CHAPTER 1

INTRODUCTION

Indian Council of Forestry Research and Education (ICFRE), an apex body in the national forestry research system, has been undertaking the holistic development of forestry research through need based planning, promoting, conducting and coordinating research, education and extension covering all aspects of forestry. The Council deals with the solution based forestry research in tune with the emerging issues in the sector, including global concerns such as climate change, conservation of biological diversity, combating desertification and sustainable management and development of resources. Topical research by the Council enhances public confidence in the ability of forest managers and researchers to successfully handle challenges related to natural resource management.

Objectives of ICFRE

- To undertake, aid, promote and coordinate forestry education, research and their applications.
- To develop and maintain a national library and information centre for forestry and allied sciences.
- To act as a clearing-house for research and general information related to forests and wildlife.
- To develop forestry extension programmes and propagate the same through mass media, audio-visual aids and extension machinery.
- To provide consultancy services in the field of forestry research, education and allied sciences.
- To undertake other jobs considered necessary to attain these objectives.

Institutes and Centres under the Council

ICFRE has eight Regional Research Institutes and four Research Centres located in different bio-geographical regions of the country to cater to the forestry research needs of the nation. The regional research Institutes are located at Dehradun, Coimbatore, Bangalore, Jabalpur, Jorhat, Jodhpur, Shimla and Ranchi and the Centres are at Allahabad, Chhindwara, Hyderabad and Aizawl.

Research Institutes under the Council are:

- Forest Research Institute (FRI), Dehradun
- Institute of Forest Genetics and Tree Breeding (IFGTB), Coimbatore
- Institute of Wood Science and Technology (IWST), Bangalore
- Tropical Forest Research Institute (TFRI), Jabalpur
- Rain Forest Research Institute (RFRI), Jorhat

- Arid Forest Research Institute (AFRI), Jodhpur
- Himalayan Forest Research Institute (HFRI), Shimla
- Institute of Forest Productivity (IFP), Ranchi

Advanced Research Centres under the Council are:

- Centre for Social Forestry and Eco-Rehabilitation (CSFER), Allahabad
- Centre for Forestry Research and Human Resource Development (CFRHRD), Chhindwara
- Forest Research Centre (FRC), Hyderabad
- Advanced Research Centre for Bamboo and Rattans (ARCBR), Aizawl

Salient Achievements/Highlights of Research by ICFRE and its Institutes

ICFRE

- Participation by Director General, ICFRE and Head, Biodiversity and Climate Change Division, ICFRE in 26th SBSTA / SBI meetings of the UNFCCC from 7th to 18th May 2007 at Bonn, Germany.
- Participation by Director General, ICFRE in High Level Meeting on Forests and Climate organized under the 'Global Initiative on Forests and Climate' of the Department of Foreign Affairs and Trade, AusAID and Department of the Environment and Water Resources, Government of Australia from 23rd to 25th May 2007 at Sydney, Australia.
- Participation by Director General, ICFRE in the Expert International Workshop on 'Global Carbon Monitoring System, Forest Biodiversity Measurement and Assessment Methodology' in Tuczno (Poland) on 18th and 19th October 2007.
- Participation of ICFRE delegation in the United Nations Climate Change Conference (COP/MOP) at Bali, Indonesia from 3rd to 14th December 2007.
- Organised a national workshop on "Forestry Projects for Climate Change Mitigation in India: Stakeholders Dialogue and Capacity Building" at New Delhi on 21st and 22nd February 2008.
- Organised an international workshop on "Developing Methodology for Assessment of Enhancement of Forest Carbon Stocks due to Conservation, Sustainable Management of Forests and increase in Forest Cover" at New Delhi on 7th and 8th March 2008.
- Initiated activities pertaining to "Assessment of soil carbon stocks and dynamics in forest soil of India for the period 1995-2007" under national project on "Second National Communication to United Nations Framework convention on Climate Change".
- ICFRE has been awarded ISO 9001:2000 Quality Management System Certification.

INSTITUTES

FRI, Dehradun

- Patents obtained on Black hair dye composition and a process for preparation thereof.
- Patent for a "New eco-friendly economical and non-hazardous wood preservative ZiBOC - comparable to CCA" was applied in December 2007.
- Patent for a "New efficacious eco-friendly wood preservative lignin copper complex A and B" Patent applied PAT/4.19.14/03046/2003.
- The ENVIS Centre on Forest published Annotated Bibliography on Participatory Forest Management and two special issues of ENVIS Forestry Bulletin on Forest Genetics and Tree Improvement and Medicinal Plants.
- Tissue culture technology was developed for the protocol development of four *Eucalyptus* hybrids FRI-6, FRI-10, FRI-13 and FRI-15.
- Mass scale multiplication protocol for two others *Eucalyptus* hybrids FRI-5 and FRI-14 were also developed successfully.
- A modified solar kiln has been installed. Its work efficiency is encouraging and the cost of the new kiln is about 25-30% less than the prevalent model, design is simpler so that specialist carpenter is not required and the modified kiln is equally efficient in seasoning of wood.
- A tentative schedule to dry *Populus deltoides* to less than 15% MC levels from 90% MC levels in two steps of vacuum level-temperature combinations has been developed.

IFGTB, Coimbatore

- More than 140 species of plants including 10 RET species have been collected from various parts of southern India and introduced in Botanical garden and maintained.
- A total of 687 plant species belonging to 493 genera and 127 families have been identified from the 1128 sacred groves in 91 villages of the district Alappuzha are the only remnants of natural forests once present.
- Suitable seed handling techniques for four important NTFP species namely, *Calophyllum inophyllum, Decalepis hamiltonii, Garcinia gummigutta* and *Sapindus emarginatus* were standardized.
- Developed *in vitro* axillary bud proliferation protocol for the multiplication of mature plants of *Bambusa nutans* and *Dendrocalamus giganteus*.

IWST, Bangalore

- An instrument for rapid estimation of stiffness of wood in standing trees and logs was designed and fabricated.

- A robust method for determination of dynamic MoE, shear modulus and Poisson's coefficient of discontinuous fibre filled thermoplastic composites was developed.
- A technology package for manufacturing of bamboo fibre filled polypropylene composites was developed.
- A simple laboratory method has been developed to determine quantity of jigat in adulterated samples by UV-spectroscopic method. The developed method will help to meet the needs of end users / stakeholders.
- A simple method using UV-spectroscopy has been developed for estimation of sandalwood oil in adulterated mixture. The developed method will help to meet the needs of end users / stakeholders.
- The annual loss of revenue caused by insect borers in bamboo depots was estimated to be around 25 %, the main borer on commercial bamboo being *Dinoderus minutus.*
- Three hundred species of xylophagous insects were recorded from fallen logs at Nagarhole national park.
- Twenty species of fungi and 42 species of mycophagous insects were recorded from fungi inhabiting fallen logs.
- A Microsporidian pathogen is isolated from the teak defoliator, *Hyblaea puera* for the first time.
- Protocols have been developed for micro-propagaiton of *Bambusa pallida* and *Bambusa nutans* using nodal shoot segments of mature clumps.
- Micro-propagated plants of five species of bamboos were found to perform better in terms of growth as compared to seed and macro-propagated plants.

TFRI, Jabalpur

- Supplementing egg parasitoid, *Trichogramma raoi* in teak seed orchards @1.20 lakh/ha proved effective to minimize the intensity of pest attack and loss in annual growth as compared to non-supplemented sites.
- Compendium on Achanakmar – Amarkantak Biosphere Reserve prepared and submitted to Ministry of Environment and Forests, Government of India.
- The new genera of fungi described as *Acrodictiella* and *Kamalomyces* are new to science.
- Four strains of *Ganoderma lucidum* were screened for enzyme production and found as best source of glucanase enzyme, which has medicinal value.
- Six isolates of *Pseudomonas solanacerum* and *Xanthomonas* sp. were identified as potentially dangerous pathogen from the FDCM teak nursery of MP and MS.
- Cultivation techniques of *Rauvolfia serpentina*, *Andrographis paniculata*, *Gymnema sylvestre* and *Tinospora cordifolia* were standardized.

- Non-destrcutive harvesting practices of *Terminalia arjuna*, *R. serpentina*, *A. paniculata*, *G. sylvestre* and *T. cordifolia* were developed.
- Developed tissue culture protocol of *Bambusa nutans* and *Bambusa tulda.*
- Genetic diversity analysis of trees and populations of Indian teak using ISSR and AFLP molecular markers.

RFRI, Jorhat

- Establishment of Van Vigyan Kendra in six north-eastern states.
- Establishment of model village at Koliapani, Jorhat.
- Laid out demonstration and extension trial of *Acacia mangium* at Koliapani model village.
- Established seedling seed orchard of *Aquilaria malaccensis*.

AFRI, Jodhpur

- Developed site index equation for *Tecomella undulata* plantations in Indira Gandhi Nahar Pariyojna (IGNP) area of Rajasthan.
- Raised performance trial from 23 elite accessions, native trials from 160 accessions and spacing and pollarding trials of *Jatropha curcas.*
- SE Maturation percentage was significantly improved.
- Severe infestation of a semilooper, *Achaea janata* (noctuidae) has been noticed on all mehndi (*Lawsonia inermis*) growing areas at Sojat road (Pali).
- The pathogens, *Rhizoctonia bataticola,* causing charcoal root rot and *Rhizoctonia solani* were isolated and identified from Guggal collected from Basan Nursery, Gandhinagar.
- The root infection was recorded 54% while, AM spores were found 210 /100 gms of soil in mehndi.

HFRI, Shimla

- Entomo-pathogen, which resulted in large scale mortality of larval and pupal population in field as well as in laboratory conditions, was identified as *Bacillus cereus* var. Mycoides (Flugge) Smith, Gorden and Clark. The study indicated that this biological control agent can play an important role in eco-friendly management of this pest.
- *Polygrapzhus longifolia* Stebbing was identified as one of the most destructive pest of Chir Pine trees as this beetle bore directly into the bark for oviposition and made the tree vulnerable for the attack of other insect borers like *Cryptorhynchus rufescens* Roelfs and *Sphaenoptera aterrima* Kerremens subsequently.
- *Plusia orichalcea* Fab. (Lepidoptera: Noctuide) had been graded as the most serious defoliator of *Saussurea costus* (Falc) Lisch, *Picrorhiza kurrooa* Royle ex Benth., *Arctium lappa* Linn, *Heracleum candicans* Wall.ex DC., *Angelica glauca* Edgew., and *Valeriana jatamansi* Jones. This is the first report of the insects on these plants.

- *Rheum moorcroftianum* Royle belonging to the family Polygonaceae, is a robust perennial herb with large basal leaves and have 1-3 erect cylindrical hairy spikes of greenish flowers turning to reddish as the fruit matures. The flowering and fruiting occurs during the month of June and July. It is distributed from Himachal Pradesh to Nepal between 3600-4700 m above msl. During floristic survey in the state of Himachal Pradesh, the plant has been found in open slopes between 3700-4200 m above msl in drier areas of Giavung Valley in cold deserts of district Kinnaur (Himachal Pradesh).

IFP, Ranchi

- Germplasm bank of selected oil yielding trees was established under the project funded by NABARD. Propagation methods for clonal multiplication were standardized and sufficient numbers of clonal ramates of selected oil yielding trees (*Derris indica* and *Madhuca latifolia*) were raised for further field evaluation.
- A MoU was signed between the IFP and the Damodar Valley Corporation Limited for providing consultancy and services for "Planting and Green Belt Development around Chandrapura Thermal Power Station, DVC".