

FOREST RESEARCH INSTITUTE

- I. RESEARCH PROJECTS/ACTIVITIES COMPLETED DURING THE YEAR 1996-97
1. Revision of the Book "Indian Woods" - their identification, properties and uses VOL. I.
 2. Vegetative propagation of some important forest tree species by rooting stem cuttings.
 3. Identification and screening of suitable nitrogen fixing species for various afforestation programmes.
 4. Modification of high yield pulps from *Populus deltoides*.
 5. Bleaching of alkali oxygen delignified kraft pulps from *Eucalyptus tereticornis* and *Anthocephalus indicus* and fungal pretreated *Dendrocalamus strictus* chemical-mechanical pulp and characterisation of effluents.
 6. Purification of gum ghattii (*Anogeissus latifolia*) and its shaping.
 7. Preparation of sterling gum by the synergistic action of guar gum, xanthan gum, CMC and Agar.
 8. Development of a substitute of Jigat (*Machilus macrantha* bark powder) used as a binding material for Agarbathi making. Product developed named "FRI Jigat" and know-how transferred to Agarbathi manufacturers.
 9. Studies on the utilisation of pine needles for production of musk and dye.
 10. Evolving gluing techniques for high glue bond strength in *Eucalyptus* hybrid wood.
 11. Development of packing boxes from plantation timber.
 12. Design and development of glued timber joints, glue laminated structure components.
 13. Repaid ecological appraisal of eastern sector iron ore mines of SAIL under phase -1.
 14. Soil-geological studies of Tehri Forest Division (U.P.) water-sheds with relationship to the forests.
 15. Identification of provenances based on leaf morphology in *Tectona grandis*.
 16. Studies on cultivation and optimum time of harvesting of tropical and sub-tropical medicinal plants.
 17. To identify high yielder chir pine trees for resin extraction by rill method for improvement of its genotype.
 18. To evolve scientific and environmental friendly method of tapping gum for *Acacia nilotica* and *Sterculia alata* and standardization of tools.
 19. To study the economy and commercial utility of canes.
 20. Studies on tribal welfare in relation to fibre and flosses.
 21. Study on cultivation of lignicolus mushroom, *Lentinus edodes* was completed.
 22. Preparation of volume tables of *Prosopis juliflora*.

23. Propagation of bamboos.

24. Development of forestry tools and equipments (pruning clipper).

II. NEW RESERACH PROJECTS TAKEN UP IN HAND DURING THE YEAR 1996-97

1. Germplasm collection of medicinal plants and its introductions at FRI.

2. Comparative studies on nitrogen fixing ability in some tree species.

3. Recycling of waste paper with respect to improving strength/optical properties.

4. Chemical composition and optimization of the contentional pulping process through kinetics studies of non-woods.

5. Development of adhesives from renewable sources (Starch, bark etc.).

6. Preparation of flocculants by chemical modifications of biopolymers for the treatment of industrial discharge.

7. Studies on the utilisation of pine needles for making cattle feed.

8. Screening of *Cephalotaxus harringtonia* needles for bioactive compounds.

9. Reclamation aid ecological monitoring of Iron Ore Mines in Sarauda Bonai Range (SAIL - ICFRE Project).

10. To prepare a monograph entitled "A Systematic catalogue of the Entomological Reference Collection".

11. Relative natural insect resistance in the clones and hybrids of poplar.

12. Studies on cultivation techniques, optimum harvesting schedule of tropical and sub-tropical medicinal plants of high market value.

13. Studies on Indian rattan with emphasis on taxonomic survey, genetic diversity, cultivation, exploitation, processing and utilization.

14. Preparation of volume and yield tables of Poplar species in North India.

15. Economics of *Tectona grandis* plantations in Tarai region of U.P.

16. Economics analysis and socio-economic impact of usarland plantations on rural area development in Western U.P. and Haryana.

17. Productivity studies of teak plantations with high inputs.

18. Breeding of poplars for genetic improvement.

19. Establishment of first clonal seed orchard of chirpine by grafting methods

20. Effect of trees on agricultural crops.

III. OLD RESEARCH PROJECTS BEING CONTINUED DURING THE YEAR 1996-97

1. Studies on rare and endangered plant.

2. Ethnobotanical studies on various important plant species.

3. Development and species enrichment of Botanical Garden, Arboretum, Bamboostum, Carpological Museum and Herbarium

4. Indian woods - their identification, properties and uses VOL. VI.

5. Physiological effects of water stress on growth and development of some fast growing tree species to different water stress condition.
6. Utilization of alkali spent liquor lignin characterization and hydroxylation of polyol, polyurethanes.
7. Studies on isolation and characterisation of the polysaccharides of abundantly available seeds of trees/shrubs, leaves, barks and exudate gums.
8. Phytochemical examination for the utilisation of leaves, bark, fruits, seeds and roots of Indian Forest Trees.
9. Studies on *Jatropha curcas* seed oil.
10. Control of growth stress induced sawing and seasoning degrade in plantation wood.
11. Chemical plasticization of wood for solid bent wood furniture.
12. Design and development of low cost kiln seasoning of timber.
13. Fundamental studies on the mechanism of drying factors affecting moisture conduction and behaviour of seasoned timber in service.
14. Studies on durability, treatability and efficacy of preservative treated wood species including plantation wood species.
15. Pressure treatment of refractory wood species/green wood.
16. Development of medium density fibre board (MDF) from *Eucalyptus* hybrid.
17. Integrated fibre resource utilization for reconstituted wood based panels.
18. Studies on wood working carving and wood finishing on plantations timbers. Developmental work on utility processes and performance.
19. Development of laminated wood from *Eucalyptus* and poplar for joinery and furniture items.
20. Evaluation of physical and mechanical properties of plantation timbers including studies on variation of timber grading and clarification for different uses and development of a CD for physical and mechanical properties of Indian timbers.
21. Design, development of accelerated and simulated performance tests and properties evaluation of wood products and materials received from outside organisations.
22. Development of appropriate technology for utilization of bamboos and *Eucalyptus* poles and poplar planks for cost effective housing and other structural components.
23. Ecological monitoring of biodiversity and the strategy for conserving thereof in the region of UP.
24. Regeneration, mortality and species diversity in sal forest of U.P.
25. Reclamation and ecological monitoring of mined areas in lime stone phosphate mines.
26. Surveillance and monitoring of insect pest species their seasonal abundance, pest activity and management by light trap techniques.
27. Management of sal heratwood borer in natural forests.

28. Laboratory evaluation of natural termite resistance in *Eucalyptus*, poplar and bamboos.
29. Identification of forest insect fauna, augmentation and maintenance of entomological reference collection and museum.
30. Preparation of Guide (key) to the National Insect Reference Collection.
31. Technology for improvement of land based biomass productivity for different social and agroforestry plantation patterns.
32. Geological, geomorphological and micromorphological studies of skeletal and sodic soils.
33. Selection of suitable provenances of tree species for sodic soils.
34. *In vitro* rejuvenation/multiplication of *Eucalyptus* hybrid, Teak, Shisham, Chirpine *Paulownia* and Bamboos.
35. Genetic improvement of *Pinus roxburghii* including provenance Research.
36. Studies on cultivation and optimum time of harvesting of temperate and alpine medicinal plants of high market value.
37. Seed pathology of *Bamboo* species, *Dalbergia sissoo*, *Eucalyptus*, *Anthocephalus chinensis*, *Acacia* and *Albizia*.
38. Studies on diseases of *Eucalyptus*, *Acacia* species and *Paulownia* spp. and their management.
39. Studies on diseases of *Albizia* spp. and their management.
40. Studies on diseases of poplars and their management.
41. Studies on biofertilizers.
42. Estimation of biomass, productivity and nutrient cycling in an age series plantation ecosystem of teak.
43. Preparation of volume and yield tables of different origin of chir-pine situated at demonstration area, FRI, Sample Plots.
44. Preparation of volume and yield tables of *Dalbergia sissoo* in U.P.
45. Improvement of nursery techniques of important commercial species.
46. Investigation into seed viability, germination and longevity of some important species of upper Gangetic plains.
47. Development of forestry tools and equipments.

DETAILS OF EXPENDITURE INCURRED DURING THE YEAR 1996-97.

| Sl.No. | HEAD /PROJECT | AMOUNT (Rs.) |
|--------|-----------------------------|--------------------|
| 1. | Salary | 1,48,04,032 |
| 2. | O.E. | 99,26,932 |
| 3. | T.A. | 8,36,048 |
| 4. | Capital expenditure | 1,60,55,859 |
| 5. | Loan and advance | 8,81,950 |
| 6. | Payment to KV, FRI | - |
| 7. | Minor work maintenance | 1,07,36,172 |
| 8. | Material & Supply | 1,12,732 |
| 10. | Cash Award | 12,997 |
| | Total (Plan) | 5,33,66,722 |
| | Non-Plan Expenditure | 6,51,10,910 |

INSTITUTE OF FOREST GENETICS AND TREE BREEDING

I. RESEARCH PROJECTS/ACTIVITIES COMPLETED DURING THE YEAR 1996-97

01. Genetic upgrading of *Casuarina equisetifolia* for increasing productivity.
02. Canonical analysis and cluster analysis of the clones in the clone bank have been carried out in order to develop a rapid methodology for drawing a mating plan for *Eucalyptus tereticornis*, *Eucalyptus camaldulensis* and *Casuarina equisetifolia*.
03. Mass propagation of *Bambusa arundinacea*, *Bambusa nutans*, *Dendrocalamus membranaceus* and *Dendrocalamus strictus*
04. Biochemical investigations in relation to tissue culture and mass multiplication with particular relevance to proteins and isoenzymes in bamboos have been carried out.
05. Standardised Random Amplified Polymorphic DNA Assay in the clones of *Casuarina equisetifolia*.
06. Standardized the neem seed collection procedure and studied the effect of moisture content on the viability of seeds.

II. NEW RESEARCH PROJECTS TAKEN UP IN HAND DURING THE YEAR 1996-97

01. Characterization of the phenotypes and genotypes of the natural population of *Emblica officinalis* of Tamil Nadu and Kerala.
02. Allelopathic effect of forestry species on seed germination.
03. Standardization of seed handling procedures for commercially important forest medicinal plants.
04. Standardization of root trainer size, potting mixture and watering regime for forestry spp.
05. Species trials for afforestation in degraded lands.
06. Selection of pest/disease resistant phenotypes of Teak, *Casuarina* and *Eucalyptus*.
07. Socio-economic studies of some important Forest Medicinal Plants in the tribal areas of Tamil Nadu.
08. Socio-economic studies on the impact of Joint Forest Management.

III. OLD RESEARCH PROJECTS BEING CONTINUED DURING THE YEAR 1996-97

01. Genetic improvement of *Tectona grandis* (Teak).
02. Genetic improvement of forest trees for increased productivity in marginal lands.
03. Reproductive biology of Tropical tree species.
04. Tree breeding for Agroforestry.

05. International provenance trials of *Casuarina equisetifolia*, *C. junghuniana* and *Acacia nilotica*.
06. Species trial of Acacias.
07. Seedling Seed Orchards of *Eucalyptus tereticornis* and *E. camaldulensis*.
08. Production of high yielding propagules of *Casuarina* and Eucalypts.
09. Assessing growth and physiological variations like photosynthesis in fast growing tree species for improving yield.
10. Micropropagation and tissue culture studies on Bamboo and Eucalypts.
11. Biotechnology of Trees (WB Project)
12. Standardization of optimum storage conditions for *Azadirachta indica* and methods to prolong the viability.
13. Studies on the seedlife of *Casuarina equisetifolia* and working out the germination capacity.
14. Standardization of germination methods in *Tectona grandis* and evaluation of vigour for seeds of different sources.
15. Standardization of pre-treatment requirement of miscellaneous species.
16. Establishment of Seed Bank
17. Establishment of International Provenance Trial of *Azadirachta indica*.
18. Establishment of provenance trial of *Pongamia pinnata* and *Jatropha curcas*.
19. Standardization of germination methods and optimum storage conditions for oil yielding species viz. *Pongamia pinnata* and *Jatropha curcas* and methods to prolong their viability.
20. Species and Soil amendment trials for reclamation of magnesite minespoils.
21. Species and Soil amendment trials for reclamation of quartz dumps.
22. Screening of *Casuarina equisetifolia* and *C. junghuniana* provenances and genotypes for plantation in problem soils of Tamil Nadu.
23. Biofertilizer trials in *Casuarina equisetifolia*.
24. Nutrient Cycling (WB Project)
25. Development of Agroforestry models for the various agro-ecological regions. (ICFRE - NABARD Project on Agroforestry)
26. Pest problems in nurseries and plantations
27. Studies on Seed pests.
28. Studies of host resistance against pests
29. Studies on botanical pesticides
30. Studies on bio-control

31. Disease problems in nurseries and plantations
32. Studies on biofertilizers
33. Pest/disease resistance studies
34. Market survey on prices and utilization pattern of timber products.
35. Economics of raising Teak, Casuarina and Eucalyptus plantations in the states of Tamil Nadu and Kerala.
36. Comparative growth studies of Teak plantations (Natural and man made) in Tamil Nadu.

FINANCIAL STATEMENT

| SL. NO. BUDGET HEAD | EXPENDITURE (Rs.) |
|--|--------------------------|
| I. PLAN | |
| A. Revenue expenditure | 10064819.00 |
| B. Loan and Advances | 439665.00 |
| C. Capital Expenditure | 4313583.00 |
| TOTAL (PLAN) | 14818067.00 |
| D. Externally Aided Projects | |
| a. FORTIP | 159099.00 |
| b. UNDP | 853313.00 |
| c. WORLD BANK | 16429827.00 |
| TOTAL (Externally Aided Projects) | 17442239.00 |
| II. NON-PLAN | |
| A. Revenue expenditure | 4165962.00 |
| TOTAL (PLAN NON-PLAN + FREEP) | 36426268.00 |

INSTITUTE OF WOOD SCIENCE AND TECHNOLOGY

I. RESEARCH PROJECTS/ACTIVITIES COMPLETED DURING THE YEAR 1996-97

1. Control of biodeterioration with wood extractives, other plant derivatives and bioactive substances.
(A sub-project using metabolites from *Trichoderma* and *Gliocladium* was only completed and report prepared).
2. Natural durability of different timber species and panel products under marine conditions.
(A sub-project comprising 87 timber species was only completed and data collected).
3. Durability of preservative-treated timber under marine conditions.
(A sub-project comprising rubberwood panels treated with CCA and CCB was only completed and report prepared).
4. Occurrence, ecology, bionomics and control of insect pests of nurseries, forest, plantations and timber.
(A sub-project on bionomics of *Inglisia bivalvata* on sandal was only completed and report prepared).
5. A simple method to isolate santalins, the red pigments from Red sanders wood.
6. Value added products from *Eucalyptus* hybrid oil by simple chemical reactions.
7. A simple method to isolate santalins, the red pigments from Red sanders wood.
8. Study (Evaluation) of anatomical, physical and mechanical properties of less known/plantation grown timbers. (The following sub-projects have been completed):
 - (i) Evaluation of physical and mechanical properties of *Cupressus* species and Teak completed.
 - (ii) Pith to periphery variation in anatomical features of 5 species completed.
 - (iii) Anatomical structure of 27 species of Indian coniferous woods completed (collaborate project with FRI, Dehra Dun).
 - (iv) Density and calorific values of *Acacia tortalis*, *Acacia nilotica*, *Acacia bubucra*, *Acacia cupressiformis* and *E.tereticornis* have been determined for their use as fuelwood. Electrical resistivity of plantation grown silver oak, rubber wood and *E. tereticornis* completed.

II. NEW RESEARCH PROJECTS TAKEN UP IN HAND DURING THE YEAR 1996-97

1. Studies on the insect fauna of mangroves of Goa, Karnataka and Andhra Pradesh coasts.
2. Development of tissue culture protocol for sandal, sissou and teak.

3. Scientific debarking experiments to get maximum bark with least damage to standing trees of *Machilus macrantha* and *Cinnamomum iners*.
4. Study (Evaluation of anatomical, physical and mechanical properties of less known/plantation grown timbers.
 - (i) Pith to periphery variation in anatomical features of *Tecomelia undulata*.
 - (ii) Study of properties of plantation grown by NDT.
 - (iii) Electrical properties of *Cupressus* species and *Tecomelia undulata*.
 - (iv) Laboratory level preparation of LVL from hardwoods and use of ligno-cellulosic material for making boards.
5. Studies on weathering of wood under accelerated weathering conditions
6. Weathering performance of finished/paint coated wood surfaces.
7. Treatment of timber with wood preservatives for fabrication of catamarans.

III. OLD RESEARCH PROJECTS BEING CONTINUED DURING THE YEAR 1996-97

1. Control of biodeterioration with wood extractives, other plant derivatives and bioactive substances.
2. Studies on the effect of biofertilizers.
3. Durability of preservative-treated timber under terrestrial conditions.
4. Occurrence, ecology, bionomics and control of insect pests of nurseries, forest, plantations and timber.
5. Distribution, ecology, biology and physiology of marine wood-borers and foulers.
6. Natural durability of different timber species and panel products under marine conditions.
7. Durability of preservative-treated timber under marine conditions.
8. Service-cum-demonstration trials on preservative treated catamarans.
9. Ecology, biodeterioration, afforestation and conservation of mangroves along Goa, Karnataka and Andhra Pradesh coasts.
10. Natural durability of different timber species and panel products under terrestrial conditions.
11. Intercepting forest seed consignments for pest infestation and evolving control measures.
12. Raising tissue-cultured plants using stem explants of *Machilus macrantha* and *Lannea coromandelica*.
13. Studies on qualitative improvement of *Eucalyptus* hybrid oil for value addition.
14. Research on sandalwood.
15. Preparation and screening of compounds having biocidal activity.
16. Studies on *Machilus macrantha*.

17. Study (Evaluation) of anatomical, physical and mechanical properties of lesser known/plantation grown timbers.
 - (i) Evaluation of physical and mechanical properties of timbers
 - (ii) Investigation of structure of woods-plantation grown species
 - (iii) Study of electrical properties of timbers
 - (iv) Study of Anatomy of important timber species for identification
 - (v) Pith to periphery variation in 10 less known species.
 - (vi) Computer assisted wood identification.
 - (vii) Development of software for calculating properties with CALPRO.
 - (viii) Study of properties of plantation grown timber by NDT.
 - (ix) Assessment of wood quality of different clones of *Eucalyptus tereticornis*.
18. Studies on the treatability of refractory species from plantations.
19. Study of mechanism of fixation of preservatives in refractory woods.
20. Study of growth stresses in plantation timber and their effect on conversion in seasoning of timbers.
21. Dimensional stabilisation of wood by polymerisation.
22. Analytical studies on moisture migration in wood.
23. Study on the mechanism of surface degradation due to weathering.
24. Durability of timber under different eco-system in treated and untreated conditions.
25. Chemical modification of wood.
26. Treatment of catamaran timber by wood preservatives, for field trials.

FINANCIAL STATEMENT

| SL. NO. | BUDGET HEAD | EXPENDITURE (Rs.) |
|------------|--|--------------------|
| I. | PLAN | |
| | A. Revenue expenditure | 6972077.90 |
| | B. Loan and Advances | 45400.00 |
| | C. Capital Expenditure | 2166957.30 |
| | TOTAL (PLAN) | 9184435.20 |
| | D. Externally Aided Projects | |
| | a. UNDP | 810850.00 |
| | b. WORLD BANK | 8440293.65 |
| | TOTAL (Externally Aided Projects) | 9251143.65 |
| II. | NON-PLAN | |
| | A. Revenue expenditure | 3663231.00 |
| | TOTAL (PLAN NON-PLAN + EAP) | 22098809.85 |

TROPICAL FOREST RESEARCH INSTITUTE

I. RESEARCH PROJECTS/ACTIVITIES COMPLETED DURING THE YEAR 1996-97

1. Biodiversity studies in permanent preservation plots in Orissa.
2. Biodiversity studies in Nawegaon National Park in Satpura range.
3. Biodiversity studies in plantation and natural sal forest around Amarkantak, M.P.
4. Phenological studies on Neem.
5. Identification of various group of fauna help in production of natural compost.
6. Study of nutritional value of plant parts of *Bombax ceiba* and *Sterculia urens*.
7. Study of *Aegle marmelos*, *Acacia nilotica* and *Lantana camara* for their potential fungitoxicity.
8. Study of species tolerant to accumulation of metals.
9. Investigation on allelochemical effects of leaf leachates of agroforestry species.
10. Chemical screening of insect resistant clones/provenances of teak, bamboo and poplar.
11. Screening of phytochemicals for their pesticidal activities of *Madhuca indica* and *Jatropha curcus*.
12. Production, demand, supply and market of wood and non wood products of *A. nilotica* in Chhatisgarh region of Madhya Pradesh.

II. NEW RESEARCH PROJECTS/ACTIVITIES TAKEN UP DURING THE YEAR 1996-97

1. Analysis of natural forest based bamboo production-to consumption system (IDRC aided).
2. Regional bamboo provenance trial.
3. Study of nutritional value of plant parts of *Bombax ceiba* and *Sterculia urens*.
4. Study of *Aegle marmelos*, *Acacia nilotica* and *Lantana camara* for their potential fungitoxicity.
5. Study of species tolerant to accumulation of metals.
6. Screening of phytochemicals of *Madhuca indica* and *Jatropha curcus* for their pesticidal activities.
7. Production, demand, supply and market of wood and non wood products of *A. nilotica* in Chhatisgarh region of Madhya Pradesh.
8. Economic study of unirrigated government teak plantations in Nagpur district of Maharashtra.

III. OLD RESEARCH PROJECTS BEING CONTINUED DURING THE YEAR 1996-97

1. Development of afforestation methodology for different types of mined over areas degraded and waste lands.

2. Post afforestation influence on soil properties in basaltic tract of Madhya Pradesh.
3. Pollution absorbing efficiency of different species in industrial areas.
4. Biodiversity studies in permanent preservation plots in Orissa.
5. Biodiversity studies in Nawegaon National Park in Satpura ranges.
6. Biodiversity studies in plantation & natural sal forest around Amarkantak.
7. Seed collection, storage in seed bank and supply.
8. Phenological studies on Neem and teak.
9. Vegetative propagation of ornamentals and fruit yielding species and campus development.
10. Germplasm collection of different species of Bamboo, *Diospyros melanoxylon* and grasses for introduction to Central India, location of high yielding species and varieties, their distribution for further multiplication.
11. Selection of fruit yielding trees of forest origin and edible bamboo, development of multiplication techniques, establishment of demonstration plots and seed orchard.
12. Standardisation of cultivation, processing and storage techniques of medicinal plants of commercial importance.
13. World Bank FREE project No. 4 Forest Entomology
14. Research on agroforestry models with instant income yielding crops.
15. Research on multipurpose trees in the practice of agro-forestry in Chhatisgarh region of M.P.
16. Alley cropping of maize/cowpea with *Sesbania sesban* to optimize productivity.
17. Developing tissue culture protocols for bamboo species and *Albizia procera*
18. Evolving technology for vegetative propagation of teak, bamboo, neem, *Pongamia pinnata* and safed siris through judicious application of phytohormones.
19. Genetic improvement of teak and safed siris.
20. Establishment of provenance trials, SPAs, CSOs, SSOs and multiplication garden.
21. Investigation on allelochemical effects of leaf leachates of agroforestry species.
22. Chemical screening of insect resistant clones/provenances of teak, bamboo and poplar.
23. Studies on diseases of important tree seeds nursery plantation, stored wood and bamboos.
24. Researches on biological control of important diseases of forest trees species.
25. Studies on mycorrhizae and biofertilizers, their mass production and field application in multipurpose tree species.
26. Agroforestry model for bamboo cultivation on degraded agricultural lands.

FINANCIAL STATEMENT

| SL. NO. | BUDGET HEAD | EXPENDITURE (Rs.) |
|------------|--|--------------------|
| I. | PLAN | |
| | A. Revenue expenditure | 16317924.00 |
| | B. Loan and Advances | 340000.00 |
| | C. Capital Expenditure | 4470491.00 |
| | TOTAL (PLAN) | 21128415.00 |
| | D. Externally Aided Projects | 13828277.00 |
| | TOTAL (Externally Aided Projects) | 13828277.00 |
| II. | NON-PLAN | |
| | A. Revenue expenditure | 2050656.00 |
| | GRANT TOTAL | 37007348.00 |

INSTITUTE OF RAIN & MOIST DECIDUOUS FORESTS RESEARCH

- I. RESEARCH PROJECTS/ACTIVITIES COMPLETED DURING THE YEAR 1996-97**
1. Selection of typical shifting cultivation areas as well as undisturbed similar, natural forest stands.
 2. Socio-economic survey of shifting cultivation area and partially in nearby settled areas.
- II. NEW RESEARCH PROJECTS/ACTIVITIES TAKEN UP DURING THE YEAR 1996-97**
Nil
- III. OLD RESEARCH PROJECTS BEING CONTINUED DURING THE YEAR 1996-97**
1. Mycorrhizae screening :
 - (i) Screen tropical evergreen forest species for VAM association.
 - (ii) Develop technique for production of VAM inoculum and its field application as biofertilizer.
 2. Study of changes in microflora including mycorrhiza due to shifting cultivation.
 3. Studies of the diseases of important forest tree species in nurseries, plantations and natural forests of North Eastern region of India.
 4. Studies on biology of *Rhizobium* sp. and their association with important leguminous forest tree species of North East India.
 5. Micro and macro propagation of bamboo.
 6. Seed production and germination.
 7. Planting stock improvement programme.
 8. Micropropagation and genetic improvement of Rattan.
 9. Ecology of evergreen tropical forests :
 - (i) Examine the current conservation status of forest resources to determine the effectiveness of protected area network.
 - (ii) Evaluate changes in forest structure and composition over time, document the effect of logging on forest structure and composition and determine optimal harvest schedules for production of timber.
 9. Biology of gall-aphids infesting styrax sp.
 10. Microfaunal components of litter ecosystem influencing soil characteristics and their changes in relation to shifting cultivation.
 11. Biological studies on insect pests of some important forest trees like *Aquillaria agallocha*, *Dipterocarpus macrocarpus*, *Gmelina arborea* etc. and their natural enemies.

12. Collection of information on shifting cultivation areas. Different land use patterns of North East India. Extent of shifting cultivation and documentation of existing data.
13. Identification and documentation of plant types and their distribution in both the areas.
14. Collection of soil samples (shifting cultivation area).
15. Analysis of soil for their physico-chemical properties during different shifting cultivation.

FINANCIAL STATEMENT

| SL. NO. BUDGET HEAD | EXPENDITURE (Rs.) |
|-------------------------------------|-------------------|
| PLAN | |
| A. Revenue Expenditure | 4491913.00 |
| B. Loan and Advances | 81000.00 |
| C. Capital Expenditure | 32305.00 |
| TOTAL (PLAN) | 4605218.00 |
| D. Externally Aided Projects | |
| a. IDRC Project | 577006.00 |
| a. b. UNDP | 680507.00 |
| c. WORLD BANK | 1612777.00 |
| GRANT TOTAL | 7475508.00 |

ARID FOREST RESEARCH INSTITUTE

I. RESEARCH PROJECTS/ACTIVITIES COMPLETED DURING THE YEAR 1996-97

NIL

II. NEW RESEARCH PROJECTS TAKEN UP IN HAND DURING THE YEAR 1996-97

1. Research cum demonstration trials in hot arid regions of India under RD Project at Rohat, Nagaur, Bikaner, Churu and Palanpur on

- i) Rain water harvesting
- ii) Agroforestry
- iii) Silvopastoral
- iv) Shelterbelts
- v) Sand dune stabilisation
- vi) Tree density
- vii) Silviherbal
- viii) Nutrient Management

2. NABARD: Development of suitable agroforestry models for arid region.

- I) To select multipurpose tree species for integration in agroforestry systems.
- II) To introduce biofertilizers in agroforestry plantations.
- III) To design experiments on models for improving land use in arid region.
- IV) To design appropriate land use/management plans for arid region.

III. OLD RESEARCH PROJECTS BEING CONTINUED DURING THE YEAR 1996-97

- 1. UNDP: Transfer of technology through training and demonstration.
- 2. Studies on pest problems in forest nurseries and their management in arid and semi-arid zone.
- 3. Biological control of major insect pests.
- 4. Studies on the host specificity of the key defoliators and non insect pests and their control measures.
- 5. Microbial control of insect pests of tree species in arid area.
- 6. Utilization of neem constituents for the management of forest insect pests of arid and semi-arid region.
- 7. Studies on the bioefficacy of extracts of different parts of *Capparis decidua* against insect pests of arid and semi-arid zone.
- 8. Studies on seed pests of mandate tree species in arid and semi-arid zone.

9. Studies on the disease spectrum of arid and semi-arid tree species (nursery and plantations).
10. Provenance trial of *Tecomella undulata*.
11. National Provenance trial of Neem.
12. International provenance trial of Neem.
13. Provenance trial on fodder species *Acacia nilotica* and *Ailanthus excelsa*. (W.B. Project).
14. Development of vegetative propagation technique for *Acacia nilotica* and *Ailanthus excelsa*. (W.B. Project).
16. Development of tissue culture technique for *Acacia nilotica* and *Ailanthus excelsa*. (W.B. Project).
17. Develop vegetative propagation and tissue culture technique for some arid zone tree species.
18. Growth and yield studies on irrigated plantations (W.B. project).
19. Studies on VAM association in irrigated plantations and agro-forestry system (W.B. project).
20. Lopping regime of important arid zone fodder tree species (W.B. project).
22. Growth studies on neem in Gujarat and Rajasthan State.
23. Woody plant water relations (W.B. Project).
24. Irrigation Water Management for tree species in arid zone (W.B. Project)
25. Research cum Demonstration trials in hot arid regions of India (R.D. Project)
 - i) At Jodhpur on (a) Agroforestry, (b) Rain water harvesting,
 - ii) At Jasol on (a) Rain water harvesting, (b) Nutrient management.
26. Studies of fatty oils of some important oil bearing plants of arid zone.
27. Study on the variation of important biologically active chemical components of *Azadirachta indica*.
28. Studies on biocidal properties of extractive of some arid zone plants.
29. A general screening of arid zone flora for fatty oils.
30. A study on the proteins of arid zone plants.
31. Study on the effect of extractive of arid zone plants against seed borne mycoflora.

FINANCIAL STATEMENT

| HEAD/PROJECT | EXPENDITURE (RS.) |
|--------------|----------------------|
| PLAN | 197,44,865.00 |
| NABARD | 1,12,386.00 |
| World Bank | 69,98,511.00 |
| UNDP | 6,28,947.00 |
| RDP | 15,24,821.00 |
| TOTAL | 290,09,530.00 |

HIMALAYAN FOREST RESEARCH INSTITUTE

- I. RESEARCH PROJECTS/ACTIVITIES COMPLETED DURING THE YEAR 1996-97
Conservation of Indigenous Poplars in India (FAO Project).
- II. NEW RESEARCH PROJECTS TAKEN UP IN HAND DURING THE YEAR 1996-97
 1. Increasing productivity of man-made forests.
 - i) Studies on the performance of some clones of *Populus deltoides* in different edapho-climatic conditions of Himachal Pradesh and maintenance/multiplication of their germplasm.
 - ii) Trial on introduction of few species of *Paulownia* and their multiplication.
- III. OLD RESEARCH PROJECTS BEING CONTINUED DURING THE YEAR 1996-97
 1. Cold desert afforestation and pasture establishment under FREEP (World Bank Project).
 - i) Select suitable species for planting, including trees, shrubs and grasses and develop effective establishment techniques.
 - ii) Improve establishment of clonal wood species.
 2. Regeneration of coniferous and broadleaved forests.
 - i) To examine the effect of the introduction of poplars into degraded coniferous forests.
 - ii) Develop improved propagation, nursery and planting techniques.
 3. Agroforestry/silvipasture in the lower hills.
 - i) Selection of species most suited for agroforestry/silvipasture in the lower hills and develop appropriate models with people's participation.
 4. Planting stock improvement programme.
 - i) Identification and location of seed stands and their development into seed production areas (SPAs).
 - ii) Establishment of seed orchards.
 - iii) Establishment of vegetative multiplication gardens of *Populus deltoides* and *Dalbergia sissoo*.
 5. Himalaya eco-rehabilitation (IDRC- Project).
 - i) Rehabilitation of mined and other degraded areas.
 - ii) Base-line and eco-economic impact studies in the rehabilitation areas.

6. Strengthening and developing ICFRE (UNDP Project).
 - i) Increasing forest productivity through production of genetically superior planting material.
7. Studies on Himalayan pines (Pine project).
 - i) Identification, screening, selection and collection of germplasm of *Pinus roxburghii*.

FINANCIAL STATEMENT

| HEAD/PROJECT | EXPENDITURE (RS.) |
|----------------------------|---------------------|
| 1. UNDP Project | 2,54,664.00 |
| 2. IDRC Project | 4,23,501.00 |
| 3. Poplar Project (FAO) | 4,089.00 |
| 4. Plan Budget | |
| (a) Revenue Expenditure | |
| (i) Research | 19,92,032.00 |
| (b) Administrative Support | 12,40,397.00 |
| (c) Loans & Advances | 33,125.00 |
| (d) Capital Expenditure | 22,929.00 |
| 5. FREEP | 19,85,365.00 |
| GRAND TOTAL | 5,956,102.00 |

INSTITUTE OF FOREST PRODUCTIVITY

- I. RESEARCH PROJECTS/ACTIVITIES COMPLETED DURING THE YEAR 1996-97
NIL
- II. NEW RESEARCH PROJECTS TAKEN UP IN HAND DURING THE YEAR 1996-97
 1. REHABILITATION OF MINED AREAS.
 2. TRIALS FOR RAISING MEDICINAL PLANTS.
- III. OLD RESEARCH PROJECTS BEING CONTINUED DURING THE YEAR 1996-97
 1. STUDY ON BIO-DIVERSITY CONSERVATION.
 2. STUDIES ON LOSS OF BIO-DIVERSITY DUE TO FOREST FIRE UNDER NATURAL SAL FOREST AT SUKNA.
 3. RESEARCH ON AGROFORESTRY MODELS YIELDING SUSTAINED INCOME (INCORPORATING AGRICULTURAL, HORTICULTURAL CROPS) AND THEIR DEMONSTRATION.
 4. DESIGNING AGROFORESTRY MODEL FOR LAC CULTIVATION.
 5. STUDY AND MARKET DATA COLLECTION OF LAC, ITS ANALYSIS AND CIRCULATION.
 6. RECLAMATION OF DEGRADED LATERITIC SOILS THROUGH ADDITION OF ORGANIC MATTER, FERTILIZER, BIOFERTILIZERS AND MICRO-NUTRIENTS.
 7.
 - a. PRODUCTION OF QUALITY SEEDLINGS OF MPTs FOR TRIALS AND DISTRIBUTION.
 - b. STUDIES ON PROMOTING GROWTH OF SEEDLINGS.
 8. ESTABLISHMENT OF CLONES / PROVENANCES / INTRODUCTION TRIALS FOR IMPORTANT MPTs.
 9. EXTENSION OF LAC AND NON-WOOD FOREST PRODUCTS.
 10. CONDUCTING TRIALS IN NEW LAC HOSTS.
 11. MAINTENANCE OF BROODLAC FARMS.
 12. TREE IMPROVEMENT.
 - A. SELECTION OF SPA OF MPT SPP.
 - B. IDENTIFICATION OF PLUS TREES.
 - C. RAISING OF SEED/CLONAL ORCHARDS OF MPT SPP.
 - D. RAISING OF MULTIPLICATION GARDENS.

13. HYDRO-METEROLOGICAL STUDIES AND INFILTRATION STUDIES IN BALASON CATCHMENT IN WEST BENGAL.
14. STUDIES ON ARTIFICIAL REGENERATION AND BIOMETRY OF MANGROVE AREAS IN W.B. AND A & N ISLANDS.
15. UNDP PROJECT (DEMONSTRATION PLANTATION).

FINANCIAL STATEMENT

| SL. NO. | NAME OF ACTIVITY/PROJECT | EXPENDITURE |
|--------------|---------------------------------|-------------------------|
| I | REVENUE EXPENDITURE | |
| A. | Research | — |
| 1 | Salary | — |
| 2 | Travel Expenses | 340633.00 |
| 3 | Office Expenses | 2677885.10 |
| 4 | Publication | 16293.00 |
| 5 | Material & Supply | 230002.00 |
| II | LOAN AND ADVANCES | |
| 1 | Loan / Advances | 21800.00 |
| 2 | House Building Advances | 60000.00 |
| 3 | Equipments and Library books | 142025.00 |
| 4 | Vehicle | -- |
| III | EXTERNALLY AIDED PROJECT | |
| 1 | UNDP | 339863.00 |
| 2 | World Bank Project | 110685.00 |
| TOTAL | | Rs. 1,529,086.10 |

CENTRE FOR SOCIAL FORESTRY AND ECO-REHABILITATION

- I. RESEARCH PROJECTS/ACTIVITIES COMPLETED DURING THE YEAR 1996-97
Nil
- II. NEW RESEARCH PROJECTS/TAKEN UP IN HAND DURING THE YEAR 1996-97
Nil
- III. OLD RESEARCH PROJECTS BEING CONTINUED DURING THE YEAR 1996-97
- (i) UNDP-ICFRE Project: Strengthening and developing the ICFRE.
 - (ii) World Bank-ICFRE FREE Project.
 - (iii) NABARD-ICFRE Project.

FINANCIAL STATEMENT

| SL. NO. | BUDGET SUB HEAD | EXPENDITURE (Rs.) |
|---------|----------------------------------|-------------------|
| 1. | A. Revenue expenditure | |
| | a. Research | |
| | 1. Salaries ® | 1145392.00 |
| | 2. Travel expenses ® | 144888.00 |
| | 3. Office expenses ® | 567616.00 |
| | 4. Forestry research | - |
| | 5. Fellowship/scholarship | - |
| | 6. Forestry education | - |
| | 7. Publications | - |
| | 8. Material and supply | - |
| | TOTAL | 1857896.00 |
| | b. Administration support | |
| | 9. Salaries (NR) | 573166.00 |
| | 10. Travels expenses (NR) | 20300.00 |
| | 11. Office expenses (NR) | - |
| | 12. Minor works/Maint. | - |
| | 13. Payment to KVS | - |
| | TOTAL | 593466.00 |
| | B. Loan and advances | |
| | 14. Vehicle advance | 22400.00 |
| | 15. House building advances | - |
| | TOTAL | 22400.00 |

| C. Capital expenditure | |
|------------------------------------|-------------------|
| 16. Building & Roads | - |
| 17. Equipment and library | 23662.00 |
| 18. Vehicles | - |
| TOTAL CAPITAL EXPENDITURE | 23662.00 |
| TOTAL GENERAL PLAN/NON PLAN | 2475024.00 |
| D. External aided project | |
| 19. NABARD | 189258.00 |
| 20. UNDP (Strength. ICFRE) | 1045433.00 |
| UNDP Contribution | 72173.00 |
| 21. WORLD BANK | 1389776.00 |

**CENTRE FOR FORESTRY RESEARCH AND HUMAN RESOURCE
DEVELOPMENT**

- I. RESEARCH PROJECTS/ACTIVITIES COMPLETED DURING THE YEAR 1996-97**
1. II. Junior certificate course in Nursery and Plantation Technology Completed (July-November, 1996).
- II. NEW RESEARCH PROJECTS TAKEN UP IN HAND DURING THE YEAR 1996-97**
- Nil.
- III. OLD RESEARCH PROJECTS CONTINUED DURING THE YEAR 1996-97**
1. Studies on the impact of J.F.M. approach on forest productivity.
2. Studies on environment impact assessment and reclamation of open cast mined areas in PENCH-KANHAN region.
3. Phyto-chemical examination for the utilization of leaves, bark, fruits and roots of some native forest species.
4. Ecology and control of insect pests of teak, *Tectona grandis* in Chhindwara and adjoining areas.

FINANCIAL STATEMENT

| SL. NO. BUDGET HEAD | EXPENDITURE (Rs.) |
|--|-------------------|
| NON-PLAN | |
| A. Revenue expenditure | 19.71 |
| B. Loan and Advances | 1.45 |
| C. Capital Expenditure | 31.86 |
| TOTAL (PLAN) | 53.02 |
| D. Externally Aided Projects World Bank | 5.65 |
| GRANT TOTAL | 58.67 |



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