CHAPTER IV

TROPICAL FOREST RESEARCH INSTITUTE JABALPUR

Tropical Forest Research Institute (TFRI) is one of the eight institutes under the Indian Council of Forestry Research and Education (ICFRE). Started in the year 1973 as a Regional Forest Research Centre of FRI, Dehra Dun, it became an institute in April 1988 - with the objective to provide research support to the problems of forestry sector in Central India. TFRI is well equipped for undertaking diverse and intensive research on forestry and related problems of tropical forests of Madhya Pradesh, Maharashtra, Orissa and Chhattisgarh. The major thrust areas of TFRI are: research on non-wood forest products, rehabilitation of mined areas and other stress sites, research and demonstration in agroforestry models, planting stock improvement, research on biofertilizers and forest protection.

PROJECTS COMPLETED DURING THE YEAR 2001-2002

Project 1 : Research on tree farming models in association with instant income yielding crops [001/TFRI-92/Agro-5/1992-2001]. *For technical report contact, Principal Investigator- Mr. A.K. Sah.*

Findings : Maintenance of experimental plots of vegetables for seed production under *A. procera*. Observation on parameters related to seed production of chilli and onion; maintenance of citrus plants. Data has been analyzed.

Project 2 : Optimum land use through mixed cropping of Bach (*Acorus calamus* Linn.) with paddy. [008/TFRI-98/Agro-9/1998-2001]. *For technical report contact, Principal Investigator- Mr. A.K. Sah.*

Findings : Data on the growth and yield of bach and paddy combination and bach and paddy grown separately were tabulated , analysed and evaluated. Planting stock of bach has been maintained.

Project 3 : Development of agroforestry model for teak plantations with medicinal plants. [014/TFRI-99/Agro-14 /1999-2002]. *For technical report contact Principal Investigator- Mr. Akhilesh Argal.*

Findings : Data on growth and yield of safed musli (*Chlorophytum*

borivillianum) grown in the idle space of teak plantation with three levels of pruning and control (no pruning) was tabulated and analysed. Planting stock of safed musli was maintained

Project 4 : Identification of the markets of NTFPs, their potential, prices and marketing pattern in M.P. [031/TFRI-(2000) 2001 /(Econ) Agro-1(7)/2000-2001]. *For technical report contact Principal Investigator- Dr. Nanita Berry.*

Findings : Dhamtari and Pendra were identified as the major NTFP markets in Chhattisgarh state and Kundam and Katni in Madhya Pradesh. Indore has been found as regional market for NTFPs where about 300 pharmaceutical industries are running successfully based on these NTFPs in M.P. NTFPs in both the forms - raw as well as processed product, are being supplied all over India viz. Mumbai, Delhi, Chennai, Calcutta, Viruddhanagar (A.P.) and Amritsar (Punjab) from Indore market. Data collected on market price variation of various NTFPs are being tabulated.

Women at NTFP market, Nagri Dhamtari, Chhattisgarh

Project 5 : Research on mass production .of biofertilizers (VAM, Rhizobium and other beneficial organisms) [004/TFRI/94/Patho-3 /1994-2001]. *For technical report contact Principal Investigator- Dr. Jamaluddin.*

Findings : The culture of VAM fungi and other associated organisms like rhizobium helper bacteria, azotobacter and Phosphate Solubilizing Bacteria (PSB) were isolated from teak, bamboo and *Albizia procera*. Inoculum of VAM fungi for teak, bamboo and *A. procera* were prepared in bulk using maize as trap species in glass house. Inoculum of VAM fungi, N_2 fixers and PSB were produced in glass house and in the laboratory. Field experiments were conducted in two localities, i.e. at Sagar (Chandbilla) and Katni (Dhimarkheda) by using VAM fungi, Azospirillum and PSB in teak and bamboo. Cultures of VAM fungi, rhizobia, PSB, azotobacter and other microbes are maintained for their further use. Cultures of VAM fungi were supplied to different divisions in the institute and to SFDs. Demonstrations were also given, both in the laboratory and in field, to the visitors.

PROJECTS CONTINUED DURING THE YEAR 2001-2002

Project 1 : Social and livelihood analysis of dependence of tribal people on forests. [015/TFRI-2000/Econ.-23/2000-2005]. *Principal Investigator - Dr. Nanita Berry.*

Status: Questionnaire to conduct socio-economic study of households from different selected villages prepared. Data from Kuppa and Handipani villages of Betul district and Chanagarh and Jollykheda villages of Hoshangabad district for socio-cultural study of Korkus and their dependence on forest was collected.

Project 2 : Market survey of prevailing tree species and forest products. [025/TFRI-94/(Econ.)/2001-2002]. *Principal Investigator - Mr. Akhilesh Argal.*

Status : Market rates of timber of *Tectona grandis, Shorea robusta, Eucalyptus* and Bamboo species have been collected upto the quarter ending March 2002 from Raipur, Nagpur and Jabalpur markets. Market rates for different fuelwood species for the quarter ending March 2002 were also collected. On the basis of survey information quarterly "Timber/bamboo trade bulletin" upto Dec. 2001 has been published by ICFRE, Dehra Dun.

Project 3 : Collection of ethnobotanical data from various tribes of Central India [006/TFRI-97/Bot-7/1997-2005]. *Principal Investigator - Dr. Rajiv Rai.*

Status : Ethnobotanical studies and folklore surveys were conducted in Madhya Pradesh and Chhatisgarh. The ethnobiological studies conducted amongst Bhariya tribe of M.P. state revealed that one hundred and twelve plants of forest origin are used by them in indigenous medicines; details have been recorded. The studies on Hill Korwa tribe of Chhattisgarh State revealed that they have started working in cottage industries, collecting bamboos, canes and *Katha* from forest. Their womenfolk collect tubers, rhizomes, gums and resins from forests and extract dyes from plants for colouring clothes. One hundred and twenty four plants have been recorded that are used for various purposes.

Project 4 : Biodiversity study in protected area (a) Nauradehi Wildlife Sanctuary, M.P. (b) Debrigarh Wildlife Sanctuary, Orissa. [016/TFRI-2000/BD-16/2000-2003]. *Principal Investigator - Dr. D.K. Shadangi.*

Status : Calculated the IVI and diversity index of tree species in Mohli Range of Nauradehi Wildlife Sanctuary. Large number of samples of surface and sub surface soil have been analysed for different soil properties to know the level of variation in different habitat types.

Project 5 : Eco-restoration of degraded forests [017/TFRI-2000/Ecol-20/2000-2005]. *Principal Investigator - Dr. S.K. Banerjee.* **Status :** Site selected near Niwas having different years of protection by the local village forest committees. Phyto-sociological studies have been carried out, plant and soil

samples collected and analysed. Analysis of soil samples collected from Niwas. Analysis of plant samples collected from Niwas.

Project 6 : Ecological and economic evaluation of teak monoculture & mixed plantations [032/TFRI-(2000) 2001/Ecol.-2(5)/2000-2005]. *Principal Investigator - Mr. P.K. Shukla.*

Status : Ground water table measured in wells near plantation and away from plantation area. Ground flora diversity studies were carried out in teak plantations of different ages and adjoining open land. Phyto-sociological attributes were calculated. Soil and plant samples collected are being analysed and tabulated.

Project 7 : Population dynamics, behaviour of sal heartwood borer and development of its control measures [007/TFRI/97/Ento-06/1997-2002]. *Principal Investigator - Dr. K.C. Joshi.*

Status : While assessing the borer affected sal forests of Amarkantak, Karanjia, and Motinala, the population of beetles was recorded very low. At Motinala, no beetles were recorded on the trap trees. The density of infested trees was found less than one tree per hectare at all the places visited. The beetles collected reared successfully in the laboratory.

Project 8 : Mass multiplication of *Trichogramma* spp. and their efficacy against key pests of teak forests [018/TFRI-2000/Ento-24/2000-2005]. *Principal Investigator - Dr. Mohd. Yousuf.*

Status : Identified 15 egg parasitoids, *Trichogramma* species from teak growing areas of Mandla Division. A field experiment was carried out to compare the efficiency of 4 species of *Trichogramma* species, viz. *T. brasiliensis, T. pretiosum, T. chilonis* and *T. japonicum* against teak leaf skeletonizer. Observations on sustainability of the parasitoid in released sites are in progress.

Project 9 : Investigations into the nature of inheritance and breeding of teak [019/TFRI 2000 / Gen 21/2000-2005]. *Principal Investigator - Dr. A.K. Mandal.*

Status : During the period under report two major activities were undertaken : (1) Studying genetics of seed parameters of teak of M.P. origin and (2) establishment of genetic tests. Seeds from 40 plus trees selected earlier from different teak growing areas of M.P. were taken for recording data on different fruit and seed characters. Data were statistically analyzed using mean values over replications for estimation of genetic parameters. Variability parameters in terms of range etc. indicated considerable range of variation for fruit weight and seed weight. The differences between the values of phenotypic and genotypic coefficients of variability were low for all the traits. This is indicative of the fact that these characters are less likely to be influenced by changes in the environmental conditions. Expected genetic gain for these characters was also quite appreciable (5.28 21.11 percent). The present set of genotypes can also form a part of breeding population, if established.

Project 10 : Development of tissue culture protocol for important forestry tree species (a) Teak (b) *Gmelina arborea* [020/TFRI2000/Gen22/2000-2003]. *Principal Investigator - Dr. Fatima Shirin.*

Status : In the first study solutions of ascorbic acid, citric acid, activated charcoal, boric acid, glutamine and sterile water (as control) were used to pre-treat nodal segments and terminal buds. Boric acid proved to be the best treatment with 40- 50 % green healthy buds. In the second study Murashige and Skoog's medium (1962) was found to be the most suitable basal media for shoot multiplication. Different combinations of 6-Benzyl Adenine (BA) and Naphthalene Acetic Acid (NAA) were tried and 5 μM BA with 0.5 μM NAA proved to be the best combination for high rate of shoot multiplication (3- 4 fold) as well as elongation of shoots. Liquid MS medium was better than semisolid medium supplemented with agar. In the third study four auxins viz., naphthalene acetic Acid (NAA), Indole-3-Acetic Acid (IAA), Indole-3-Butyric Acid (IBA) and Indole-3-Propionic Acid (IPA) were tried in various concentrations. Naphthalene Acetic Acid proved to be the most effective auxin, with high percentage of rooting and more number of roots. The study is still in progress. Source of auxin for rooting of *in vitro* raised shoots has been screened out. IBA was found to be most suitable for rooting. No rooting was noticed in the medium containing NAA while IAA was less effective. Graded dose of IBA was tried for rooting and 1 μM IBA was found to be most suitable for rooting. Experiments were carried out with graded dose of BA and Kinetin to find out interaction for maximum shoot multiplication. Combination of 1 μM BA and 0.1 μM Kinetin was found most effective for high shoot multiplication rate.

Project 11 : Evaluation of various NWFP species for saponins potential and their value addition [021/TFRI-2000/Chem.-18/2000-2005]. *Principal Investigator - Mrs. Neelu Singh.*

Status : Seeds of *Madhuca indica* and roots of *Asparagus racemosus,* were collected and processed for the isolation of saponins with the help of solvent extraction, fractionation and chromatographic techniques. Biological activities of *Sapindus mukrossi*, *M. indica*, *C. gigentia* and *A. racemosus* extractives were assessed against fungi, *Fusarium* sp. and *Aspergillus flavus.*

Project 12 : Establishment of advance centre on NWFP [022/TFRI/2000/NWFP/ 19/2000-2005]. *Principal Investigator - Dr. S.S. Bisen.*

Status : The project includes five (5) sub-projects:

Sub-Project 1 : Germplasm collection, conservation biology, domestication & commercial cultivation of threatened species of medicinal plants in India. Species: *Terminalia chebula, Celastrus paniculatus*

Collected harra and malkangini seeds from study area. Seed germination studies of *C. paniculatus* were conducted in field and none of the seeds were germinated. Seed germination study of *C. paniculatus* in laboratory showed a very poor germination in all the treatments. Germination studies of Harra (*T.*

chebula) seeds of Bajag and Dindori were carried out; germination percentage was recorded as 55% of Bajag and 26.33% of Dindori respectively.

Sub-Project 2 : Utilization of Non Wood Forest Produce waste for making composites. *Hyptis suaveolens* and *Cymbopogon martinii*.

Plant materials of *H. suaveolens* and *C. martinii* were collected and their fibres separated for preparation of composites. Contents of cellulose and other ingredients in fibres were also estimated.

Sub-Project 3 : Resource assessment of NWFPs, documentation and develop NWFP information system.

Database on NWFP species were entered in the recently developed software by computer division. Entered data of NWFP potential, availability and production of 25 species by using FOXPRO.

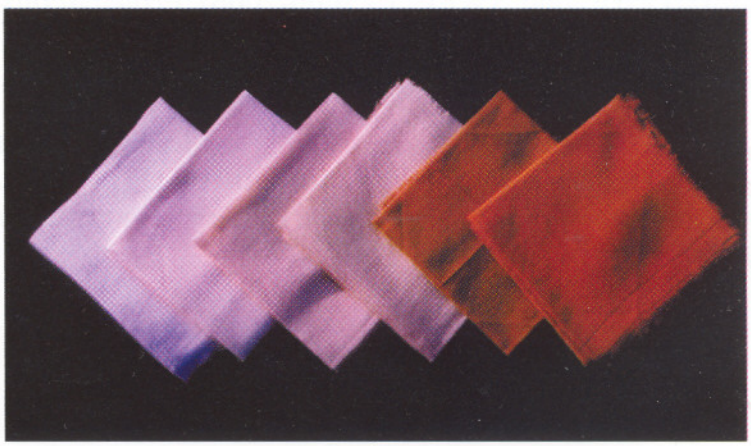
Sub-Project 4 : Qualitative and quantitative variations in tree-borne oil seeds *Schleichera oleosa* (Kusum) and *Garcinia indica* (Kokam).

Surveyed natural growing areas of *Garcinia indica* in the study area of Maharashtra and collected fruits/seeds. Also collected 2 kg seeds from Banda, North Goa district of Goa. Study germination percentage and estimated oil content.

Surveyed and collected fruits/seeds of *S. oleosa* from a few districts of Chhattisgarh. Studied germination percentage and estimated oil, protein, total carbohydrate nitrogen and saponification. Studies revealed maximum germination (61.5%) from Sheotarai and minimum (21.5%) from Kundam, Jabalpur. Estimated oil percentage from 6 different localities of Chhattisgarh; oil percentage ranges from 58.39 to 69.06%. Maximum oil percentage and protein 30.45% recorded from Bhagat Deori.

Sub-Project 5 : Standardization of methodologies for extraction and value addition of NWFPs. (*Butea monosperma, Woodfordia fruticosa* & *Hyptis suaveolens*).

A field experiment on *Curcuma angustifolia* (Tikhur) in RBD design (6 treatments X 5 replications) was laid out at NWFP garden for evaluation of the best harvesting period for maximum yield of starch. The starch was extracted from the freshly collected samples. The best



Different shades of Clothes with natural dyes obtained from *Butea monosperma*

harvesting time for the maximum yield of extracted starch was found to be the month of January. Data on flower production of *Butea monosperma* from 18 selected trees in different girth class were recorded to determine the flower production/tree in different girth classes. Extracted dye from the flowers of *B. monosperma* and *Woodfordia fruticosa* and *B. monosperma* dye was used for dying the textiles; developed 14 shades. *Hyptis suaveolens* (seeds) and *E. nuda* (tubers) were collected from Bajag (Dindori) and Keolari (Seoni) and their bio-chemical parameters were estimated.

Project 13 : Studies on population structure dynamics and efficacy of existing silvicultural systems for the management of teak forests in Central India [023/TFRI-2000/Silvi-15/1999-2002]. *Principal Investigator - Mr. C. Krishnan.*

Status : Sites were selected at Kanad in Aurangabad Circle of Maharashtra. Sample plots were laid out. Trees in each plot were enumerated, measured for height, girth etc. and marked. Phyto-sociological studies and regeneration survey in selected areas were carried out. Soil samples and litter samples were estimated for bio-chemical studies. Entomological and pathological observations were noted. Collected compartment histories from the State Forest Department.

Project 14 : Standardization of improved nursery techniques for different multipurpose forest tree species of Central India (i) Standardization of root trainer seedling producing system. (ii) Studies on compost production [024/TFRI-2000/Silvi-17/2000-2003]. *Principal Investigator - Mr. Sanjay Singh.*

Status : Protocols for root trainer seedling production for *Albizia lebbek, Dalbergia latifolia, Gmelina arborea, Bombax ceiba* and *Pterocarpus marsupium* have been standardized. Approximately 1500 cft. compost from abundantly available local species is being prepared. These composts have been tested against MPT species viz. *Albizia lebbek, Dalbergia latifolia, Gmelina arborea, Bombax ceiba* and *Pterocarpus marsupium* in different treatment combinations. Estimated the nutrient status like organic carbon, nitrogen, pH & moisture for the vegetative compost prepared from five species. Two experiments on clonal propagation of *Tectona grandis* through cuttings obtained from vegetative multiplication garden (VMG) have been conducted. Sufficiently large number of cuttings (7000 Nos.) have been planted employing 20 and 15 different treatments respectively. In addition, vegetative propagation experiments on *Gmelina arborea*, *Albizia procera, Dalbergia latifolia, Pongamia pinnata* and several bamboo species have been conducted under mist propagation system, low cost mist chamber, shade house and open condition. Various hormones, vitamins and alternative cheap chemicals have been tried to induce adventitious rooting in shoot cuttings. Plants of *Bambusa vulgaris* were produced through adventitious rooting of cuttings in low cost mist chamber. Initial germination, moisture content and viability of *Pterocarpus marsupium* and *Acacia catechu* seeds were studied, experiment on seed pre-treatment of these species were carried out.

NEW PROJECTS INITIATED DURING THE YEAR 2001-2002

Project 1 : Integrated management of diseases of seeds, nurseries and plantations [035/TFRI-2001/Patho-4(5)/2000-2006]. *Principal Investigator - Dr. Jamaluddin.*

Status : 13 provenances of *A. nilotica* were evaluated for seed associated mycoflora. *Trichurus spiralis* was found in 6 provenances, which inhibited seed germination *in vitro* and *in vivo*. Seed of *Gmelina arborea* from various seed sources was also evaluated for seed mycoflora. *Streptomycetes* sp. (Actinomycete) controlled the wilt disease of *A. procera*, *D. sissoo* and *A. lebbek* caused by *Fusarium oxysporum* in pot experiment. *Ganoderma lucidum* root rot of *A. procera* was successfully controlled *in vitro* by using Bordeaux mixture+ *Trichoderma polysporum* (biocontrol agent).

Project 2 : Studies on differential adventitious rooting response vis-à-vis clonal propagation of economically important forestry species [038 / TFRI 2001 /Gen 2(4)/2001-2005]. *Principal Investigator - Dr. S.A. Ansari.*

Status : 300 shoot cuttings each of five tropical forest tree species, viz., *Anogiessus latifolia, Boswellia serrata, Dalbergia latifolia, Dalbergia sissoo* and *Gmelina arborea* were collected at an interval of every two months. The collected shoot cuttings were treated at their base for 24 h with 0 (control) and 5 mM each of IAA, IBA, NAA and thiamine (P vitamin B_1). The top cut end of treated cuttings was sealed with paraffin wax prior to planting them in polythene bags containing soil, sand and FYM in 1 : 1 : 1 ratio. The donor trees were also analyzed for endogenous level of auxin, soluble sugar, starch, phenol, O-phenol and moisture content. The endogenous level of these biochemicals followed the pattern : *Boswellia serrata* > *Gmelina arborea* > *Anogeissus latifolia* > *D. latifolia* > *D. sissoo*. However, a different scenario emerged for rooting response of these species which was *Dalbergia sissoo* > *Boswellia serrata* > *Dalbergia latifolia* > *Gmelina arborea* > *Anogissus latifolia*. Of the treatments, IAA was found to be the most effective followed by thiamine for induction of adventitious roots in all species.

EXTERNALLY AIDED PROJECTS

PROJECTS COMPLETED DURING THE YEAR 2001-2002

Project 1 : Development of neem in various ecological regions of India (M.P. & Orissa) [011/TFRI-99/(NWFP)Ecol.-11(NOVOD)/1999-2002]. *For technical report contact Principal Investigator - Dr. S.K. Banerjee.*

Findings : 21 localities in different agroclimatic zones of M.P. and Orissa were selected and superior trees of neem were marked, and phenological studies were carried out. Seeds form selected superior trees were collected and seedlings are

being raised in nursery. About 60,000 seedlings are being raised and maintained at TFRI, and Chhindwara. Soil samples from rhizosphere of neem trees were collected and analysed. Neem leaf litter and green leaves have been collected for chemical and biochemical studies like protein, polyphenol and carbohydrate. Oil content of neem seeds collected form different localities were estimated. About 12 ha model plantation and 2 ha research orchard have been raised from seeds and propagules of different localities. Two training programmes for farmers were organized at Betul in M.P. and Raipur in Chhattisgarh. Vegetative propagation method for neem has been standardized. Stem cuttings from 1 year old branches, 1.5 to 2.5 cm in diameter, have been found to be appropriate for good rooting. Branch cuttings procured during March-April with 30 second dipping in 2000 ppm IBA solution gave the best result.

Project 2 : Role of mycorrhizae in the establishment of tissue culture raised plants [030/TFRI-(1999)2001/Patho-3(DST)(4)/1999-2001]. *For technical report contact Principal Investigator - Dr. Jamaluddin.*

Findings : A large number of VAM are found associated with musli. The level of infection varies in different localities, the spore populations also vary accordingly. The VAM flora including species of *Glomus, Scutellospora, Gigaspora* and *Acaulospora* were found associated with the roots of *C. borivillianum*. Cultures of all these species were prepared by using maize as the trap plant. An experiment was conducted in safed musli plantation done by IFFDC, Sagar. The yield of musli root was also high in both of these treatments as compared to control.

Project 3 : Central scheme for development of agro-techniques for medicinal plants (*Alstonia scholaris, Crataeva magna, Strychnos potatorum* and *Gmelina arborea*) [010/TFRI-98/NWFP-10(Agrotech)/1998-2002]. *For technical report contact Principal Investigator - Dr. S.S. Bisen.*

Findings : Agro-techniques for *A. scholaris* and *G. arborea* have been standardized completely. The best propagation method for these two species is through seeds. Chemical investigations on the bark for their active ingredients at various stages of growth have been completed partially. Seed germination techniques in *S. potatorum* have been standardized. The best method of propagation in *C. magna* has been found through root suckers by means of vegetative propagation method. Demonstration plot has been established for recording growth data, for all the above species.

Project 4 : Integrated development of tree borne oil seeds of forest origin. (Mahua, Karanj and Jatropha) [012/TFRI-99/NWFP-12 (NOVOD)/1999-2002]. *For technical report contact Principal Investigator - Dr. S.S. Bisen.*

Findings : Seeds for raising required seedlings (50,000) for distribution were collected from the selected trees and the chemical analysis of fatty acid profile was done. On the basis of their oil content and fatty acid profile trees were selected for seed collection and the seedlings were raised during the project period. The seedlings raised were distributed to forest departments, NGOs and some

farmers. A video film of 30 minutes duration showing silvicultural practices, extraction of oil, and utilization of fatty oil has been completed by TTTI, Bhopal.

Project 5 : Integrated development of tree borne oil seeds compact plantation of Mahua, Karanj, Jatropha and Neem [036/TFRI-2001/NWFP-1 (NOVOD)(6)/2001-2005]. *For technical report contact Principal Investigator - Dr. S.S. Bisen.*

Findings : Required seedlings of above mentioned species have been raised for undertaking plantations in the forest lands by involving forest protection committees in Dindori, division of Madhya Pradesh and Bhanupratappur and Rajnandgaon divisions in Chhattisgarh.

NEW PROJECTS INITIATED DURING THE YEAR 2001-2002

Project 1 : Standardization of commercial method for propagation of endangered rare and endemic plants and their *ex-situ* conservation in botanical garden [037/TFRI-2001/BD-1 (MOEF)(3)/2001-2003]. *Principal Investigator - Dr. V. Nath.*

Status : The project has been initiated to improve infra-structural facilities in botanical garden of TFRI, Jabalpur for *ex-situ* conservation of rare / endemic plants. The works completed from the allotted funds of first installment include fencing of botanical garden, drilling of bore well for irrigation and improvement of mist chamber. Some of the rare species collected from biologically rich areas of the states under the jurisdiction of TFRI are being raised in mist chamber.

Project 2 : Screening and identification of teak of Madhya Pradesh for resistance against major insect pests. [034/TFRI-2001/Ento 1 (MPCST) (4)/2001-2004]. *Principal Investigator - Dr. N. Roychoudhary.*

Status : Surveyed teak seed orchards from the study area, collected seeds from 51 plus trees of teak of MP origin, seed vigour examined and sowing carried out. Initiated laboratory experiments to test feeding potentiality of leaf skeletonizer on 4 teak clones and plus tree progeny of 10 teak clones. Initiated field study to measure defoliation impact of leaf skeletonizer on around 150 teak trees, planted at Behrai and Seoni. Initiated experiments on indicators of insect resistance.

Project 3 : Studies on carbonic anhydrase and its relationship with photosynthesis and productivity in Teak (*Tectona grandis*) [033/TFRI2001/Gen1(CSIR)/2001-2004]. *Principal Investigator - Dr. S.A. Ansari.*

Status : Carbonic anhydrase activity was assayed in different buffer systems. The maximum activity was 16413±3282 unit per mg. chlorophyll, which was observed in 12 mM veronal buffer. The assay was repeated five to ten times using different plant leaf extracts separately. The CO_2 concentration at 0 (initial) day was 60 mM,

which gradually declined to 24 mM within one month of storage in refrigerator. Therefore CO_2 saturated water, stored for one month, can be utilized as substrate of CA, for Km value of the enzyme is very low, i.e. 7.99±2.99.

Research Achievements

Name of State	No. of Projects Completed in 2001-2002	No. of Ongoing Projects in 2001-2002	No. of Projects Initiated in 2001-2002
Madhya Pradesh	09	10	02
Maharashtra	--	02	--
Chhattisgarh	02	01	--
Orissa	--	01	--

Technology Assessed and Transferred

- Selection of elite genotypes of teak for enhancement in production from plantations.

Education and Training

National

1. Shri Har Prasad, Dy. C.F., Foundation course in Financial Management (Centre for Training and Social Research, New Delhi).

International

- Shri P.N. Mishra, Scientist-C, Rehabilitation and Management of Degraded lands (CSIRO, Canberra, Australia) July 2001.
- Shri Ram Bir Singh, RA-I, Rehabilitation and Management of Degraded Lands (CSIRO, Canberra, Australia) July 2001.
- Dr. Smita Bist, Scientist-B, Ecology of Forest Eco-system (Florida, USA) July 2001.

Linkages and Collaboration

- Three laison meetings with SFDs of MP, Maharashtra & Chhattisgarh.
- Provided training on modern nursery techniques to subordinate staff (about 70 officials of Chhattisgarh) in Bilaspur.
- Large number of queries related to problems mainly with insect pests and disease were attended, mainly from divisions in M.P. and Maharashtra.

Publications

1. A Report on Research Communication by C. Krishanan, S. Singh and S. Bisht.
2. "Biofertilizer" by Dr. Jamaluddin and Dr. R.K. Verma.
3. Book on 'Important Medicinal Plants of Central India'.
4. Booklet on 'Development of culture of biofertilizers and its field application.
5. Booklet on 'Genetic Technology of Forest Trees'.
6. Booklet on 'Production of mushroom and their uses'.
7. Booklet on 'Screening of Insect Resistant Trees'.
8. Booklet on 'Techniques of mushrooms cultivation' (Hindi).
9. Brochure on 'Plus Tree Selection'.
10. Diseases and insect pests of teak' By Shri P.K. Shukla, Dr. Jamaluddin and Dr. N. Roy Choudhary.
11. "Mushroom cultivation technology" by Dr. Jamaluddin and Dr. V.S. Dadwal.
12. Pamphlets containing information about infrastructure available on rental basis by TFRI.
13. 'Recent trends in insect pest control-Enhance Forest Productivity' by Shri P.K. Shukla and Dr. K.C. Joshi.

Publication in National Books

1. Ansari, S,A,, Kumar, S, Sharma, S, and Shirin, F. (2001). Clonal propagation of teak (*Tectona grandis*). In Genetics and Silviculture of Teak (Eds.A.K. Mandal and S.A. Ansari). International Book Distributors. Dehradun pp. 183-207.
2. Mandal, A.K. and Rambabu, N. (2001). Quantitative genetic aspects of teak improvement. In Genetics and Silviculture of Teak (Eds. A.K. Mandal and S.A. Ansari). International Book Distributors, Dehradun pp. 135-145.
3. Nagarajan, B, Tamil Selvi, K.S. Wills, P.J. and Mandal, A.K. (2001). Reproductive biology and breeding system in teak (*Tectona grandis*). In Genetics and Silviculture of Teak (Eds. A.K. Mandal and S.A. Ansari), International Book Distributors, Dehradun, pp.107-120.
4. Nagrajan B., Varghese, M., Nicodemus, A. and Mandal, A.K. (2001). In : Forest Genetic Resources: Status, Threats and Conservation Strategies (Eds., R. Uma Shankar, K.N. Geneshaiah and K.S. Bawa), Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, pp. 85-97.
5. P.K. Shukla, Rajiv Rai and V. Nath. Documentation of new plant species of medicinal and food values in tribal region of Madhya Pradesh. ethnomedicine & phorcognosy Part II. Recent Progress in Medicinal Plants 2001, Vol. 7. Page 117 120, Pub. Researcho Book Centre, New Rohtak Road, New Delhi.
6. Rajiv Rai, P.K. Shukla and V. Nath. Characteristics and ethnobotanical studies on primitive tribe of Madhya Pradesh. ethnomedicine and Phermalognosy part II. Recent Progress in Medicinal Plants 2001 Vol. 7. Page : 543 554, Pub. Researcho Book Cantre, New Rohatak Road, New Delhi.

7. V. Nath, P.K. Shukla and Rajiv Rai. Ethnobiological documentation of germplasm on medicinal values and their conservation. Ethnomedicine & Phorcognosi Part II. Recent Progress in Medicinal Plants, 2001 Vol. & Page : 95 104, Pub : Researcho 104, Book Centre, New Rohtak Road, New Delhi.

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Folders:

1. Neem
2. Compost-urvarak se utpadan vridhi
3. Tissue culture technique dwara bans ki unnath kism ka utpadan
4. sagon ke sath safed musli ke kheti
5. Buch
6. Jaiv urvarak
7. Key defoliators of teak and their control

Film

1. Video film on mushroom cultivation. (20min.)
2. "Utkristata ki talash" (Aspire for Excellence) A 17 minutes film on TFRI activities and achievement by TTT, Bhopal in Hindi and English.

Conference, Meetings Workshops, Symposia and Exhibitions

Trainnings Organised

Sl.	Subject	Duration	Target Group
1.	Rehabilitation of Degraded Sites an Agro-Forestry Practices	15th -16th March, 2001	30 nos. of SFD staffs
2.	Cultivation Processing and Marketing of Medicinal Plants	27th 28th March, 2001	30 nos. of SFD staffs

3.	Extension of Technologies	5th 6th, Nov., 2001	SFD personnel of Madhya Pradesh
4.	Transfer of Technologies	4th-5th,Dec., 2001	SFD, Orissa
5.	Tree Improvement and Propagation of Superior Genotypes	13th-14th, Dec., 2001	SFD, Chhattisgarh
6.	Tree Improvement and Propagation of Superior Genotypes	13th-14th, Dec., 2001	SFD personnels, Maharashtra
7.	Integrated Development of Neem	4th 5th March, 2001	Farmers of Shivpuri, M.P.
8.	Integrated Development of Neem	23th 24th March, 2001	Farmers of Tala, Umaria Bandhavgarh, M.P.
9.	Development of Tree Borne Oil Seeds	-	Farmers of Barha, M.P.
10.	Biofertilizers, Mushroom Cultivation, Agroforestry Models and Cultivation of Medicinal Plants	11th-12th, Dec., 2001	Farmers and SFD officials, Chhattisgarh
11.	Modern Nursery Techniques, Nursery for Clonal Plants, Application of Biofertilisers, Agroforestry Models	11-12 Dec., 2001	Farmers and SFD officials, Chhattisgarh
13.	Eco-restoration and Rehabilitation of Stress Sites	27th -28thDec.,	NGOs and SFD officials, Madhya Pradesh, other stake holders
14.	Integrated Development of Neem	14th-15th , Feb., 2002	Farmers and SFD personnel of MP
15.	Tree Borne Oil Seeds	24th -25th, Feb., 2002	Farmers and SFD personnel of Madhya Pradesh Forest Department

Workshops and Conferences organised

Sl.	Subject	Duration	Target Group
1.	Bharatiya Vigyan Sammelan (TFRI provided the venue)	12th-14th, January 2002	National level scientists and research workers

Exhibitions/Melas organised

Sl.	Title	Duration	Subject
1.	Swarozgar Mela	17th Dec. 2000	Demonstration/Exhibitions of TFRI Technologies
2.	Kisan Mela	21st Dec. 2000	Demonstration/Exhibitions of TFRI Technologies
3.	Laghu Van Upaj Mela	4th -6th, Nov., 2001	Demonstration/Exhibitions of TFRI Technologies
4.	Grameen Vikas Takneekee Mela	15th -18th, Dec., 2001	Demonstration/Exhibitions of TFRI Technologies
5.	Narmada Maha Kumbh Swarozgar Mela	17th -22th, March, 2002	Demonstration/Exhibitions of TFRI Technologies

Workshops, Symposia and Conferences

Hon'ble Minister of State, Tribal Affairs Shri Faggan Singh Kulaste interacting during the Farmer's Training at Niwash (M.P.)

1. Jamaluddin. Bio-inoculants for sustainable forestry. National Symp. on Forestry. Feb. 16-18, 2001 Dept. of Botany, Kakatiya University, Warangal, 2001.

2. Joshi, K.C., Sambath, S. and Singh, S, 2001. Chemical pesticides and their safer use. In Recent Trends in Insect Pest Control to Enhance Forest Productivity. Proceedings of a Workshop on Entomology and Biological Control held at TFRI, Jabalpur, India, 25th September, 2000 : 1-6.

3. Roychoudhary, N. 2001. Tree resistance in insects : A novel approach of forest insect management. In Recent Trends in Insect Pest Control to Enhance Forest Productivity. Proceedings of a workshop on Entomology and Biological Control held at TFRI, Jabalpur, India, 25th September, 2000: 28-60.

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5. Kulkarni, N. 2001. Anti-insect bio-activity of some botanicals, their prospects as a component of integrated insect pest control system. In Recent Trends in Insect Pest Control to Enhance Forest Productivity. Proceedings of a Workshop on Entomology and Biological control held at TFRI, Jabalpur, India, 25th September, 2000: 95-137.

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7. S.K. Banerjee, T.K. Mishra, A.K. Singh and Avinash Jain (2001) Impact of plantation on ecosystem development in drastically disturbed coal mine overburden spoils. *Proc. Natn. Symp. on Development and Management of Problem Soils for Sustainable Agriculture Production,* held at J.N.K.V.V., Jabalpur on Dec. 21-22, 2001, 168-182.

Distinguished Visitors

1. Hon'ble Governor of Madhya Pradesh, Bhai Mahavir - January 2002
2. Dr. D.N. Tiwari, Member, Planning Commission of India - January 2002.
3. Shri Sompal, Member, Planning Commission of India - March 2002.
4. Shri Faggan Singh Kulaste, Hon'ble Minister, GOI - January 2002.

Miscellaneous

- Cultural programmes were organized from time to time with the involvement of the families of the TFRI employeès.
- Selection trials were held for selection of suitable candidates to participate in All India Forest Meet held at Chandigarh.
- Quiz competition, talks and seminars etc. were held on World Forestry Day, Wildlife Week, Sadbhavana Divas, etc.