

## CHAPTER VII

### **HIMALAYAN FOREST RESEARCH INSTITUTE SHIMLA**

Himalayan Forest Research Institute, Shimla addresses specific forestry research problems of western Himalayan states of Himachal Pradesh and Jammu & Kashmir. Major fields of research at this institute include regeneration of temperate forests, eco-restoration of cold deserts and rehabilitation of degraded areas, integrated pest management and development and popularization of agro-forestry along with productivity enhancement through planting stock improvement. The Institute earlier known as Conifer Research Centre came into being during May 1977, primarily to investigate the cause of failure of natural regeneration of spruce and silver fir species, the most common conifer species of western Himalayas. With the reorganization of forestry research and education in India and formation of Indian Council of Forestry Research and Education (ICFRE), the Conifers Research Centre has been re-designated as Himalayan Forest Research Institute.

### **PROJECTS COMPLETED DURING THE YEAR 2001-2002**

**Project 1 : Cold desert afforestation and pasture establishment [HFRI-001/03 (EBC-01)/WB/1995].**

**Sub-Project [i] : Select suitable species for planting including trees, shrubs & grasses and to develop effective establishment techniques [HFRI-001-A/03 (EBC-01)/WB/1995]. For technical report contact, Principal Investigator-Dr. K.S. Kapoor**

**Findings:** A total of 640 plant species belonging to 92 families have been collected from the cold desert areas. Three hundred forty five species have been identified as unique species. Twenty seven species of medicinal importance, have been declared as red listed medicinal plants. Five dominant



Important indigenous shrub species for eco-restoration in Cold Desert Areas

indigenous shrub species viz. *Capparis spinosa*; *Ribes* spp.; *Caragana* spp.; *Colutea* spp. and *Crataegus* spp. besides *Rosa webbiana* were short listed for afforestation and eco-restoration in cold desert areas.

Ecological survey of various sites supporting stands of *Juniperus macropoda* in Himachal Pradesh was completed.

***Quercus ilex*** : Studies on *Quercus ilex* were taken up to standardize the nursery techniques.

***Hippophae rhamnoides*** : Nursery trials to assess the performance of seeds collected to work out the optimum time of seed sowing were laid out. Seeds of Tabo & Pin Valleys performed best from eight different sources/ provenances. Winter sowing proved to be the best.

**Sub-Project [ii] : Improve establishment techniques of clonal wood species.**

**Findings** : Eco-restoration activities to improve the environment was initiated at Tabo Research Station. Experiments were initiated at Tabo (Lahaul-Spiti) to standardize the size. Computation of recorded data has revealed that sets of local poplars of diameter class of 18 cm when planted in pits of the size 60 cm<sup>3</sup> give the best results. Nursery trials on assessing the performance of various provenances were laid out. Initial results revealed that Pinder provenance of *Populus ciliata* showed the best potential under nursery condition.

**Project 2 : Regeneration of coniferous and broadleaved forests [HFRI-002/04 (SFG-01)/WB/1995].** For technical report contact, Principal Investigator- Dr. K.S. Kapoor

**Sub-Project [i] : To examine the effect of introduction of *Populus ciliata* into degraded coniferous forests.**

**Findings** : Inter-planting of silver fir at Narkanda and both silver fir and spruce at Solang Nala was carried out during monsoons under *Populus ciliata*. Preliminary observations reveal that the shade does have some positive bearing on the growth and development of these ecologically important conifers.

**Sub-Project [ii] : Develop, improve propagation, nursery and planting techniques [HFRI-002-B/04(SFG-01)/WB/1995]** For technical report contact, Principal Investigator- Dr. Sandeep Sharma

**Findings:**

**Silver Fir** : Statistical analysis revealed that the seedlings size ranging from 15-20 cm showed the highest mortality percent in the field plantations. Thus for field trial, seedlings of silver fir below 20 cm height should not be encouraged.

**Spruce** : In case of spruce, the results have shown that the seedling below 25 cm height should not be encouraged for field planting.

It was observed that fir seedlings raised in light textured soil for carrying out under-cutting and wrenching trials performed poorly in the nursery. Results

of initial survival of root-trainer plants of fir and deodar after out-planting are quite encouraging. The experiments on homoplastic and hetroplastic grafting were taken up on chilgoza pine and four types of grafts were made with four different replications and treatments. The trial was maintained and the performance of grafts was recorded regularly. Performance of homoplastic and hetroplastic grafts initially was not encouraging, later on when grafting was repeated by using small signs, the success rate went up to 25%. The seed collected from Jungi area of District Kinnaur are recorded to be the best performers. Studies revealed that chemical scarification of the seeds of *Taxus baccata* and heating the seeds alternately at temperature of 5°C and 20°C for period varying from 15 weeks to 30 weeks is essentially required to break the seed dormancy and it was also observed that the seeds exhibit embryo dormancy only.

**Project 3 : Planting Stock Improvement Programme [HFRI-004/05(SFG-02)/WB/ 1995].** For technical report contact, Principal Investigator - Mr. R.R. Bhalaiik.

**Sub-Project [i] : Establishment of Seed Production Areas (SPAs) of chir-pine.**



Establishment of Seed Production Area of Chir Pine

**Findings :** Chir-pine stands in different zones in Himachal Pradesh were surveyed to make final selection for establishing SPAs over 50 hectares. Culling operations in DPF Kopra (H.P) over an area of 10.52 have been completed. Culling permission for 22 ha for Bairkot Forest (Suket Forest Division, Mandi) has been obtained and culling operations are in progress. In case of Dibkan DPF (18.44 ha), the area has been handed over to the Forest Corporation for culling. Carried out enumeration studies in Jammu & Kashmir. Enumeration of the stand both for retention and trees to be culled has been completed and marking list of the area handed over to the State Forest Department for establishing SPA of Chir-pine over an area of 15 ha. in the state. The SPAs are being maintained as per the prescriptions of the management plan.

**Sub-Project [ii] : Establishment of Seed Orchards. [HFRI-004-B/05(SFG-02)/WB/1995]**

**Findings :** Sites for raising CSO of Shisham identified and planting over an area of 8 ha. done at Gondpur (3 ha.), Bir Plasi (1.5 ha) in Himachal Pradesh and Laliyal (3.5 ha.) in Jammu & Kashmir and managed. Progenies of 33 Candidates Plus Trees (CPTs) have been used to establish 5 ha., SSO of Chir-pine at Shun of Kunihar Forest Division. Progenies of 25 plus trees of Shisham were established over an area of 7 ha at Kudh (2 ha.) and Bir Palasi (5 ha.) in Himachal Pradesh. Training imparted to the officers of SFP of Himachal Pradesh and Jammu Kashmir on the management aspects of CSO.

**Sub-Project [iii] : Establishment of Vegetative Multiplication Garden (VMGs) and Forest Model Nursery [HFRI-004-C/05(SFG-02)/WB/1995].**  
*For technical report contact, Principal Investigator - Dr. Sandeep Sharma.*



Vegetative Multiplication Garden of Shisham

**Findings :** Two ha. VMG of shisham established at Bir Plasi Forest of Nalagarh Forest Division, Himachal Pradesh. Arrangements for irrigation facilities at the site including installation of sprinkler system have been made. Successfully established and commissioned forest model nursery for research, training and demonstration purposes near HFRI-campus at Baragaon Shimla. The nursery is well equipped with modern facilities.

## **PROJECT CONTINUED DURING THE YEAR 2001-2002**

**Project 1 : Comparative studies on the ecology of degraded forest *viz-a-viz* relatively undisturbed forests in different eco-climatic zones along with autecological studies on selected promising species of the region [HFRI-010/01 (EBC-04)/PLAN/2000].** *Principal Investigator- Dr. R.K. Verma.*

**Status :** A degraded site was identified in the study area. Ecological survey was carried out. *Justicia simplex* and *Andropogon* spp. respectively were the dominant herbs under these two forests. The diversity index was recorded. The soil samples collected were analysed. Survey to assess the needs of the local people around the degraded areas was carried out and their requirement pertaining to

fuelwood, fodder, etc. assessed. Demonstration plantation for important species like, *Grewia optiva*, *Bauhinia variegata*, *Robinia pseudacacia*, *Acacia catechu*, *Laecaena leucocephala* were planted in blocks following suitable statistical designing. Initial growth data recordings made.

**Project 2 : Assessment of conservation status of hill bamboos (Nirgals), collection of germ-plasm from various eco-climatic zones and establishment of germ-plasm bank [HFRI-011/02(EBC-05)/PLAN/2000].**  
*Principal Investigator- Dr. K.S. Kapoor.*

**Status :** Survey of hill bamboos i.e. *Arundinaria falcata* in the lower elevations and *A. spethiflora*, a species of higher elevations was conducted in Shimla district of Himachal Pradesh. Ecological survey was conducted. Association of this hill bamboo with other flora was also documented. Village communities in some of the areas were also interviewed and their requirements towards preparation of bamboo product to meet their day-to-day needs pertaining to agriculture were also assessed.

**Project 3 : Studies on floristic composition and associated mycorrhizae of dominant species in Baspa Valley of District Kinnaur, Himachal Pradesh [HFRI-018/02(EBC-06)/PLAN/2000].** *Principal Investigator- Dr. K.S. Kapoor.*

**Status :** Periodic survey of the identified sites in the Baspa Valley was carried and recorded. The accession represented 220 genus, which further represented 85 angiosperm families. Rare collections of endangered species were also recorded. Soil samples have also been collected along with the collections of dominant and economically important species to study the mycorrhizal taxonomy.

**Project 4 : Standardization of nursery technology for mass propagation of selected medicinal plant species [HFRI-009/07(NWFP-01)/PLAN/2000].**  
*Principal Investigator - Mr. R.R. Bhalaiik.*



Nursery standardisation of *Vallarina jatamansi*

**Status :** Germplasm of 21 species of medicinal plants of temperate Himalayas have been collected and maintained in Brundhar nursery. Trials have been initiated for the improvement of agro-techniques of some economically important medicinal plant species.

**Project 5 : Standardization of methodology for collection of seed, its handling, storage, testing and certification of seeds of important tree species [HFRI-012/05 (SFG-04)/PLAN/2000].** *Principal Investigator - Sh. R. R. Bhalaik*

**Status :** Seeds of various cold desert species were collected and are being tested in the laboratory. H<sub>2</sub>SO<sub>4</sub> treatment for *Ribes orientale* seeds for one minute resulted in maximum germination of 58% as compare to 33.33% in control. In case of *Hippophae tibetana*, the results rended that there is no need for pre-sowing treatment as the control showed 95% of germination in the laboratory.

**Project 6 : Developing efficient methods for preparation of compost from different locally available raw materials in different eco-climatic zones [HFRI-015/05 (SFG-05)/PLAN/2000].** *Principal Investigator- Dr. Sandeep Sharma.*

**Status :** A new compost unit has been designed and commissioned at forest model nursery, Baragaon, Shimla. Significant variation was found in the amount of nutrients present in the compost produced from leaves/needles of various temperate species.

**Project 7 : Standardization of nursery techniques of raising containerized seedlings of conifers and their broadleaved associates [HFRI-016/05(SFG-06)/PLAN/2000].** *Principal Investigator- Dr. Sandeep Sharma.*

**Status :** Root trainers along with stands of different capacities have been procured and trials have been initiated to standardize production of quality seedlings of deodar, fir and spruce in root-trainers. Trials have been also initiated to standardize clonal propagation of Himalayan conifers.

**Project 8 : Screening and selection of insect pest and diseases resistant phenotypes / provenances of important tree species viz. *Cedrus deodara*, *Pinus roxburghii*, *Dalbergia sissoo* and *Populus* spp. [HFRI-013/06(FPT-02)/2000-2005].** *Principal Investigator- Ranjeet Singh.*

**Status :** Provenances and clones of selected tree species are being surveyed for insect pest incidence and their screening for pest resistance. Seedlings of deodar from 19 seed sources at Shilly were also surveyed.

**Project 9 : Development of model for integrated pest management with special reference to *Cedrus deodara* [HFRI-017/06(FPT-03)/ 2002-2005].** *Principal Investigator - Mr. Ranjeet Singh.*

**Status :** Bio-ecology of *Ectropis deodarae*, a key insect pest of *Cedrus deodara* has been completed. The parasites emerged out from the egg, larval and pupal stages of the pest have been sent for identification to FRI, Dehra Dun. Heavy mortality of larval and pupal stages in the field was observed and the insect pathogen involved is being identified.

**Project 10 : Studies on the growth and pathogenecity of *Phytophthora***

*cinnamomi*. on deodar and standardization of control measures thereof [HFRI-008/06 (FPT-01)/ 1998-2002]. Principal Investigator - Mr. Charan Singh.

**Status :** Biological control of *Phytophthora cinnamomi* with *Trichoderma viridae* has been standardized under controlled conditions.

**Project 11 : Development of suitable field planting models using different combinations of indigenous species in lower hills Himachal Pradesh including evaluation of their economics. [HFRI-014/08(AF-01)/PLAN/2000]. Principal Investigator - Dr. R.K. Verma.**

**Status:** A socio-economic survey was conducted in a designed questionnaire. List of indigenous species preferred by the farmers was compiled and accordingly nursery has been raised to develop suitable Agroforestry models.

## NEW PROJECT INITIATED DURING THE YEAR 2001-2002

NIL

### Research Achievements

Name of the State	No. of Projects Completed in 2001-2002	No. of On-going Projects in 2001-2002	No. of Projects Initiated in 2001-2002
Himachal Pradesh	3 main Projects with 7 Sub-projects and 12 Components	11	NIL
Jammu & Kashmir	2 main Projects 3 Sub-projects and 4 Components	2	NIL

### Linkage & Collaboration

Linkages in the field of research and training with the State Forest Departments of Himachal Pradesh and Jammu & Kashmir have been established. The Institute especially addressed the issues pertaining to mortality in chir-pine, shisham and willow raised by the State Forest Departments of the above two states. Besides this, the Institute had also developed collaborations with the Coordinator, World Wildlife Funds, Shimla, through which lectures and field visits were organized. Around 335 school children from various schools were made environmentally conscious through these trainings.

## Publications

### Books

Surinder Kumar, K.S. Kapoor, Vaneet Jishtu & S.P. Subramani (2001). Hidden Treasures of Cold Desert in North West Himalayas (Threatened Medicinal Plants).

Institute's Brochure for the period under report.

Nursery Manual on Agro-technology of Silver fir & Spruce.

### Research Papers

1. Bahar, N., K.S. Kapoor and A.K. Jain (2001). Litter production pattern of *Eucalyptus teriticornis* plantations in protected and unprotected areas of upper Gangetic Plains; *The Indian Forester*, Vol. 127 (7): 814-820.
2. Singh, Charan and Shailendra Kumar (2001). Toxicity of insecticides on cut-worm; *Agrotis ipsilon* Hufnagel (Lepidoptera: Noctuidae), A pest of *Paulownia fortunei* in Paonta valley. *Indian J. Forestry*, Vol. 24 (1): 29-31.
3. Singh, Ranjeet (2000). Diversity of insects in Indian forests and its use in pest management. Edited by Ram Parkash; *Advances in Forestry Research in India*, Vol. No. XXIII, ISSN: 0971-2704 : 204-224.
4. Singh, Ranjeet (2001). Management of chir pine trees in Morni Hills, Haryana, in Recent Trends in Insect Pest Control to Enhance Forest Productivity edited by Shukla, P.K. and Joshi, K.C. ; 67 ICFRE BK-55 : 212-217.
5. Singh, Ranjeet, G.S. Goraya, Charan Singh, Shailendra Kumar and Surinder Kumar (2001). Mortality of chir pine trees by insect borers in Morni Hills Haryana - A case study. *The Indian Forester*, Vol. 127 (11): 1279-1286.
6. Singh, Ranjeet; K.K. Sashidharan, A.M. Salarkhan, and R. Mahalakshmi, (2001). *Batocera rufomaculata* (Coleoptera : Cerambycidae), A new insect record on *Casuarina equisetifolia* L. in India. *The Indian Forester*, Vol 127 (6): 723.

### Consultancy

Consultancy to the State Forest Department of Himachal Pradesh provided for establishment of MPCAs in the State of Himachal Pradesh.

### Conferences, Meetings, Workshops, Symposia, Exhibitions, etc.

HFRI had organized the following trainings-cum-workshops and meetings during the year 2001-2002:

- ❖ A CTA Workshop Cum Peer Review on Forest Entomology and Biological Control.
- ❖ Training on Bamboo for the Officers of State Forest Corporation.
- ❖ Kisan Mela was organized at Sunder Nagar in collaboration with the State Forest Department of Himachal Pradesh and FRI, Dehra Dun.



- ✦ Training on Computer Concepts and ORACLE-8i imparted to the staff of the Institute.
- ✦ Research Advisory Group Meeting was organized during the period under report.
- ✦ Liaison Meeting on the Forestry Related Matters was organized, which was attended by the Forest Officers, Scientists, NGOs, Industries and Farmers from the states of Himachal Pradesh and Jammu & Kashmir
- ✦ Organized workshop-cum-peer review on Forest Entomology & Biological Control.

### **Distinguished Visitors**

The following distinguished visitors visited the Institute at various occasions during the year 2001-2002:

- ✦ Shri R.A. Singh, IFS, Principal Chief Conservator of Forest, Himachal Pradesh
- ✦ Dr. Pankaj Khullar, IFS, Principal Chief Conservator of Forest (Wildlife), Himachal Pradesh
- ✦ Shri P.C. Kapoor, Director, State Forest Research Institute, Jammu & Kashmir
- ✦ Professor K.A. Rizvi, AMU, Aligarh

### **Miscellaneous**

Prof. T.D. Verma, University of Horticulture and Forestry, Nauni (Solan) delivered a lecture on Integrated Pest Management- A novel approach in pest management in forestry at HFRI, Shimla. Senior Officers of the State Forest Department of Himachal Pradesh also attended the same.

