

# Annual Report

## 2009-2010



**Indian Council of Forestry Research and Education**  
**P.O. New Forest, Dehradun**  
**Uttarakhand, India**

# ANNUAL REPORT

2009-2010



**INDIAN COUNCIL OF FORESTRY RESEARCH AND EDUCATION**  
(An Autonomous Council of Ministry of Environment and Forests, Government of India)  
**DEHRADUN (UTTARAKHAND)**

**Patron :**

Dr. G.S. Rawat, IFS  
Director General,  
Indian Council of Forestry Research and Education,  
Dehradun

**Published by :**

Media and Publication Division,  
Directorate of Extension,  
Indian Council of Forestry Research and Education,  
P.O. New Forest, Dehradun-248 006 (Uttarakhand), India

**Compiled and Edited by :**

Dr. Rabindra Kumar, DDG (Extension), ICFRE  
R.P. Singh, ADG (M&P), ICFRE  
Ramakant Mishra, RO (M&P), ICFRE

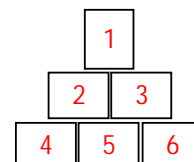
**Processed by :**

D.S. Rauthan, Foreman (Printing), (M&P), ICFRE

*Printed at : New Art Press, Dehradun*

**Front cover :**

1. *Bambusa vulgaris* in North Eastern region
2. *Garcinia indica* fruits
3. Full grown larva of *Achaea janata* on Mehndi plant
4. *Capparis decidua* in desert dune scrub in Jalore
5. Germination in nursery in *Buchnanian lanzan*
6. *Argyreia nervosa* – leaves used for boils and blisters by Vizianagaram tribals



**Back Cover :** Agroforestry (Poplar- Sugarcane) model- FRI, Dehradun



**डा० गोविन्द सिंह रावत**

महानिदेशक, भा.वा.अ.शि.प.

एवं कुलाधिपति व.अ.स. विश्वविद्यालय

**Dr. GOVIND SINGH RAWAT**

Director General, ICFRE

and Chancellor, FRI University



भारतीय वन अनुसंधान और शिक्षा परिषद

ISO 9001:2000 प्रमाणित संगठन

(पर्यावरण एवं वन मंत्रालय, भारत सरकार की एक स्वायत्त संस्था)

पो.ऑ. न्यू फॉरेस्ट, देहरादून - 248 006

Indian Council of Forestry Research and Education

(An ISO 9001:2000 Certified Organisation)

(An autonomous body of Ministry of Environment and Forests,  
Government of India)

P.O. New Forest, Dehra Dun - 248 006

## **FOREWORD**

Indian Council of Forestry Research and Education (ICFRE), an autonomous apex body of Ministry of Environment and Forests, is engaged in taking up research projects for development of a number of technologies for sustainable management of forestry resources of the country. The Council is also engaged in the task of dissemination of related knowledge and information to different stakeholders, viz., state forest departments, industries, farmers and people at large. With a view to sharing information on its activities that helps in improving its delivery, the Council publishes the Annual Report every year.

Keeping in view the desire expressed by the Board of Governors from this year the Annual Report of the Council has been prepared according to the thematic research areas of the Council. There are 7 thrust areas which have been sub divided into 32 themes. ICFRE research projects have been categorized into these thematic areas. Further, important research projects having national level implication have been formulated as All India Coordinated Projects for funding support from the Government of India.

The year 2010 is being celebrated as International Year of Biodiversity. Accordingly, ICFRE has placed high priority on biodiversity conservation and management in its research themes and thrust areas.

In view of the special efforts made by the Council in the field of climate change, it has been granted observer status by UNCCD besides its observer status earlier granted by UNFCCC. ICFRE is continuously participating in various meetings of UNFCCC, and providing valuable inputs in forestry sector related policy negotiations especially in the field of REDD plus. The Council is also making its presence felt at various international fora in the field of forestry and allied disciplines.

The Council has also undertaken the work of technical facilitation organization under Sustainable Land use and Eco systems Management- Country Partnership Programme (SLEM- CPP). In the field of environment management the Council has carried out several environment related studies in India and Bhutan in various sectors like hydro power, mining and infrastructure development.

The Council has provided Grant-in- aid to 15 State Agricultural/Deemed/Central universities to promote forestry education at Undergraduate and Post-graduate levels to the tune of ` 450 lakh in the year 2009-2010. The Council has accredited forestry curriculum of 9 universities so far on the basis of guidelines issued earlier on the subject.

I take great pleasure in presenting ICFRE Annual Report 2009-2010 which provides insights into research, education and extension activities of the Council.

14<sup>th</sup> October 2010

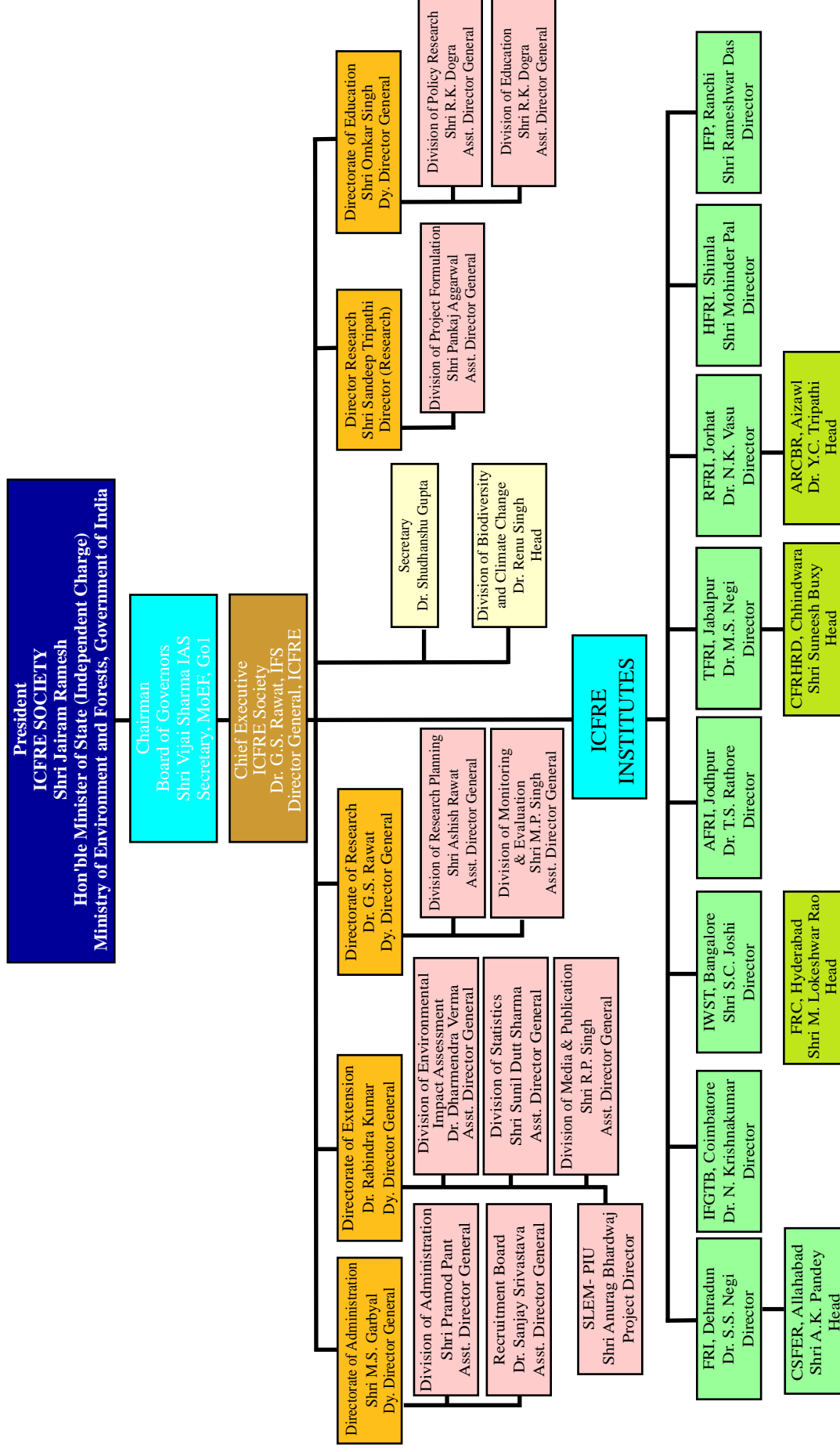
**(Dr. G.S. Rawat)**

निर्देशांक@Phones : 0135-2759382(O), 2761980(R)  
PABX : 0135-2224855(O),  
: 0135-2224333(FRI)

ईमेल@E-Mail : rawatgs@icfre.org  
फैक्स@Fax : 0135-2755353



# ORGANIZATIONAL STRUCTURE OF ICFRE



## Executive Summary

India, with a geographical area of 3287263 km<sup>2</sup>, consists of 769512 km<sup>2</sup> of recorded forest area of which, reserved forests constitute 430582 km<sup>2</sup>, protected forests constitute 206219 km<sup>2</sup> and the rest is unclassed. The country has a diverse stratification of area with identified fourteen physiographic zones. According to the State of Forest Report 2009 of the Forest Survey of India, recorded forests constitute 23.41 per cent of India's total geographical area. The total growing stock of forests is as high as 6098.23 million m<sup>3</sup> including trees outside forests.

The problems of such a complex and diverse forest system are also complex and require innovative scientific acumen to confront and solve them. Forest productivity assumes importance as the forests are to be conserved along with their role to alleviate poverty and provide sustenance to dwellers of almost 173000 forest villages in the country. Plantation Forestry coming up as an alternative source of forest products is likely to meet the requirement of almost 3000 wood based factories with a total output of more than ` 4000 crore.

The estimated share of the forestry sector to the Gross Domestic Product of our country is 1.7% against the previous figure of below 1%. The rise in share is mainly attributed to the trees outside forests, fodder provided by the forests and income generated through non-wood forest products, which provided subsistence to the forest dwellers and other forest based communities. About 3.4% of the geographical area of India is under grazing and pasture lands, catering to an estimated 500,000 population of livestock.

Through Joint Forest Management (JFM) involving people in management of forests has brought about radical change in forest management. Presently, there are about 60000 Joint Forest Management Committees in the country with 4770 JFM projects. The estimated area regenerated under JFM is of the order of 80,00,000 ha. Afforestation and JFM

programmes require quality planting stock of high productivity and ICFRE has worked on various species with focus on increasing productivity of forests. With 4000 ha of Seed Production Areas (SPA) and 114 ha of Vegetative Multiplication Gardens (VMG) of important species like teak, eucalyptus, casuarinas, developed in the past under various research projects and fresh research on other new and lesser known tree species, release of new clones, Indian Council of Forestry Research and Education (ICFRE) has contributed immensely towards providing quality planting stock for various afforestation programmes.

**Ecosystem Conservation and Management** forms an important area of research programmes of ICFRE. The first forest meteorological observatory approved by IMD was established at Forest Research Institute (FRI), Dehradun to record climatic parameters of FRI Campus. Automatic Weather Station and Agrometeorological station have been installed at Kanha National Park, Bandhavgarh National Park and Madhav National Park by Tropical Forest Research Institute (TFRI), Jabalpur to study grass biomass and soil moisture profile. A Geographical Information System (GIS) Laboratory was established at Rain Forest Research Institute (RFRI), Jorhat for systematic creation, management and upgradation of GIS based forest database of North-East India. Spatial information and attributes pertaining to vegetation, soil, topography of North-East India were integrated in a common GIS platform.

In the field of climate change, new initiatives have been undertaken at ICFRE headquarters and its institutes. The ICFRE has been actively involved in various international negotiations on Climate Change. ICFRE has also been awarded the status of 'Observer' by UNFCCC and UNCCD. It is beyond doubt that



over 70% of India's population lives in villages and agriculture remains their mainstay but there is a general feeling that the hilly areas are more suited for forestry and horticultural activities than for agriculture. The growing farming activities in hills are playing havoc with its ecology. Therefore, there is an urgent need to concentrate on eco-regions as the unit of research, analysis and management.

The ever growing economy and the vision 2020 of India will directly harp upon the natural resources, particularly the forest ecosystems and is certainly a matter of grave concern. Being a mega biodiversity country, forests in India play the critical role in providing several ecosystem services, most of which go unaccounted in the economic terms.

TFRI, Jabalpur is working on climate change, biodiversity and its conservation, tribals and their traditional knowledge system in Central India.

In cold desert regions, continuous removal of plant species for various uses and overgrazing by migratory livestock have resulted in desertification and loss of biodiversity. This genetic erosion coupled with soil erosion may retard prospects of future economic development and welfare of the people, besides posing problems for the fragile ecosystem. Keeping these facts in view, attempts are being made by the Himalayan Forest Research Institute (HFRI) to conserve particular ecosystem at all levels so as to have a detailed knowledge of the biodiversity of the Himalayas which will help in managing the resources strategically.

**Institute of Forest Productivity (IFP), Ranchi** is implementing projects pertaining to Ecological Dynamics of vegetation structure and assessment of morphological adaptive variation to create baseline data for selected species in Dalma Wildlife Sanctuary. Also the institute is working on creation of Seed Database of economically important forestry species of Jharkhand with an

aim to function as Forestry Seed Certification Agency.

With a view to produce Quality Planting Material (QPM) for conservation, production and promotion of *ex-situ* cultivation, IFP, Ranchi is also working on establishment of Medicinal Plants Garden and Propagation Centre in Chhotanagpur plateau. Besides, it has also undertaken the work of documentation and inventorization of indigenous medicinal knowledge of Jharkhand.

**Institute of Wood Science and Technology (IWST), Bangalore** has developed a web based Indian Wood Insects Database (IWID), covering about 1000 timber species and 2500 wood inhabiting insects.

In the field of **Forest Productivity**, studies were conducted on the seed storage of *Diploknema butyracea* (cheura) in order to assess the longevity, viability and vigour of seeds and to enhance the seed longevity through conventional storage methods. Seedling Vigour Index (SVI), Seedling Quality Index (SQI) and Leaf Area Index (LAI) were taken as indicators. A survey was conducted in Doon valley, Tons valley, Uttarkashi district and Nainital and Pithoragarh forest divisions to locate the populations of three species of *Bauhinia*. Population surveys were conducted for *Buxus wallichiana*, an important species for wood carving. The nurseries of important forestry species, prioritized by State Forest Department were raised. The optimum age of the seedlings of fast growing and slow growing species was assessed for transplanting in the field. The effect of different chemical and bio-treatments on the seed germination of selected *Ficus* spp. were compared.

It was found that during germination of rattan seeds, the pricking method produced more germination instead of normal seed sowing in nursery beds. Deodar and Ban Oak nurseries maintained by the Himachal Pradesh forest department were surveyed to obtain information



pertaining to establishment of nurseries. The nursery and field trials were laid and maintained for standardization of tall-planting techniques in deodar. The potential seed sources and clones of selected species of Jharkhand and adjoining states were evaluated in nurseries. Precision silviculture practices for *Casuarina junghuniana* have been developed for both nursery and plantation management.

Research was undertaken on allelopathic influence of litter, humus and foliage of trees and under-storey plants on seed germination of select conifers in laboratory. It was found that leachates of humus reduced and deteriorated radicle growth completely but enhanced germination at higher concentrations, thus, concluding that humus and foliage of specific plants are responsible for regeneration failure in these conifers and not litter as was believed till date.

For adoption of the species under farm land cultivation, multi location trials on micro and macro propagated bamboos, their nutrient management, organic and inorganic farming methods and water management were carried out to develop a species specific package of practices. Model plantations of bamboo were established in different locations covering six agro-climatic zones of Tamil Nadu. On-farm innovation in macro proliferation technique for edible bamboo species and promotion of their commercial plantation through capacity building of the Self Help Group members was conducted by imparting training and demonstration on nursery practices. Sustainable development of quality bamboo resources for employment generation and socio-economic development in north-eastern India was also studied.

Agroforestry demonstration plots were established in five agro-climatic zones along with the annual crops to enhance the livelihood opportunities for farmers. In an agroforestry model at a farmer's field at village Harsh, Tahsil Bilara, District Jodhpur of Rajasthan, wheat crop production was recorded as high as 13.67 quintal/ha during the year.

A library of soil samples of North-East India is being set up at Rain Forest Research Institute, Jorhat. Soil samples from seven north-eastern states covering 29 forest sub-group types have been collected and analyzed. RFRI has assembled 119 elite clones of *Gmelina arborea* selected from various provenances of north-eastern states and West Bengal. Also, studies on restoration of jhum land were carried out.

Pursuing research in **Genetic Improvement**, four high yielding clones of *Eucalyptus* have been released for commercial cultivation through systematic selection and multilocation trials of more than hundred clones. Through hybridization programme,  $F_1$  hybrids of *E. pellita* x *E. urophylla* were produced. The seed orchards and vegetative multiplication gardens for production of improved seeds and vegetative material have also been established. Through systematic selection and multilocation testing, four high yielding clones of *Casuarina* have also been released for commercial cultivation. Intra and interspecific hybrids of *Casuarina* (*C. equisetifolia* X *C. junghuniana*) were produced. Work has been initiated on identification of biochemical marker for saline tolerance so that germplasm could be categorized for saline tolerance.

New sets of clones of *Dalbergia sissoo* have been developed to address the problem of poor stem form (crooked stem), forking, ramicorn branching and susceptibility to dieback. A field trial consisting of 49 clones has been established. A total of 230 Candidate Plus Trees (CPTs) of *Melia composita* were selected from different geographical regions and evaluation trials of 21 most suitable families were established. A progeny trial of *Melia azedarach* and *Melia dubia* (10 plus trees each) has been established at Forest Research Centre Campus, Hyderabad. Field trials of *Pongamia pinnata* have been taken up raised for testing stability, adaptability and growth performance.





Variation and inheritance of fruit and seed traits of Gujarat teak were studied for the first time and five good general combiners were identified. A comprehensive genetic improvement programme of *Acacia auriculiformis* and *A. mangium* has been initiated. Breeding population having wide genetic base has been established and considerable improvement in tree form has been observed through progeny trials. Tree improvement programme has been initiated in the indigenous species of *Ailanthus* for boosting the productivity, yield and development of clones/genotypes. Also, tree improvement programme was initiated in tamarind to select and conserve the rare phenotypic variants. The conservation of tamarind genetic resources was carried out by establishing germplasm banks of red and sweet tamarinds.

One hundred eighty eight rhizomes of 115 bamboo clones collected from selected superior mother clumps of target species have been conserved in the gene bank at RFRI, Jorhat. Field trials of tissue culture plants of *Bambusa bambos* and *Dendrocalamus strictus* were also established. Keeping in view the ecological significance and socio-economic relevance of *Arundinaria falcata* and *Thamnochloa spathiflora* (Hill Bamboos), a survey was conducted in Himachal Pradesh to identify their populations. A vegetative propagation centre has been established in College of Forestry, Ponnampet, Karnataka for propagation of *Dendrocalamus brandisii* and *Dendrocalamus asper* and to promote cultivation of these two species in Coorg District of Karnataka.

In molecular characterization for breeding programmes, Simple Sequence Repeat (SSR) markers were developed for *Eucalyptus tereticornis* to assess the genetic structure in association mapping population targeting adventitious rooting traits. To identify genetic determinants of salt stress tolerance in *Casuarina*, 82 *Casuarina equisetifolia* clones were screened for high salt tolerance and susceptible conditions. Further, 150 clones were profiled using RAPD markers. Besides, four SSR target primers were developed from ISSR PCR product of *Casuarina equisetifolia*.

In Gene isolation and functional analysis, six transcripts representing six classes of cellulose synthase were characterized from *Eucalyptus tereticornis*. For rapid functional analysis of genes involved in salt tolerance, parameters critical for development of *E. tereticornis* composite plants with transgenic hairy roots were identified. To reduce the destructive harvest of *Aegle marmelos*, cell culture protocol was developed for the species. Enhancement of rooting and planting stock production of selected high yielding *Eucalyptus* clones through micro and mini cutting technique was achieved. Basic protocols for *in-vitro* propagation of *Jatropha curcas* and *Commiphora wrightii* were also developed.

In the field of **Forest Management**, field surveys have been conducted to lay out sample plots of commercially important tree species in semi-arid region of Rajasthan. Demand- supply gap analysis of important tree species of Eastern U.P. has been conducted and the results of the study were communicated to the various stakeholders through extension material. Market price data of commercially important species of timber, fuel wood and bamboos were collected and brought out in the form of "Timber Bamboo Trade Bulletin".

Databases of gene sequences available in public domain can be accessed for applying bioinformatics for enhancing forest productivity. A lead in this direction is being taken by way of consolidating, categorising and classifying wood forming genes in *Eucalyptus*. Database on Red sanders (*Pterocarpus santalinus*) has been developed, while databases on deodar (*Cedrus deodara*), kail (*Pinus wallichiana*) and commercial timber information system are in progress. Work is going on for developing a computerised database for forest pathology herbarium, dynamic database for forestry discussion forum, web portal for forestry research extension and GIS/RS based information system on lac production. Besides



this, information technology services were strengthened and maintained at all Institutes along with development of Indian Forestry Research Information System (IFRIS). ICFRE website is being regularly updated.

The major areas of research in **Wood Products** were evaluation of wood properties and uses of lesser known tree species in order to find the value addition of the timber. Testing facilities for evaluating the performance/ suitability of musical instruments made out of plantation timbers were developed. Studies were carried out on tree-ring analysis of teak from Karnataka and Maharashtra which is an innovative research work which showed good potential to know drought years, flood years, insect attack, fire scars and adaptation of species with changes in climate. Non destructive testing like ultrasonic and FTNIR spectroscopy techniques that are undertaken may prove to be a potential tool for estimating quality of timber in short duration in comparison to the traditional test procedures. The method of laboratory testing for the assessment of the durability of timbers against powder post beetles was standardized. Twenty different imported timber species are being evaluated for their durability against fungi and termites. Eight species of plantation timber were evaluated for their durability against decay fungi and termites. Different treatment regimes were developed for the treatment of difficult-to-treat species to give appropriate retention of preservatives. A two- step temperature vacuum schedule for drying of poplar and a three- step temperature vacuum schedule for teak has been evolved at FRI, Dehradun resulting in saving of energy and cost as compared to previous methods. A conveyor belt microwave dryer system fabricated and installed at IWST Bangalore, was standardized. Different types of joints with round wood were fabricated and tested for mechanical strength. Pole skeleton system comprising of column supports, beam/purlin/ rafter and roof truss was designed. Drawing and construction of

architectural model of house, using round timber was done. Roof trusses of Timber Engineering Museum at FRI, Dehradun were repaired, painted and re-erected.

**Non-Wood Forest Products (NWFPs)** constitute a very important component of trade in forest products. Researches on medicinal plants focusing on survey, development of organic cultivation technology, its post harvest processing including development of value addition processes, bioactivity evaluation, sustainable management and resource development through forest enrichment with natural species have been undertaken by various institutes of ICFRE. Research studies focusing on chemical profiling of wild edibles and other useful NWFPs have been undertaken. Researches have also been undertaken on tree borne oil seeds including chemical analysis of fatty oils. National Multiplication trials of different provenances and clones of *Jatropha curcas* in various states have been undertaken. Chemical analysis of various NTFPs have been undertaken to develop processes for their commercial utilization. Planting materials of various NTFP species including medicinal plants have been raised and supplied to farmers encouraging their cultivation.

In the field of **Forest Protection**, database was developed in MS-ACCESS for computerization of National Forest Insect Collection. One new genus and 13 new species of encyrtids were described as new to science. Relative resistance in selected clones of *Casuarina equisetifolia* against the bark feeding borer, *Indarbela quadrinotata* was identified through analysis of biochemical and physical nature of the clones. Apart from this, 19 fouling and 11 wood boring species were found to be new introductions to Visakhapatnam port and of these, the annelid *Hydroides operculatus* (Treadwell) and the mollusc *Siphonaria* cf. *kurracheenensis* Reeve were recorded for the first time in India. A wood boring gastropod, *Thais blanfordi* (Melvill) was recorded for the first time from the



fouling assemblages along the east coast. *Metarhizium* based mycoinsecticide product named **PESTSTAT** both in powder and liquid forms has been developed and is ready for release and application in the field.

While studying diseases, pathogens and beneficial microbes resistant and susceptible clones of *Dalbergia sissoo* have been identified against *Fusarium solani* causing vascular wilt. Two species of *Ganoderma*, *G. resinaceum* and *G. weberianum*, have been separated from the collection. The latter is a new record for India. Fifty one ITS sequences have been submitted to GenBank, (National Centre for Biotechnology Information), USA and have been released at NCBI web site. Volatile effect of citronella oil, garlic oil, lemongrass oil and ajwain oil to inhibit growth and germination of spoilage fungi in stored medicinal plant produce was successfully established. Diagnostic kit was developed after standardizing protocols for DNA extraction of *Cylindrocladium quinqueseptatum* from soil, diseased plant parts and post-inoculation pre-symptomatic *Eucalyptus* plant samples infected with leaf, twig and seedling blight which will be helpful in identification of the pathogen and for disease forecasting.

Genes of different isolates of fungus *Cordyceps sinensis* of Himalayan meadows were amplified, sequenced and submitted to NCBI and accession numbers were allotted. Wilt disease caused by *Fusarium oxysporum* in nurseries of *Buchnanian lanzan* was controlled. Four genera and seven species of wood-decaying fungi have been recorded for the first time on sal and bijasal stored wood. Five Arbuscular Mycorrhizal Fungal genera and 11 species of *Glomus* have been recorded in mehndi and ashwagandha in Rajasthan. In mehndi, *G. fasciculatum* was found to be the best in improving plant growth and vigour as compared to other treatments, whereas, in case of ashwagandha, indigenous mixed inoculums with dominance of *G. aggregatum* was found to be the best for all growth parameters.

On the front of **Biodiversity and Climate Change**, ICFRE has been ushering in the field with a stronghold on the subject. During the last year an International workshop on "National Forest Inventory: The Experiences of Non-Annex I Countries" was organized by the Indian Council of Forestry Research and Education (ICFRE), Coalition for Rainforest Nations (CfRN) and Food and Agriculture Organization (FAO), United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing countries (UN-REDD) Programme (27<sup>th</sup> to 29<sup>th</sup> April 2009). A delegation of ICFRE participated in the 13<sup>th</sup> session of the SBSTA and SBI, sixth session of AWG-LCA, and eighth session of AWG-KP at Bonn, Germany. It also participated at "Barcelona Climate Change Talks" (2<sup>nd</sup> to 6<sup>th</sup> November 2009). ICFRE has also been awarded the "Observer Status" by the United Nations Convention to Combat Desertification (UNCCD). ICFRE participated in 15<sup>th</sup> Conference of the Parties to the UNFCCC / 5<sup>th</sup> meeting of the Parties to the Kyoto Protocol at Copenhagen, Denmark (7<sup>th</sup> to 18<sup>th</sup> December 2009). The Biodiversity and Climate Change Division at ICFRE, Dehradun looking after this aspect organized a five days training course for scientists and officers on "Carbon Sequestration" at ICFRE, Dehradun (5<sup>th</sup> to 9<sup>th</sup> October 2009). Also ICFRE is vigorously pursuing to achieve the status of Designated Operational Entity (DOE) of the UNFCCC in the area of Afforestation/Reforestation CDM projects.

In the field of **Forest Statistics**, the Council has initiated a National Oilseeds and Vegetable Oil Development (NOVOD) Board sponsored project "Development of a Database on Tree Borne oilseeds in India" in August 2009. An ITTO sponsored project "Establishment of a network to facilitate collection, processing and dissemination of statistics pertaining to tropical timber and other forestry parameters in India"





was also completed during the year. Two issues of the biennial **Forestry Statistics India**, i.e. 2005 and 2007 and two issues of **Timber/Bamboo Trade Bulletin**, a quarterly (Issue no. 58, March 2009) and a half yearly (Issue no. 59, June 2009) were published. The Council is providing Joint Forest Sector Questionnaires to MoEF and International Tropical Timber Organization (ITTO) and is also catering to furnish statistical requirements to end users on demand, like Central Statistical Organization, Ministry of Environment & Forests and other stakeholders.

The Council is undertaking EIA Studies of developmental projects in the field of **Environmental Impact Assessment**. It has completed four projects during last year worth ₹ 239.13 lakh in the areas of hydropower, mining and other development sectors. The Council was also awarded six new consultancies worth ₹ 244.02 lakh during the period.

ICFRE has been awarded a project "Policy and Institutional Reform for Mainstreaming and Up-Scaling of Sustainable Land and Ecosystem Management in India" under **Sustainable Land and Ecosystem Management - Country Partnership Programme (SLEM- CPP)**, a joint initiative of MoEF, GoI and Global Environment Facility (GEF). The programme consists of seven projects with the assistance from UNDP, FAO and the World Bank being implemented in ten states in the country. The Technical Facilitation Organisation (TFO) for these projects is housed in the Council.

A poplar based agroforestry project "**Samudai Adharit Samanavit Van Prabhandhan Evam Van Sanrakshan Yojana**" popularly called Bihar project has been implemented by ICFRE in Vaishali district of Bihar. About 59 lakh plants of different species (including 47 lakh plants of poplar) were distributed free of cost to about 61000 farmers of 1396 villages of Vaishali district of Bihar.

Detailed Project Reports (DPRs) of Seventeen (17) All India Coordinated Projects (AICPs) submitted by ICFRE institutes with an estimated budget of ₹ 115.62 crore for a period of 3 to 5 years addressing a number of identified species viz. Jatropha, Poplar, Casuarina, Shisham, Bamboo, Sal etc. and various emerging forestry issues viz Biological control of *Eucalyptus* gall wasp, Genetic improvement and Tree improvement strategies, Fuel wood utilization etc. were finalized, compiled and submitted to the Ministry of Environment & Forests for arranging funds through Planning Commission.

The Council is providing Grant-in-aid to the Universities for promoting Forestry Education in the Country. Towards this end, ICFRE released Grant-in-aid to the tune of ₹ 450 lakh to 15 Universities in the financial year 2009-10.

The project of Mid Career Training of IFS by Ministry of Environment & Forests has been finalized after a competitive process, wherein ICFRE has been awarded training for Phase-III (officers 6 to 9 years of service). The total cost of the project is ₹ 5.89 crore, for a period of three years. The project has been started w.e.f. 14<sup>th</sup> December 2009. The first training course for IFS officers of 2001-2002 batch was held from 14<sup>th</sup> December 2009 to 20<sup>th</sup> March 2010. In all 59 participants from all over the country participated. The programme was inaugurated at IIM Ahmedabad on 14<sup>th</sup> December 2009 by Dr. P.J. Dilip Kumar, IFS, D.G. (Forests) and SS, Govt. of India. As part of the programme participants were taken to US (Colorado State University) & Sweden (Swedish University of Agriculture Sciences) in batches of 30 each. The programme being first of its kind can be termed as pioneering effort in the capacity building of IFS officers jointly by a number of organizations like ICFRE, WII, FSI, IIMA and the foreign partners.





### Summary of Projects\*

The position of research projects at the end of 2009-10 is as below:

Project	Completed Projects	Ongoing Projects	New Projects Initiated During the Year
Plan	76	158	71
Externally Aided	46	78	21
<b>Total</b>	<b>122</b>	<b>236</b>	<b>92</b>

\* Data provided under various themes in similar tables may vary from this tally due to the multidisciplinary nature of the projects.

## CONTENTS

<i>Chapter</i>	<i>Page No.</i>
<b>1. Introduction</b>	<b>1-3</b>
<b>2. Research Highlights</b>	<b>5-119</b>
2.1 Ecosystem Conservation and Management	11-31
2.2 Forest Productivity	32-59
2.3 Genetic Improvement	60-81
2.4 Forest Management	82-83
2.5 Wood Products	84-89
2.6 Non Wood and Forest Products	90-97
2.7 Forest Protection	98-119
<b>3. Education Vistas</b>	<b>121-140</b>
<b>4. Extension Panorama</b>	<b>141-170</b>
<b>5. Administration and Information Technology</b>	<b>171-178</b>
<b>6. Audited Annual Accounts</b>	<b>179-202</b>
<b>Annexures</b>	<b>203-212</b>
1. RTI	203-205
2. Email and Postal addresses	206-208
3. List of Abbreviations	209-212