

HIMALAYAN FOREST RESEARCH INSTITUTE SHIMLA

The Conifers Research Centre has been appropriately re-designated as Himalayan Forest Research Institute with effect from September 1998. As its name indicates it addresses specific research issues of western Himalayan States of Himachal Pradesh and Jammu and Kashmir. Major fields of research at this Institute revolve around regeneration of natural temperate forests, eco-restoration of cold deserts, rehabilitation of degraded areas and development and popularisation of agroforestry along with research on planting stock improvement.

PROJECTS COMPLETED DURING THE YEAR 2000-2001

Project 1: Agroforestry and Silviculture in the lower hills (HFRI-003/03 (AGF-01)/WB/1995).

Objectives: (a) To select species most suited for Agroforestry / Silviculture in the lower hills. (b) To develop appropriate models with people's participation.

Results: Approach paper giving status of agroforestry in the region and setting future agenda for agroforestry research in lower hills of Himachal Pradesh was compiled. This comprehensive paper brings out various areas requiring necessary research inputs to develop agroforestry models.

Project 2: Increasing productivity of man made forests (HFRI-009/08(EBC-04)/PLAN/1998).

Objectives: (a) To screen different provenances of *Populus ciliata*. (b) To screen different clones of *Populus deltoides*. (c) To maintain germplasm.

Results: The results of nursery and field trials of *Populus ciliata* and *Populus deltoides* are being compiled with necessary recommendations.



Trial of *Populus ciliata*

Project 3: Nursery evaluation of different provenances of *Cedrus deodara* (HFRI-007/04 (SFG-03)/PLAN/1998).

Objectives : (a) To identify the best stands for collection of seeds. (b) To assess the performance of various provenances both in nursery and field conditions.

Results: Significant differences in growth and development of various provenances of Deodar were observed.

OLD PROJECTS CONTINUED DURING THE YEAR 2000-2001

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

Component 1: Ecological survey of cold desert areas to select suitable species for afforestation.

Objectives: (a) To select suitable species for planting of trees, shrubs and grasses. (b) To develop effective establishment techniques.

Achievements: HFRI herbarium has a total collection of 502 plant species with increasing number of families. 310 species have been identified as the unique species, out of the total collection. Further categorisation of this flora revealed, 22 species of medicinal importance those otherwise have been declared red listed Medicinal Plants by FRLHT, Bangalore. Nursery trials of five dominant indigenous shrub species were initiated at Tabo Research Station. Germplasm of these species have also been collected and is being tested in mist chamber.

Component (2): Survey to determine the occurrence and extent of *Juniperus macropoda* stands in the Cold Desert Regions of Himachal Pradesh.

Achievements: Preliminary results have shown that the seeds of *Juniperus macropoda* exhibit both the seed-coat as well as embryo dormancy. It has been observed that stratification for 25 weeks alternating with warm treatment at 20°C after soaking the seeds with Sulphuric Acid for one hour is required for breaking the seed dormancy. The germination percentage even after this treatment was only about 7%.

Component (3): Studies to determine species composition, plant biomass and net primary production in certain alpine pastures.

Achievements: Nutrient estimations in the vegetational components and comparison of basic data made during the period. Status report has also been compiled.

Component (4): Development of Nursery and Planting Techniques of *Fraxinus xanthoxyloides*.

Achievements: Interesting results on the effect of root clipping and irrigation schedule were obtained. It has been found that bed size of 1m x 1m when irrigated with 10 litres of water after every four days gave the best results in nursery conditions. Root clipping showed encouraging results when the root clipping is done in between 25 to 30 cm.



Scanty natural vegetation - *Juniperus macropoda*

Component (5): Development of Nursery and Planting Techniques of *Quercus ilex*.

Achievements: Nursery techniques standardized. Experiments on transplanting techniques did not show encouraging results. Data compiled.

Component (6): Development of Nursery and Planting Techniques of *Hippophae rhamnoides*.

Achievements: Winter sowing of the seeds of the species *Hippophae rhamnoides* gave the highest germination percentage in nurseries. The cuttings having dia class varying from 1 cm - 1.25 cm performed best in the nursery conditions.

Component (7): Studies on different soil working techniques for afforestation of slopes and low lying areas in the cold desert regions.

Objectives: To establish clonal wood species.

Achievements: Developmental activities at the experimental site were taken up and it is being maintained. Growth data recorded are being compiled.

Component (8): Studies on planting techniques of Poplars in the cold deserts areas.

Achievements: Sets of local Poplars of diameter class of 18 cm, planted in pits size of 60 cm³ gave the best results. The results were recommended.

Component (9): Performance testing of different provenances of *Populus ciliata* and other Poplars in nursery and in field conditions.

Achievements: Nursery trials on various provenances of *P. ciliata* and *P. alba* have been completed and the 'Pinder' provenance of *P. ciliata* were found to be the best potential for planting in specific sites. *P. alba* showed very encouraging results in nursery condition. 15 provenances of *P. ciliata* are under trial.

Project 2: Regeneration of coniferous and broadleaved forests (HFRI-002/04(SFG-01)/WB/1995).

Component 1: Improvement of Silver Fir and Spruce and regeneration through introduction of *Populus ciliata* as Nurse Crop.

Objectives: To examine the effect of introduction of *Populus ciliata* into degraded coniferous forests.

Achievements: Planting of Silver fir and Spruce done at Solang Nallah as per the requirement of experimental design and mortality replacements of these species and of Poplar were also carried out. Planting stock in the nurseries at both the locations are being maintained.

Component 2: To develop, Improve Propagation, Nursery and Planting Techniques.

Objectives: (a) To determine the seedling grade for field planting of Silver fir. (b) To assess the size of Root Trainers for raising and standardised the size of Silver fir and Spruce Seedlings.

Achievements: Field trial for determination of seedling grade of Spruce was laid out at Chhichar Forest near Narkanda and maintained. Mortality replacements were carried out and the preliminary results have shown that Spruce seedling below 25 cm height could be culled out for planting.

Component-3: Studies on grafting techniques of *Pinus gerardiana*.

Objectives : To standardize the grafting techniques of *Pinus gerardiana*.

Achievements: Trial to standardise the grafting techniques in *Pinus gerardiana* were laid out and maintained. Planting stock are being maintained for grafting techniques in *Pinus gerardiana*. It was observed that approximately 25% of success can be achieved in case of small signs with out needles.

Component-4: Studies to evaluate the performance of different seed sources of *Pinus gerardiana* in field conditions.

Objectives : To suggest specific finding for the use in the field and to recommend the best performers.

Achievements: The trial was maintained during the period and necessary developmental activities in the experimental plot were carried out and mortality replacements done.

Component-5: Studies on seed dormancy of *Taxus baccata*.

Objectives : (a) To assess the causes of seed dormancy. (b) To find the remedial measures to over come the same.

Achievements: Writing up of status paper is in progress.

Project 3: Planting Stock Improvement Programme (HFRI-004/05(SFG-02)/WB/1995).

Component-1: Identification and location of seed stands of *Pinus roxburghii* and to develop Seed Production Areas (SPAs).

Objectives : To establish Seed Production Areas (SPAs) of Chir-pine.

Achievements: Seed Production Areas (SPAs) measuring 32.52 ha has been identified at Kopra Forest and Bairkot Forests and maintained. Data on various related aspects taken up, and Draft Management Plan was prepared.

Component-2: Establishment of CSO of Shisham (*Dalbergia sissoo*: 8 ha).

Objectives: (a) To establish Seed Orchards. (b) To achieve mass production of Improved Planting Material.

Achievements: The CSO of *Dalbergia sissoo*, established earlier at Gondpur (3 ha), Paonta Sahib (H.P.); 3.5 ha Laliyal (J&K) and 1.5 ha were at Bir Plasi Forest in Nalagarh Forest Division are being maintained and necessary data were recorded. Long term Plans for management of the CSO has also been prepared.

Component-3: Establishment of SSO / SSPA of *Pinus roxburghii* and *Dalbergia sissoo*.

Objectives: (a) To establish Seed orchards. (b) To achieve mass production of improved planting material. (c) To exploit the natural variability by selection of suitable provenances for a particular site. (d) To establish SSPAs Chir-pine (5 ha.) and Shisham (7 ha.).

Achievements: Established Seedling Seed Production Area (SSPA) measuring 5 ha and relevant growth data recorded. Maintained the Seedling Seed Orchards raised under various Forest Division and growth data recorded.

Sub-project (1): Establishment of Vegetative Multiplication Gardens (VMGs).

Component-1: Establishment of VMG of *Dalbergia sissoo* (2 ha.)

Objectives : To assess techniques for identifying superior performers and ability of rooting the vegetative material and media.

Achievements: 2 ha of VMG of Shisham at Bir Plasi under Nalagarh Forest Division were maintained.

Project 4: Assessing the impact of disease and insect-pest attacks both in nursery and in field conditions and working out control measure thereof (HFRI-008/06(FPT-01)/PLAN/1998).

Objectives: (a) To study on the growth and pathogenicity of *Phytophthora cinnamomi*, Rands on Deodar and standardization of control measures. (b) To study the mode of infection and growth rate of fungi in diseased Deodar Forests. (c) To asses the impact of edaphic and climatic factors on the growth and development of casual organism. (d) To evolve biological and chemical control in the laboratory and in nursery conditions. (e) To study the effect of mulching in diseased Deodar forests and Physical control of disease by trenching.

Achievements: Studies have been completed on growth characteristics and mode of infection of *Phytophthora cinnamomi*. Ecology and distribution of this fungal pathogen over a period of time has been done to find out the impact of this pathogen on Deodar forests. Fungicides employed by trenching methods are being monitored. Biological control methods with the help of *Trichoderma viridae* are being standardized.

NEW PROJECTS TAKEN UP DURING THE YEAR 2000-2001

Project 1: Comparative studies on the ecology of degraded forests vis-a-vis 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).

Objectives: (a) To assess the immediate causes of degradation of identified forests. (b) To conduct general ecological surveys in the degraded as well as relatively undisturbed forests. (c) To carry out comparative ecological studies.

Progress made: Ecological survey of the area in general and site in particular was carried out. Soil samples were collected to assess the fertility status of the area. Analysis of floristic composition and soil samples is being carried out.

Project 2: Assessment of conservation status of hill bamboos (Nirgals), collection of germplasm from various eco-climatic zones and establishment of germplasm Bank (HFRI-011/02(EBC-05)/PLAN/2000).

Objectives: (a) To evaluate the species diversity of hill Bamboos and their distribution in various catchments. (b) To analyze habitat diversity and distribution of hill Bamboos in different catchments. (c) To evaluate and analyze the species and habitat diversity of hill Bamboos in the various eco-climatic zones of Himachal Pradesh. (d) To prepare conservation strategies for these Bamboos in Himachal Pradesh.

Progress made: Ecological survey of the area was carried out in various catchments of Sutlej Valley. Floristics survey was conducted.

Project 3: Studies on floristic composition and associated mycorrhizae of dominant species in Baspa valley of district Kinnaur of Himachal Pradesh (HFRI-018/02(EBC-06)/PLAN/2000).

Objectives: (a) To initiate documentation of flora of peculiar Valley of Baspa, Kinnaur, H.P. (b) To assess the extent of mycorrhizal associations with the dominant and economical important plants of the area. (c) To identify the useful but lesser known species of the area and preparation of voucher herbarium specimens of entire flora of the valley.

Progress made: Survey of the identified sites in the Baspa Valley carried out and 450 floral species collected.

Project 4: Standardization of nursery technology for mass propagation of selected medicinal plant species (HFRI-009/07(NWFP-01)/PLAN/2000).

Objectives : (a) To survey and identify the medicinal and aromatic plants from different areas of Himachal Pradesh. (b) To establish germplasm of the various species. (c) To standardize nursery technology for mass propagation of important medicinal plants.

Progress made: Survey was carried out and 18 plant species of medicinal importance collected from various locations and their germplasm maintained in the nursery.

Project 5: Standardization of methodology for collection of seed, its handling, storage, testing and certification of seed of important tree species (HFRI-012/05(SFG-04)/PLAN/2000).

Objectives: (a) To study the effect of time of harvest and different methods of seed extraction, cleaning and grading on seed quality and germination characteristics for coniferous and broadleaved species of Western Himalayas. (b) To standardize the seed storage conditions with particular reference to seed moisture content, storage temperature, storage containers, insect pest and disease infestation. (c) To find out the effect of different methods of pretreatment, media and light on the vigour, viability and germination of the seeds. (d) To develop effective seed handling and storage technology for coniferous and broadleaved species of Western Himalayas.

Progress made: Survey conducted. Various experimentation with respect to insect-pest and pathogen attack were also carried out.

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).

Objectives: To develop technology for the production of high quality compost from locally available organic raw material.

Progress made: Compost unit prepared in the temperate zone and the experiment initiated at two locations using the locally available material.

Project 7: Standardization of nursery techniques of raising containerised seedlings of conifers and their broadleaved associates (HFRI-016/05(SFG-06)/PLAN/2000).

Objectives: (a) To reduce the nursery period (gestation period) of high level conifers. (b) To standardize the techniques for production of quality seedlings of conifers and their broadleaved associates. (c) To develop a comprehensive package on nursery technology for studied species.

Progress made: Seed collected, seed sowing was also taken up in different sized root trainers.

Project 8: Screening and selection of insect-pest and disease resistant phenotypes / provenances of important tree species (HFRI-013/06(FPT-02)/PLAN/2000).

Objectives: (a) To identify major insect-pests of selected tree species. (b) To select pheno - types of tree species for resistance against insect - pests. (c) To formulate management programme of recognized insect-pests of *Cedrus deodara*.

Progress made: Provenances and clones of selected tree species are being surveyed for screening of pest and disease resistance. Seedlings of Deodar from 19 seed sources at Shilly were surveyed regularly and systematically for insect pest attack and their extent of damage in the field. Variation towards resistance of seedlings was observed. *Dasychyra mendosa*, a new insect was reported in this seed source except local and their attack was minor.

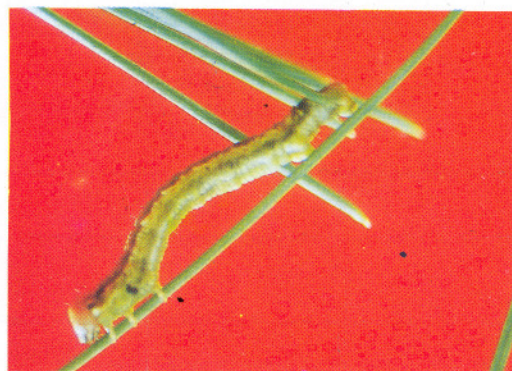
Project 9: Development of model for integrated pest management with special reference to *Cedrus deodara*.

Objectives: (a) To study the host plant relationships. (b) To document the natural enemies of the pest and their habitats. (c) To evolve early detection and monitoring system. (d) To assess the population dynamics of the pest. (e) To study the biopesticidal control. (f) To screen the insect-pest resistant phenotypes for integrated pest management.

Progress made: Bio-ecology of *Ectropis deodara*, a key insect pest of *Cedrus deodara*, is being studied in the laboratory and field conditions. A Carabid beetle, *Calosoma beesoni* has been found to be a potential predator of this serious defoliator. A new record of insect, *Dasychira mendosa* (Lepidoptera: Lymantridae) has been reported from Deodar forests in Himachal Pradesh. An outbreak of this pest has been reported by the State Forest Department, survey conducted and the data on different aspects of pest were collected.



Calosoma beesoni - Potential predator of Deodar defoliator



Larva of *Ectropis deodara* prout
Lepidoptera - Geometridae

Project 10: Development of suitable field planting models using different combinations of indigenous species in lower hills of Himachal Pradesh including evaluation of their economics.

(HFRI-014/08(AF-01)/PLAN/2000)

Objectives: To design and evaluate suitable agroforestry models.

Progress made: A questionnaire was developed and benchmark survey conducted. A list of indigenous agroforestry species preferred by the farmers was compiled.

EXTENSION

Facilities generated and services rendered.

- Library and Documentation – Computer facilities, time spared and revenue earned:
- Library has been equipped with TREE-CD having CAB abstracts since 1939. There are 21 Computers in the Institute connected to LAN environment. The internet facilities are also provided in the Institute.
- Institute has 14 number of Video-films related to Forestry Research in its Video Library.

✓ **Other Extension Activities are reported in the Introduction - Forestry Extension, ICFRE.**

FINANCIAL STATEMENT DURING 2000-2001

I. PLAN		EXPENDITURE (RS. IN LAKH)
A.	REVENUE EXPENDITURE	
	(a) Research	59.41
	(b) Administrative Support	25.68
	(c) Others specify	0.49
B.	LOAN AND ADVANCES	
	(a) Loan Advances (Conveyance)	2.00
	(b) House Building Advance	3.01
C.	CAPITAL EXPENDITURE	
	(a) Building & Roads	- -
	(b) Equipments, Library Books	- -
	(c) Vehicles	- -
	(d) Others specify	- -
TOTAL FOR PLAN (A+B+C)		90.59
II. NON-PLAN		
A.	REVENUE EXPENDITURE	
	(a) Research	- -
	(b) Administrative Support (Salary)	- -
TOTAL FOR NON-PLAN		- -
III. FUNDED PROJECT		
A.	World Bank Project	58.85
	IDRC Project	0.06
TOTAL FOR FUNDED PROJECT		58.91