chakidi, Ambafutia, Badmoranda, Siltia	19	38
(B) N.B. Farm Malichak	Kosumha, Ranichak	12	70
(C) N.B. Farm Chandwa	Hutap, Hargarwa, Guditar, Chiro and Turhamu	32	64
TOTAL		63	172

Training-cum-demonstration on modern techniques of lac cultivation was organised at Raipur (Chhattisgarh), Chandwa (Jharkhand), Katghora (Chhattisgarh) and Malichak (Jharkhand). Nineteen staffs are deployed for market trend on lac and village survey for lac cultivation. Data are being collected from 34 centres of 14 districts in 3 states falling under jurisdiction of this Institute.

NEW PROJECTS INITIATED DURING THE YEAR 2003-2004

Project 1: Development of appropriate agro-silvicultural systems for selected medicinal flora of Chotanagpur and Santhal Pargana [IFP-20/ERM (MP)/2003]

Principal Investigator - Dr Malabika Ray

Status: Forest areas around Ranchi district for the survey work and Site for plantation of collected propagules were identified.

Project 2: Creation of Germplasm Resource bank of threatened medicinal plants of Darjeeling Himalayas [IFP-11/ERM (MP)/P-V/2003]

Principal Investigator - Shri Jagdish Chandra

Status: Literature on medicinal plants under study was collected. Nursery site for raising collected germplasm was selected and demarcated at Sonada and Udai Singh Jote. Finalization of programme for survey and collection of germplasm of medicinal plants in co-ordination with West Bengal State Forest Department.

Project 3: Studies of perceptible transitions and their dynamics in forest management policies and operational mechanism in Bihar (Now Bihar and Jharkhand), West Bengal and Sikkim in recent times [IFP-21/FMS (Policy research)/2003]

Principal Investigator - Shri Arun Kumar



Status: Some documents related to study (chiefly circulars, executive instructions and policy guidelines) has been collected from Sikkim and Bihar. The scope of study (issues to be covered) has been finalized. Design of questionnaire survey for JFM has been finalized and question contents on JFM policies (for top executives) have been formulated with special reference to Bihar and Jharkhand and it has been circulated to the top officials of both the states. The response is awaited.

PROJECTS COMPLETED DURING THE YEAR 2003-2004

(Externally Aided)

NIL.

PROJECTS CONTINUED DURING THE YEAR 2003-2004

(Externally Aided)

Project 1: *Schleichera oleosa* (Lour.) Oken, a lac host: *In vitro* propagation [2003-2006]

Principal Investigator - Dr Animesh Sinha

Status: Donor plant Selection: Superior trees having middle age of 30–40 years were selected from the research farm of Indian Lac Research Institute, Namkum, Ranchi. Besides these explants were also collected from 3–4 years aged trees from the campus of research centre of Mandar.

Explants collection: The shoot tips from the new shoots of pruned branches of plus trees were taken as the explants.

Surface sterilization: Satisfactory result in respect of production of aseptic cultures was observed by sterilizing with $HgCl_2$ (0.1 percent) for 7 minutes in case of nodal bud explant and $NaOCl$ (3 percent) for 10 minutes in case of shoot tip explant.

Inoculation of shoot: $\frac{1}{2}$ MS media without any

hormone showed bud initiation. However, it is too early to draw any conclusions.

Project 2: Development of Bio-aesthetic habitat by Central Coalfields Limited over a 5 hectare company's land at Ranchi [2003-2008]

Principal Investigator - Shri R.K. Mishra

Status: Study of soil profile for detail soil analysis, soil samples were collected from different sites. In water logged area the survival percentage is very low. Soil treatment as per soil analysis was completed. Plantation of 0.6 hectare (Ridge as well as Pit planting) was done with 26 species. Maintenance of plantation with inputs like compost, fertilizer, other chemicals such as fungicide, insecticide has been done regularly. The growth percentage so far is roughly 150 cm max. and 80 cm min. roughly. Raising of plants for next year with 30 species is under progress.

NEW PROJECTS INITIATED DURING THE YEAR 2003-2004

(Externally Aided)

NIL.

RESEARCH ACHIEVEMENTS

Name of State	No. of projects completed in 2003-04	No. of ongoing projects in 2003-04	No. of projects initiated in 2003-04
Jharkhand	Nil	7	1
West Bengal	Nil	7	1
Bihar	Nil	1	
Sikkim	Nil	Nil	1

TECHNOLOGY ASSESSED AND TRANSFERRED

1. Compost has been prepared from rice straw, rice straw – rice husk mix in different ratio



- in below and above ground chamber in bulk quantity.
2. Vermicompost has been prepared from cow dung, by mixing of cow dung and rice straw mix and cow dung and Acacia leaf litter.

EDUCATION AND TRAINING

Training organized

1. Training-cum-Appreciation Programme on Modern Nursery Techniques and Planting Stock Improvement for Range Officers of the Soil Conservation Wing of Damodar Valley Corporation was conducted at the Institute from 22nd to 24th May, 2003, where in 12 nos. of DVC personnel were participated.
2. A three days training-cum-demonstration on Modern Lac Cultivation was imparted to the members of JFM Committees (3) (villagers/ Lac growers) and Forest personnel of Raipur Circle (Chhattisgarh) under North Raipur Division by the Officials of this Institute. The cost of training was borne by North Raipur Division.
3. One day training-cum-demonstration programme was organized at Chandwa N.B. Farm on scientific methods of lac cultivation. 80 kg of Brood lac was distributed among 40 Lac growers/villagers. Sh. Preemjit Anand, DCF and Staff of this Institute carried out field demonstration.
4. One day training on modern techniques in lac cultivation was organized by the Institute at Katghora Forest Division, Chhattisgarh. ACFs/Rangers/Foresters/Forest Guards, villagers and member of Van Samiti were participated in this training programme. 99 participants were benefited.

LINKAGES AND COLLABORATION

International

Linkages were established with NABARD, DFID, U.K. and IDRC.

National

Linkages were established with Medicinal Plant Board, Department of Biotechnology, Central Coalfields Limited, ILRI, Namkum, ISM, Dhanbad, HARP, Plandu, BAU, Kanke, Ranchi, SFD, Jharkhand, SFD, West Bengal and SFD, Bihar.

PUBLICATIONS

1. A brochure titled "*Institute of Forest Productivity – A Profile*" has been published.
2. Annual Lac Bulletin 2002-2003.
3. Brochures - Hindi Book lets on "Modern Techniques of Lac Cultivation".
4. Proceedings of the abstracts of Papers accepted for publication at the National Seminar- "Rehabilitation of Lands under Anthropogenic Stress and Degradation" on 20th January, 2004 organized by the Institute.
5. Two research papers/notes entitled "Status and Strategies for Teak Improvement in North-East India" (Article) authored by Shri Animesh Sinha, Scientist-C and "Albinism in Simarouba Glauca, Linn." (Research note) authored by Dr B.N. Diavakara, Scientist-B have been published in the Indian Forester, Vol. 129 of September, 2003 No.9.

CONFERENCES / MEETINGS / WORKSHOPS / SEMINARS / SYMPOSIA / EXHIBITIONS

Organized

1. National seminar on "Rehabilitation of lands under anthropogenic stress and degradation" on 20th January, 2004. 42 papers were received and 27 papers were presented in the seminar.
2. Modern Nursery Techniques and Planting Stock Improvement organized from 11th to 13th March, 2004 and 25th to 27th March, 2004 was attended by 17 ROFs and 20 ACFs, respectively.

3. Training on modern lac cultivation was imparted to 100 villagers and 20 Forest Guards from four districts of Jharkhand state from 16th to 19th March, 2004.

Attended

Shri Arun Kumar and Dr P.K. Das attended the workshop on "Development and utility of Bamboo in Bihar" in Patna on 8th and 9th December, 2003" and presented the following papers:

1. "Bamboo - Resource Status and Related R&D Activities" by Shri Arun Kumar, Director, IFP, Ranchi.
2. "Improved Methods of Vegetative Propagation of Bamboo" by Dr P.K. Das, Research Officer, IFP, Ranchi.
3. Dr S. Nath presented a paper titled National Seminar on Environmental Engineering at ISM, Dhanbad on 19th and 20th March, 2004 by presenting research paper entitled "Ecosystem Approach for Rehabilitation of Coal Mine Areas".
4. Dr B. N. Diwakara presented a paper titled "Variation and Correcor Association for various pot trials in *Tamarindus indica* linn." in the National Seminar on Forest Resource Management" held on 17th November, 2003 at C. S. Azad University of Agriculture and Technology at Kanpur.
5. Shri Arun Kumar, Director attended the National workshop on "Regional Strategy for Plant Conservation" on 26th and 27th February, 2004 at TFRI, Jabalpur.
6. Officers/Scientists and technical staff demonstrated seedlings of different forest species, application of compost and vermicompost with tissue culture plants of bamboo at Kissan Mela organized by Indian Lac Research Institute, Namkum on 17th February, 2004.

CONSULTANCY

Consultancy was taken up on Green Belt Development in Chandrapura Thermal Power Station and Maithan Right Bank Thermal Power Station proposed by Damodar Valley Corporation, Kolkata.

DISTINGUISHED VISITORS

1. World Bank Team visited the Institute on the 31st July, 2003 to explore the collaboration under consideration for Jharkhand State Forest Department.
2. South Asia Regional Coordinator of DFID Shri Andy Hall along with scientists of ICRISAT, Hyderabad and Director of N.G.O. (Livelihood Solutions) visited IFP, Ranchi on 7th October, 2003.



National Seminar organised on 20th January, 2004 by the Institute on "Rehabilitation of Lands under Anthropogenic Stress and Degradation"



Workshop-cum-demonstration on "Modern Lac Cultivation Techniques" imparted to villagers of Chandwa, Latehar (Jharkhand) on 3rd Nov., 2003

