

HIMALAYAN FOREST RESEARCH INSTITUTE SHIMLA

Himalayan Forest Research Institute (HFRI), Shimla, Himachal Pradesh was, earlier, established as High Level Conifer Regeneration Research Centre in May 1977 for carrying out research on the problems associated with natural regeneration of Silver fir and Spruce. The Centre developed the technologies for these problems and, then, transferred the same to the State Forest Departments. During reorganization of forestry research at the level of Government of India and coming up of Indian Council of Forestry Research & Education (ICFRE), Dehradun in 1987, the mandate of this Centre was enlarged from Regeneration of Silver fir and Spruce to Eco-Rehabilitation of Cold Deserts, Mined Areas Rehabilitation, Insect-Pests and Disease Management, besides studies on Agroforestry practices in hills and Regeneration of Coniferous and Broadleaved Forests. This Centre was redesignated as Himalayan Forest Research Institute, Shimla in 1998.

An abstract of projects run by the Institute is as follows:

	No. of projects completed in 2008-09	No. of ongoing projects in 2008-09	No. of new projects initiated in 2008-09
Plan Projects	3	10	6
Externally Aided Projects	4	3	3
Total	7	13	9

PROJECTS COMPLETED DURING THE YEAR 2008-2009

PLAN PROJECTS

Project 1: Studies on plant diversity in cold deserts of district Kinnaur, Himachal Pradesh [HFRI-029/02(EBC-11)/PLAN/2004-2009]

Findings: Carried out phytosociological studies at an altitude varying from 2700m to 5000m above msl in Labrang, Pooh, Ropa-Giavung, Lippa-Asrang, Namgia and Hango areas. Labrang area showed that the total number of plant species was 191 belonging to 47 families and 127 genera. In Lippa-Asrang area, total number of plant species was 191 belonging to 49 families and 134 genera. Pooh area revealed that the total number of plant species was 192 belonging to 55 families and 136 genera. In Ropa-Giavung area, total number of plant species was 160 belonging to 51 families and 119 genera. Namgia area revealed that the total number of plant species was 142 belonging to 49 families and 105 genera. In Hango area, total number of plant



Nako Lake

species was 130 belonging to 41 families and 101 genera. The dominant families were Asteraceae, Rosaceae, Ranunculaceae, Lamiaceae and Polygonaceae. The distribution pattern of most of the plant species was contiguous in all the areas. The Index of similarity for shrub and herb species between different altitudes was low indicates remarkable degree of dissimilarity in plant species between different altitudes.



Waldheimia glabra



Corydalis crassissima



Arnebia guttata

Out of 114 medicinal plant species as recorded from the areas, 24 species fall in the category of threatened plants. The ethnobotanical study carried out in Labrang, Dubling, Nako, Maling, Leo, Namgia and Hango villages of Pooh sub-division and documented 40 plant species used for different purposes.

Project 2: Diagnostic studies of indigenous and institutionalized Participatory Forest Management in Himachal Pradesh to assess the most suited approach and its impact on forest conservation [HFRI-025/08(PFM-1)/Plan/2005-08]

Findings: The most preferred species of timber, fuel and fodder were documented by local people in different PFM areas of Himachal Pradesh. The role of women in PFM was studied. It was found that as per the guidelines of VFDC formation under PFM, women were given due representation in the state of Himachal Pradesh. However, practically in the execution of work, their role was not up to satisfactory level except in few VFDs, such as, Dhalwan in Mandi Circle and Kohbag in Shimla Circle, etc. The



Women participation in plantation activities



Water harvesting structure constructed

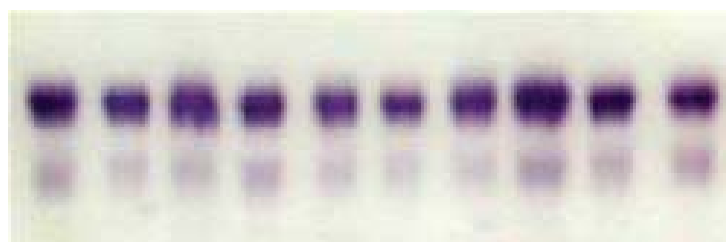
Participatory Forest Management may not have achieved its objectives completely but it has brought positive change in mind frame and thinking of local people and field staff towards the forest conservation.

It was observed that the PFM scheme has brought positive change in attitude of people throughout the state barring few places. The PFM scheme was viewed as income generation source on daily wages basis by common people for short duration. Barring the few

shortcomings, PFM scheme has helped in creation of awareness among common people regarding the importance of forest and its conservation.

Project 3: Allozyme variation in natural populations of Deodar (*Cedrus deodara*) [HFRI-030/05(SFG-10)/PLAN-03/2005-08]

Findings: Isozyme analysis has provided new information about the relative amounts of genetic variation present within and among fifteen populations of *Cedrus deodara*. Within population genetic variation was found to be higher as compared to total variation among populations. The population from Cheog forests showed higher genetic distances more than 0.03 with all other remaining populations. The tendency of grouping was witnessed between the populations based on population parameters. Taking allelic diversity and differentiation into consideration population Cheog and Nankhari remains separated from the rest of the populations. Population Chopal, Manali, Chowai, Jhungi, Dhgamoon, Chamba, Shillaru and Mashobra makes one group and the populations Sarain, Chail, Kupwara, Bhadrawah and Kalpa can be combined into one group. The same tendency is observed for genotypic differentiation. The genetic distance values further supports this grouping as population Cheog shows relatively higher genetic distance with the remaining populations followed by population Nankhari, whereas, the other populations show less genetic distance within the group. The tendency of grouping among different populations, despite altitudinal differences, suggests common descent of the populations.



A1 A11 A1 A11 A1 A11 A1 A11 A11 A11
B2 B11 B1 B22 B1 B11 B1 B1 B11 B11

EXTERNALLY AIDED PROJECTS

Project 1: Ecological assessment of forest areas falling under Kol Dam Hydroelectric Project in Bilaspur District of Himachal Pradesh [FT48-88/86(FCA) CATP Kol Dam-HPSFD Funded Project] [FT48-88/86(FCA) CATP Kol Dam-HPSFD/2005-09]

Findings: Carried out phytosociological studies in different catchment areas falling in the Forest Divisions of Bilaspur, Suket, Kunihar, Shimla, Theog and Karsog. Study in Bayali catchment of Suket forest division showed that the total number of plant species was 140 belonging to 66 families and 127 genera. In Hadaboi catchment of Suket forest division total number of plant species was 192 belonging to 72 families and 164 genera. While studying the composition of vegetation in Jattu catchment of Suket forest division, the total number of plant species was 43 belonging to 24 families and 36 genera. In Kasol catchment of Bilaspur forest division total number of plant species was 133 belonging to 60 families and 113 genera. Kandhar catchment of Kunihar forest division revealed that the total number of plant species was 166 belonging to 56 families and 135 genera. In Tattapani catchment of Karsog forest division total number of plant species was 167 belonging to 66 families and 150 genera. Studied the composition of vegetation in Kotlu catchment of Karsog forest division and found that total number of plant species was 219 belonging to 83 families and 188 genera. In Sunni catchment

of Shimla forest division total number of plant species was 227 belonging to 77 families and 194 genera. Matiana catchment of Theog forest division revealed that total number of plant species was 155 belonging to 70 families and 140 genera. The dominant families were Asteraceae, Fabaceae, Lamiaceae, Euphorbiaceae, Rubiaceae and Rosaceae. The distribution pattern of most of the plant species was contiguous in all the catchments. Out of 128 medicinal plant species recorded from the various catchments, 6 species i.e. *Dioscorea deltoidea*, *Taxus wallichiana*, *Zanthoxylum armatum*, *Gloriosa superba*, *Roylea cinearea* and *Valeriana jatamansi* fall in the category of threatened plants.



Gloriosa superba



Cassia fistula



Punica granatum



Adhatoda zeylanica

Project 2: Study on plant diversity in Rakchham, Chitkul Wildlife Sanctuary of district Kinnaur, Himachal Pradesh [GBPI/IERP/04-05/15/862-GBPI-Funded Project/2006-09]

Findings: Phytosociological studies were carried out at various altitudes in Doje forest, Kanasa area and Shone Khad area of Rakchham beat; Hitch Pawang, Murti Panag, Rani kanda to Jarra and Tumer area of Chitkul beat; Rasrang, Hurba and Shingan area of Batseri beat of the sanctuary. In Doje Forest, number of trees, shrubs and herb species were 15, 31 & 117 with dominance of *Betula utilis*, *Hippophae salicifolia* and *Polygonatum verticillatum* respectively. In Kanasa Nala, number of trees, shrubs and herbs species



Betula utilis Forest

were 9, 23 & 122 with dominance of *Acer acuminatum*, *Rhododendron campanulatum* and *Polygonum polystachya* respectively. In Shone Khad, number of trees, shrubs and herbs species were 11, 23 & 115 with dominance of *Hippophae salicifolia*, *Juniperus indica* and *Rumex nepalensis* respectively. In Hitch Pawang, number of trees, shrubs and herbs species were 3, 29 & 103 with dominance of *Pinus wallichiana*, *Lonicera parvifolia* and *Polygonum polystachya* respectively. In Murti Panag, total number of tree, shrub and herb species were 7, 18 & 97 with the dominance of *Betula utilis*, *Berberis jaeschkeana* and *Potentilla atrosanguinea* respectively.



Rhododendron lepidotum



Hippophae tibetana

In Rani Kanda to Tumer Nala, the number of trees, shrubs and herbs species were 1, 11 & 74 with dominance of *Betula utilis*, *Rhododendron anthopogon* and *Polygonum polyatachya* respectively. In Rani Kanda to Jarrya top, the number of trees, shrubs and herbs species were 1, 8 & 98 with dominance of *Betula utilis*, *Juniperus indica* and *Thymus linearis* respectively. In Rasrang area, the number of trees, shrubs and herbs species were 13, 25 & 70 with dominance of *Cedrus deodara*, *Abelia triflora* and *Rumex nepalensis* respectively. Whereas, in Hurba area, the number of trees, shrubs and herbs species were 9, 25 & 73 with dominance of *Betula utilis*, *Juniperus communis* and *Caltha palustris* respectively. In Shingan area, the number of trees, shrubs and herbs species were 13, 26 & 95 with the dominance of *Betula utilis*, *Rhododendron anthopogon* and *Thymus linearis* respectively. Three species of *Rhododendron* viz., *Rhododendron campanulatum*, *R. anthopogon*, and *R. lepidotum* were also recorded from the sanctuary. The distribution pattern of plant species was mostly contiguous in all the studied areas. The population structure of various tree species occurring in different areas of the sanctuary was estimated and recognized three patterns of population structure. Out of 105 medicinal plant species recorded from the various areas, 27 plant species fall in the category of threatened plants. Conducted ethnobotanical studies in Rakchham, Chitkul, Batseri, Themgarang, Boningsaring villages and documented 50 plant species used for various purposes.

Project 3: Inventorization, documentation and to evolve site specific management strategies for the conservation of sacred groves of Kullu valley in Himachal Pradesh [GBPI/IERP/04-05/18/865/2005-08]

Findings: A total of 33 sacred groves were inventorized in the Kullu valley and these sacred groves were found rich in plant biodiversity. A total of 224 plant species were recorded. The sacred groves serve as storehouse of medicinal plants. During the study, ethnobotanical information on 69 plant species were also documented. Deodar (*Cedrus deodara*) was recorded as the dominant tree species in most of the sacred groves. However, the number of deodar trees varied among the sacred groves. A pamphlet on “Dev van Ek Prachin Dhrohar” was

prepared for creating awareness among the local community for conservation and rejuvenation of sacred groves. Reasons for degradation of individual sacred groves were identified and site-specific management strategies for rejuvenation and conservation of the sacred groves were evolved with the participation of people.

Project 4: Studies on population status and berberine content in different provenances of *Berberis aristata* DC. in Himachal Pradesh and standardization of its propagation techniques [BT/PR-4695/PBD/17/300/2004, dated 13th May 2005/2004-08]

Findings: Seven provenances of *Berberis aristata* were identified in Himachal Pradesh. After identification of different *Berberis aristata* provenance/populations, root samples were collected, cut into small pieces, dried in shade and sent to the Forest Research Institute, Dehradun for estimation of berberine content. The chemical analysis showed maximum berberine content of 2.81 % in sample no. 30 followed by 2.70% in sample no. 5. The high berberine yielding plants identified in this study were mass propagated through stem cuttings, but the rooting percentage and survival of the rooted cuttings were very less. Although, the vegetative propagation of the species is very difficult, the species can be easily propagated through seeds.

PROJECTS ONGOING DURING THE YEAR 2008-2009

PLAN PROJECTS

Project 1: Introduction and performance trials of *Gmelina arborea* for Agroforestry in Lower hills of Himachal Pradesh and Jammu and Kashmir [HFRI-039/08(AGF-05)/PLAN/2007-12]

Status: Nurseries of *Gmelina arborea* have been raised at Bir Plasi (Nalagarh), Johron (Paonta Sahib) and Nagbani (Jammu) for raising field plantations. Field plantations-cum demonstration plots have been raised at Puruwala (Paonta Sahib) in district Sirmour and Kot in Hamirpur district of Himachal Pradesh. Survey for taking up field plantation in the state of Jammu and Kashmir is being undertaken. Growth data of the seedlings at nursery stage and in plantation area have been recorded. Preliminary results are encouraging.



Performance trail of *Gmelina arborea*

Project 2: Evaluation of soil fertility status and nutrient return from the important indigenous agroforestry tree species in Himachal Pradesh with special reference to Hamirpur district [HFRI-034/08(AGF-04)/PLAN/2006-11]



Evaluation of Soil fertility status

Status: After conducting a survey, experiments have been laid down in the Aghar and Bilkar Kahan of district Hamirpur. Collection of litter samples is being undertaken which are further being processed and analyzed for various constituents/ nutrients viz., N, P, K, Ca, Mg so as to know the magnitude of nutrient return from five important agroforestry species of this region. Soil samples are also being collected and being analyzed to evaluate the soil fertility status.

Project 3: Standardization of nursery techniques of five prominent indigenous species (*Capparis spinosa*, *Colutea nepalensis*, *Caragana gerardiana*, *Ribes orientale* and *Cratagus songarica*) besides *Eleaegnus angustifolia*, *Hippophae rhamnoides* and *Rosa webbiana* of Cold Deserts [HFRI-019/03(EBC-08)PLAN/2002-10]

Status: Trials to understand the (i) Effect of different concentration of Indole-3 Butyric Acid on rooting in shoot cuttings of *Ribes orientale*, *Colutea nepalensis*, *Eleaegnus angustifolia*, *Hippophae rhamnoides* & in root suckers of *Rosa webbiana* & *Capparis spinosa*, (ii) Effect of pre-sowing (hot-water and Gibbrellic Acid) treatment on germination behaviour in the seeds of *Ribes orientale*, *Colutea nepalensis*, *Hippophae rhamnoides*, *Capparis spinosa* and *Rosa webbiana* and (iii) Effect of medium (various ratios of sand & soil) on germination behaviour in the seeds of *Ribes orientale*, *Colutea nepalensis*, *Hippophae rhamnoides*, *Capparis spinosa* and *Rosa webbiana* were conducted both in poly house and in nursery conditions. Besides this, experiments on the effect of mulching treatments on *Ribes orientale*, *Hippophae rhamnoides*, *Rosa webbiana* and *Capparis spinosa* were also undertaken. Detailed ecological studies for the identified *Capparis spinosa* species were carried out in the selected sites at Mane, Ladang, Kurith, Hurling, Tabo and at Samdoh falling in Spiti Valley of Himachal Pradesh.



Capparis spinosa

It was seen that the experiments as laid out inside the poly tunnels are performing well over the plants growing in the open nursery. Field trials to assess the performance of *Eleaegnus angustifolia*, *Hippophae rhamnoides*, *Rosa webbiana* and *Colutea nepalensis* were established which are giving the excellent performance. Mortality replacements in field trials of species like, *H. rhamnoides*, *C. nepalensis* and *R. webbiana* were carried out. Repeat ecological studies of the identified species in field conditions were also conducted. Major emphasis was laid on *Cratagus songarica*—the species found growing in Lahaul valley only. Arlier trails on different species under study as laid in the nursery and in field conditions were maintained. Data are being compiled.

Project 4: An ecological assessment of floristic diversity in Hemis High Altitude National Park, Ladakh and Jammu & Kashmir [HFRI-031/02 (EBC-12) PLAN/2006-11]

Status 4: During 2008, conducted ecological and taxonomic studies in Markha valley of Hemis High Altitude National Park. Surveyed the area indepth and camped within the valley at various high altitude camp sites; viz, Chilling (3800 m), Kaya (3700 m), Skyu (3800 m), Markha (4000 m), Shingo (4200 m) and Chalak (3900 m) etc. Laid quadrats along the representative slopes within the valleys following the altitudinal gradient, from 3600 m to the upper benchmark of 4400 m above msl. Made floral collections but collected only unique specimens for Herbaria and also documented the vegetation types in the river valleys and also the general flora near habitations.

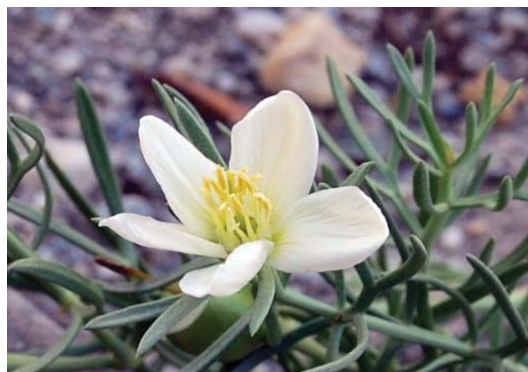
Back at the Institute, the plant specimens collected during the survey were processed as per standard procedures and put in plant press. The specimens after proper drying, pasting on standard handmade sheets and fumigation will be taken to the DD and WII Herbaria at Dehradun for authentication.



Markha Village



Hippophae and Phragmites formations

*Hippophae rhamnoides sub sp. turkistanica**Peganum harmala*

Project 5: Survey, biology and control of insect pests of important medicinal plants in Himachal Pradesh [HFRI-033/06(FPT-07)PLAN/2005-10]

Status: In total, 37 insect species belonging to five insect orders viz. Lepidoptera, Coleoptera, Hemiptera, Orthoptera, Hymenoptera and 24 families have been recorded from 13 selected medicinal plants, being cultivated in this region. The studies on the biology of *Plusia orichalcea* Fab. on *Saussurea costus* infesting *Picrorhiza kurrooa* Royle ex Benth., *Acrtium lappa* Linn., *Heraclium candicans* Wall. ex DC., *Angelica glauca* Edgew., *Saussurea costus* Falc. and *Valeriana jatamansi* Jones have been summarized. *P. orichalcea* was found to be most active from second week of April to last week of June. Four overlapping generations were studied from March to June. The fecundity of a female varied from 113 to 228 eggs and the total life cycle was completed in 27 to 38 days during different months. Experiments were laid to evaluate the Efficacy of Summeroil, Grownim, Di-methoate 35 EC and Neem Seed Bitter on *Valeriana jatamansi* to control the mite attack in nursery. The data were collected before and after the treatments. During the survey, moderate to heavy attack of White grub were recorded in the nursery at Shillaru and Rorhu area on *Aconitum heterophyllum*, *Valeriana jatamansi*, *Picrorhiza Kurrooa*, *Angelica glauca* and *Saussurea costus*.

Project 6: Management of insect borer complex in Chirpine forests [HFRI-035/06 (FPT-08)2006-11]

Status: *Polygraphus longifolia* Stebbing was identified one of the most destructive pest of Chirpine trees as this beetle bores directly into the bark for oviposition and make the tree vulnerable for other insect borers to infest subsequently. It is graded as formidable pest of Chirpine since it infest trees of all ages from the seedling and sapling to the oldest tree and even the green trees. Owing to the rough thick bark of the Chirpine and the deep crevices in

it, it is by no means easy to detect the attack of this insect without removing the bark. To evaluate the effectiveness of tree trap for entrapping the beetles of *Polygraphus longifolia*, billets of two sizes (80 cm L X 70 cm GBH and 100 cm L X 90 cm GBH) were kept at two experimental sites and the data on insect activity and population abundance of *P. longifolia*, *Cryptorhynchus rufescens* and *Sphaenoptera aterrima* were recorded along with moisture content of the logs. Trees falling into the girth range 90-180 cm were found to be highly susceptible to infestation in comparison with young (below 90 cm) and mature (above 180 cm) stands. Fire incidence and excessive resin tapping increased the susceptibility of the trees to the beetle incidence. Grownim and endosulphan 35 EC at various concentrations ranged from 1.0% to 5.0% for containing the insect pest population was evaluated in the field. Data on population abundance of insect on randomly selected trees during pre and post treatment were recorded.

Abnormal increase in population of Chirpine weevil (*Cryptorhynchus rufescens*) was reported in June-July in Solan Forest Division of Himachal Pradesh. The weevil is elongated and measured about 6.6–8.5 mm in length. It attacks the young green sapling to old tree of large size. The young grubs eat out small galleries in an irregular fashion. As it increases in size, the grubs bore deeper galleries in thick bark, cambium and the sapwood. The galleries are packed with red dust. The weevil population ranged from 3-5 per 10 cm² of bark area.



Cryptorhynchus rufescens



Mature grub of *C. rufescens*
before pupation

Project 7: Planting Stock Improvement Programme in *Cedrus deodara* [HFRI-028/05 (SFG-08) PLAN-03/2003-08]



Progeny trial of *Cedrus deodara*

Status: The matter to obtain culling permission from the competent authority was pursued with Principal Secretary, Forests Government of Himachal Pradesh, PCCF of Himachal Pradesh and Director, State Forest Research Institute, Jammu from time to time so that seed stands are converted into Seed Production Areas (SPAs). However, the culling permission is yet to be obtained. Progeny trial is being maintained in the nursery and growth data being recorded periodically.

Project 8: Productivity enhancement through selection of superior clones of *Dalbergia sissoo* [HFRI-038/05(SFG-09) PLAN/2007-12]

Status: The clones selected on the basis of morphometric traits were raised in the nursery. These selected clones are being evaluated for their stress resistance. Experiments laid out for insect pests resistance continued. The morphometric variation recorded in selected clones is also being corroborated for genetic variation through isozyme studies. The site to raise advance generation orchard was fenced and prepared for planting.

Project 9: Determination of morphological and physiological quality parameters of nursery stock of Deodar (*Cedrus deodara*) and Ban Oak (*Quercus leucotrichophora*) [HFRI-037/05 (SFG-12)PLAN/2007-12]

Status: Maintained about 30,000 plants of Deodar (6,000 no.) and Ban Oak (24,000 no.) at Model Nursery, Shimla and Shilly nursery, Solan respectively. Very good germination recorded in case of Ban Oak acorns; however, germination failed in Deodar seeds owing to collection made during 2007, considered as a bad seed year. Visited some more nurseries of State Forest Department of Himachal Pradesh and collected information from field functionaries regarding production of Deodar & Ban Oak nursery stock and quality parameters adopted while selecting Deodar & Ban Oak nursery stock. Selected sites in Solan and Shimla Forest Division for establishing field trials of Deodar and Ban Oak nursery stock based on morphological parameters. Carried out experimental plantations based on morphological parameters on approximately 4ha area during July-August 2008 rains. Growth and survival data pertaining to experimental plantations are being recorded regularly. Fresh seeds of Deodar & Ban Oak acorns were collected during October 2008 to January 2009 and subsequently sown in the nursery for studying physiological parameters of nursery stock quality. Compiled secondary information and interim minimum standards for Deodar and Ban Oak nursery stock proposed for further finalization and adoption in the field.



Graded Nursery Stock of
Deodar & Ban Oak

Project 10: Standardization of methodology for seed collection, seed handling, storage and breaking seed dormancy in *Juniperus polycarpus* C. Koch and *Fraxinus xanthoxyloides* (Wall. ex G. Don) DC. [HFRI-036/03 (SFG-11)PLAN/2006-11]

Status: The germination data of *Fraxinus xanthoxyloides* seeds treated with different conc. of gibberellic acid ranging from 500 ppm to 3000 ppm statistically analyzed and maximum 74% germination was recorded in seeds treated with 1500ppm gibberellic acid as compared to control which registered only 19.66% germination. Similarly, good germination was observed in *Juniperus polycarpus* seeds treated with different presowing treatments.



Seed Germination in *Juniperus polycarpus*

The seed storage trial in *Fraxinus xanthoxyloides* and *Juniperus polycarpus* by using different type of storage containers/storage environment was maintained and viability test carried out periodically. The *Fraxinus xanthoxyloides* seeds stored in different type of storage containers/environment showed decreasing trend in seed viability and seeds stored in refrigerator (<5°C) retained >70% viability after 15 months of storage. Similarly, *Juniperus polycarpus* seeds also showed decreasing trend in seed viability and seeds stored in refrigerator (<5°C) retained >50% viability after 15 months storage compared to other storage environment.

EXTERNALLY AIDED PROJECTS

Project 1: Setting up 100 hectares demonstration plot in Himachal Pradesh and production of elite planting material of *Dendrocalamus hamiltonii* [BT/PR/5243/Agr/16/456/2004/2005-10]

Status: Raised 50 ha demonstration plots of Tissue Culture and Stem Cutting raised *Dendrocalamus hamiltonii* at Dhadiyarghat in Solan Forest Division. The Tissue Culture raised plants have shown 84 per cent survival and Stem Cutting raised has survived up to 95 percent. Monkeys, Porcupines and landslides were the main reasons of mortality. The growth data are being recorded periodically.



Performance of Tissue Culture Raised Plants

Project 2: Suitability of *Jatropha curcas* L. seeds sources in lower and mid-Himalayan regions of Himachal Pradesh [BT/PR/5094/AGR/16/429/2005-2010] (DBT Funded Project)

Status: Demonstration-cum-experimental plantations established on 23 ha. of area during 2005-06, 2006-07 and 2007-08 at various locations in Himachal Pradesh were maintained intensively during 2008-09 for better survival and growth so that it could be used for future planting material resource as well as training purposes. It was estimated that about 33,500 cutting could be made available to funding agency for future propagation from those demonstration plantations. About 22 fresh seed samples amounting approximately 10 kg collected from different seed sources of Himachal Pradesh during November 2008 and are being analyzed for oil estimation. Growth and survival data pertaining to experimental-cum-demonstration plantations are being recorded regularly. The project has been extended for two years by the funding agency i.e. up to 31st March 2010 for getting possible logical conclusion from the project being executed under *Jatropha* micro mission of DBT.



Demonstration Plantations of *Jatropha curcas*

Project 3: Production of quality planting material of *Aconitum heterophyllum* Wall. ex Royle & *Angelica glauca* Edgew and extension of their cultivation technology to local communities [GO/HP-07/2006-09] (NMPB Funded Project)

Status: Raised and maintained about 2.20 lacs nursery stock of *Aconitum heterophyllum* Wall. ex Royle (Atish) & 1.05 lacs nursery stock of *Angelica glauca* Edgew (Chora) at two nurseries of the Institute viz., Shillaru nursery (Shimla) and Brundhar medicinal plants nursery (Manali) during 2008-09. The nursery activities mainly included preparation of land for nursery beds, sowing/pricking, shading, irrigation and other maintenance activities. Overall, up to March 2009, the Institute has raised 3.80 lacs of quality planting material of Atish and Chora under this project in different nurseries. Under extension activities of the project, Institute has successfully organized two training & demonstration programmes on 'Commercial cultivation of Atish & Chora' at Mashobra, Shimla on 29th August 2008 for 44 farmers & field functionaries of SFD, Himachal Pradesh and at Mahunaag in Karsog Forest Division of Himachal Pradesh on 5th December 2008 for 60 numbers of farmers, members of Mahila Mandal, NGO & field functionaries of SFD, Himachal Pradesh. Besides these, around 2.00 lacs QPM of Atish and Chora distributed to various end users during the year. The project has completed its period of 3 years on 31st March 2009; however, one year extension for the project is under consideration with the funding agency to fully achieve all the objectives of the project.

NEW PROJECTS INITIATED DURING THE YEAR 2008-2009

PLAN PROJECTS

Project 1: Ecological assessment of floristic diversity in Kalatop Khajjiar Wildlife Sanctuary of district Chamba, Himachal Pradesh [HFRI-040/ 02(EBC-13) PLAN/2008-11]

Status: Selected the study sites and carried out phytosociological studies in alpine pasture from Dankund to Jyot, altitude wise from Lakadmandi to Khajjiar and Khajjiar to Sach areas of Kalatop-Khajjiar Wildlife sanctuary. Total number of plant species in alpine pasture from Dankund to Jyot were about 30. Documented the plants of medicinal value from the studied areas.



General View of the Sanctuary

*Podophyllum hexandrum**Roscoea alpina*

Project 2: Management of Indian Gypsy Moth (*Lymantria obfuscata*) in Himachal Pradesh [3-[FPD-4(6)]HFRI/2008-13]

Status: Native baculovirus strains of LONPV was harvested from the infected larvae feeding on Ban Oak forest. The purified occluded bodies were applied with 5 different dilutions on IGM larvae in the dose-mortality-bioassay experiment to get LD⁵⁰ and LD⁹⁰ value of the virus.

Project 3: Survey and bioecology of potential insect pest and pathogen of cone and seed of *P. gerardiana* Wall. [HFRI-042/06(FPT-10) PLAN/2008-10]

Status: During this period a survey tour was organized to the Kinnaur and six sites at four localities i.e. Kalpa (Pangi), Labrang, Kilba and Jhangi were selected for carrying out different survey and observational activities. These areas are surveyed to assess the infestation of insect pests and pathogens on the cones and seeds of the Chilgoza pine. Samples were also collected from these sites. Field visits and assessment of preharvest infestation on cones and seeds of pines i.e. *P. gerardiana* has been recorded. Samples have been collected from field for post harvest evaluation of infestation of insect pests on cones and seeds. Isolation of insect pests and pathogens have been isolated from infected cones and seeds. New seed borer i.e. borer *Cateremna tuberculosa* Meyrick, 1882 have been reported for the first time as a seed pest of Chilgoza seed. Life history of seed borer *Cateremna tuberculosa* Meyrick, 1882 of Chilgoza has been recorded for the first time. Further investigation on damage by the insects and pathogens on the cones and seeds of Chilgoza is in progress.

Project 4: Assessment of nutritional status of most preferred wild edible plants of Kinnaur district, Himachal Pradesh [HFRI-043/07(NWFP-02) PLAN/2008-11]

Status: A Questionnaire for documentation of wild edibles was prepared and used to collect information on wild edible plants from Kalpa, Rogi, Pangi, Akpa, Rarang, Asarang, Sangla, Batseri, Raksham, Chitkul and Nichar villages. Information on 21 wild edible plants was documented and most preferred wild edible plants were prioritized. Preliminary nutritional analysis of wild edible fruit samples is in progress.

Fruits of *Viburnum cotinifolium*Unripe fruits of *Hippophae salicifolia*

Project 5: Population genetic analysis and characterization of *Cedrus deodara* germplasm through DNA based markers [HFRI-044/05(SFG-14)PLAN/2008-11]

Status: Collected plant samples (needles) from 11 populations from the state of Himachal Pradesh. These samples were collected from 50 individual trees selected randomly within the population with each selected tree photographed, numbered and geo-referenced. Standardized genomic DNA isolation and purification techniques at FRI, Dehradun.



Selected trees of Deodar for DNA analysis

Project 6: Development of techniques for raising Deodar (*Cedrus deodara*) plantations through tall plants [HFRI-045/04(SFG-15)PLAN/2008-11]

Status: Carried out survey and selected forest near Shillaru in Shimla district for extraction of Deodar wildlings for experimental purposes under the project. Besides this, also selected a site near Shillaru nursery for establishing pilot scale field trial. Carried out experimental plantation of Deodar tall wildlings during August 2008 on that selected site. Nursery studies for raising tall plants could not be initiated as Deodar seeds of last year's collection (2007 was considered as bad seed year in case of Deodar) failed to germinate in nursery. Fresh seeds of Deodar were collected during October 2008 and subsequently sown in the nursery for studying the techniques of raising Deodar tall plants. Growth and survival data pertaining to experimental plantation are being recorded regularly. However, initial field survival results of Deodar tall wildlings are not encouraging.



Field Planting of Tall Wildlings of Deodar

EXTERNALLY AIDED PROJECTS

Project 1: Network Project on, “Population assessment and identification of superior genetic stock of *Picrorhiza kurrooa* Royle ex. Benth and *Valeriana jatamansi* Jone by screening different populations from North-western Himalayas (Himachal Pradesh and Uttarakhand)[GO/HP-03/2009/2008-11]

Status: This is a multi-institutional project. To draw roadmap for implementation of the project, two workshops were organized at Himalayan Forest Research Institute (HFRI), Shimla and Jaypee University of Information & Technology (JUIT), Wagnaghat, Solan. The protocols have been developed for administrative and research issues. Published the brochure on *Picrorhiza kurrooa* and *Valeriana jatamansi* for proper identification of the species in the field. Existing available strains of both the species have been sent to IHBT, Palampur and JUIT for analysis of active ingredients.



Network partners during the workshop

Project 2: Taxonomy, biodiversity & habitat association of Noctuid Moths in various conifer forests of Himachal Pradesh [0265/T/HFRI/029/0809/156/2008-11]

Status: Surveys carried out to selected localities as representatives of the habitat type in the study area i.e. Chirpine forest of Town Bhrari (Hamirpur), Malan (Kangra) & Sairighat (Solan); Kail forests of Theog (Shimla); Deodar forest of Narkanda and Theog (Shimla); Chilgoza forests of Kilba and Akpa (Kinnaur) and Silver fir & Spruce forest of Narkanda (Shimla). Total 629 specimens of Noctuid moths have been collected for these sites. Various environmental factors (Temperature, humidity & altitude), other parameters (latitude & longitude) and pest incidence in the field have been studied. The specimens of collected Noctuid moths are preserved for taxonomic study and biodiversity analysis. Some identification of Noctuid fauna has been made with the help of literature.

Project 3: Field evaluation of superior accessions of *Jatropha curcas* L. under micro-mission programme in Himachal Pradesh [BT/PR-11348/PBD/26/178/2008] [DBT Funded Project/2008-11]

Status: Total 504 no. rooted cuttings of superior accessions of *Jatropha curcas* from HAU, NBRI and Biotech Park were received in New Delhi during September 2008. For establishing experimental plantation of *Jatropha curcas*, a site was selected at village Solag, Panjgai in Bilaspur district of Himachal Pradesh (N 31°21.356' E 76°49.737', Elevation: 938m).



Nursery stock of superior accessions



Multi-location trial of *Jatropha*

Plantation of rooted cuttings carried out during October 2008, as per the statistical design provided by DBT *Jatropha* National Coordinator. Seeds of 19 superior accessions of *Jatropha curcas* received from NBPGR have been sown in institute's nursery at Bir Plassi Nalagarh (H.P.) during October 2008. The germination behaviour of these seeds was recorded in the nursery. The growth & survival data are being recorded regularly both at the plantation site and at the nursery.

EDUCATION AND TRAINING

A. ACTIVITIES UNDERTAKEN BY THIS INSTITUTE

1. Education

- A team of 16 numbers of Foresters from DoF-Nepal visited the Institute on 14th June 2008.

2. Trainings

- A training-cum-meeting was organized at village Lanabanka, Sirmour (H.P.) - A Model Village selected by HFRI for dissemination of research findings on 21st June 2008 with a view to showcasing and demonstrating the technologies in forestry research and practices. A camp workshop-cum-village meeting was organized on 3rd August 2008 at Lanabanka – Model Village as selected in District Sirmour for show-casing the research activities of the institute. Farmers including ladies folk of the villages falling in Lanabanka panchayat participated in the workshop.
- A training on “Intercropping of Medicinal Plants: Some innovations and options for diversification” was organized by the institute at Janna (Kullu), Himachal Pradesh on 14th August 2008.
- One day training-cum demonstration programme on “Commercial Cultivation of Patish and Chora” to the farmers and field functionaries of SFD of Himachal Pradesh was held on 29th August 2008 at Mashobra near Shimla under National Medicinal Plant Board Project.

- Training on “Forestry Interventions for Ecorestoration of Degraded Land” was organized at Forest Training School, Sunder Nagar on 17th July 2008. Besides the field staff of the State Forest Department, the meeting was also attended by the farmers of the surrounding areas. In all, 70 participants comprising of villagers, farmers and front line staff of HPSFD, were present during this one day training.
- The institute organized a one day Training-cum-field Demonstration programme on “Integrated Pest Management in Chirpine” on 18th September 2008 at Samtana Forest in Aghar Forest Range. About 50 forest officials and 30 farmers of the division were present during the programme.
- Five days training on planting techniques and uses of Bamboos etc. under Bamboo Technical Support Group (BTSG), ICFRE, Dehradun was organized by the institute under the aegis of National Bamboo Mission, New Delhi. The training was organized from 13th to 17th September 2008 at Forest Training Institute, Chail.
- One day training and demonstration programme on ‘Commercial Cultivation of Medicinal Plants: An Option for Augmenting Rural Income’ was organized by this Institute under VVK activities at Veergarh in Kotgarh region of Himachal Pradesh on 13th December 2008.
- One day training and demonstration programme on ‘Tree Improvement - A Tool for Productivity Enhancement’ under VVK activities has been successfully organized at Bir Plassi, Nalagarh in Nalagarh Forest Division of Solan, district of Himachal Pradesh on 16th December 2008.
- A one day training programme on Commercial Cultivation of Medicinal Plants, was organized at Matiana in Shimla district, on 24th December 2008.
- A one day training on “Awareness and Commercial Cultivation of Medicinal Plants” to the farmers and field functionaries of SFD of Himachal Pradesh was organised on 24th December 2008 at Tattapani district, Mandi under Externally Funded Kol Dam Hydro Electric Project. In all, 50 participants were present during the training.
- A one day training programme on “Commercial Cultivation of Medicinal Plants” under Kol Dam Project was organized at Tattapani, district, Shimla district, on 30th December 2008. About 50 farmers and officials of Himachal Pradesh Forest Department (Karsog Forest Division) participated in the training.



Training on "Forestry Interventions for Eco-restoration of Degraded Land"



Training on “Integrated Pest Management in Chir-Pine”



Training on “Commercial Cultivation of Medicinal Plant”

- One day training on "Integrated Pest Management in Nursery of Medicinal plants" was organized at Palampur for the front line staff of Palampur Forest Division on 5th February 2009. Total 40 frontline staff of SFD participated in the training.
- A Village Forest Development Committee meeting at Maloh, Sryuini, Mandi, Himachal Pradesh was organized by this Institute on 25th February 2009 under Participatory Forest Management Project.

B. PARTICIPATED

- Training programme on 'Introduction to ArcGIS-9' from 28th to 30th April 2008 at Himalayan Forest Research Institute, Shimla.
- Conference on "All India coordinated project on Bamboo" held at Indian Institute of Entrepreneurship, Guwahati organized by Rain Forest Research Institute, Johrat on 23rd May 2008.
- Workshop on "e-Governance Initiative by ICFRE and Development of Indian Forestry Research Information System (IFRIS)" from 21st to 23rd May 2008 in the Conference Hall of HFRI.
- Dr. Rajasekaran, Scientist attended the training on "Forest Certification for Sustainable Forest Management" organized by Indian Institute of Forest Management, Bhopal from 25th to 27th June 2008 at IIFM, Bhopal.
- Training on "Main streaming Biodiversity in Environmental Impact Assessment" at Wildlife Institute of India, Dehradun from 18th to 23rd August 2008.
- Training on Statistical Techniques for Research Methodology at IASRI, New Delhi from 26th December 2008 to 7th January 2009.
- Six weeks training on "Basic Forestry" at SFS College, Dehradun, from 15th December 2008 to 23rd January 2009.
- One day brain-storming-cum-interaction workshop for stakeholders (Growers, Traders, Industry and Scientists) on Medicinal and Aromatic Plants of Himachal Pradesh, as organized by Dr. Y.S. Parmar University of Horticulture & Forestry, NAUNI, district Solan on 24th January 2009.
- Training on "Insect Pest Management" with effect from 10th to 19th February 2009 at Indian Institute of Pest Management (ICAR), New Delhi.
- British High Commission supported two days training programme on Regional Case Study Workshop on 16th and 17th February 2009 held at Nainital, Uttarakhand.

PUBLICATIONS

Brochures/ Technical Bulletins/ Booklets/ Pamphlets Published

- A Pamphlet titled Adarsh Gaon : Lanabanka was published by the Institute.
- Singh R. (2008), Chirpine Weevil – A Pest of Chir. HFRI / BR/030: 8 p.

Proceedings etc.

- Proceedings of the workshop on Forest Insect Pest and Disease Management in Himalayas. ICFRE Number: 128-ICFRE-BK-75/ HFRI-BK-1-2009, HFRI, Shimla: 219 p.



Edited Chapters Published in the Books

Joginder Singh, A. Rajasekaran & K.D. Sharma (2008). Traditional ethnobotanical knowledge of Kiran Pargana, Shimla, district, Himachal Pradesh In: *Phytotherapeutic Wisdom of Indian Rural Aboriginals*" (Ed.), Dr V. Singh, Published by Scientific Publishers (India), Jodhpur, Page No. 253-263.

Research Reports

Ranjeet Singh (2008). Drying of *Dalbergia sissoo* Roxb. (Shisham) in National Provenance Trial at Basantar Bela, Jammu sent to the PCCF, Jammu & Kashmir and Director, State Forest Research Institute, Jammu & Kashmir.

Pawan Kumar (2008). Dying of *Cedrus deodara* (Deodar) in Pangna Forest Range of Karsog Forest Division: (Research Report). Report submitted to the PCCH, H.P.; CF, Mandi; CF (Research) and DFO, Karsog Forest Division.

CONSULTANCY

Work on the constancy on "Studies on Environment Impact Assessment and Preparation of Environment Management Plan" for Integrated Kashang Hydroelectric Project (243 MW); Kuthar Hydroelectric Project; Renuka Hydroelectric Project and Formulation of "Catchment Area Treatment (CAT) right from Pandoh Dam to Larji" is in progress.

CONFERENCES/MEETINGS/WORKSHOPS/SYMPOSIA/EXHIBITIONS

Attended

The representatives from Himalayan Forest Research Institute (HFRI), Shimla, Himachal Pradesh attended the Workshops/Seminars/Conferences/Symposia as given below during the period under report:

- International Conference on Improvement of Bamboo Productivity and Marketing for Sustainable Livelihood as organized by National Bamboo Mission, Ministry of Agriculture, Govt. of India at New Delhi from 15th to 17th April 2008.
- Meeting in the office of Himachal Pradesh Power Corporation Ltd., Shimla where Environmental Impact Assessment (EIA) and Environmental Management Plans (EMP) as prepared by the ICFRE for Renukaji Project were presented and discussed.
- Second workshop cum meeting of e-Champions on the "Development and Implementation of IFRIS at IWST, Bangaluru" from 16th to 20th 2008.
- Workshop on "Registration of Plant varieties - Protection of Farmers Rights and Traditional knowledge" on 23rd August 2008 at Armsdale Building HP Secretariat, Shimla, as organized by HP Patent Information Centre, State Council for Science, technology and Environment, Govt. of Himachal Pradesh.
- International Conference on "Novel Approaches for Food and Health Security in High Altitudes" held at the Defence Institute of High Altitude Research (DIHAR), DRDO, Leh-Ladakh-194101, J&K, INDIA from 6th to 10th September 2008. During this workshop, two papers were presented by the authors.
- Interactive Meet on "Climate Change: Perspective and Opportunities in Context of Himachal Pradesh" on 16th October 2008 in the Conference Hall of Armsdale Building in the H.P. Secretariat, Shimla.

- Workshop on "User Requirements of Weather and Climate in Western Himalayas" as organized by India Meteorological Department, Meteorological Centre, Shimla at Hotel Holiday Home, Shimla on 20th October 2008.
- Training-cum-Pilot Roll Out of IFRIS was organized by the SRIT, Bangaluru at HFRI, Shimla, from 29th October 2008 to 14th November 2008. All the officials working in the Institute actively participated and gave their feed back for improvement of the respective modules.
- Training on Right to Information Act-2005 on 14th and 15th November 2008 as organized by H.P. Institute of Public Administration (HIPA), Shimla.
- A brainstorming session for prioritizing forestry research for the state of Himachal Pradesh. The meeting was held under the Chairmanship of Additional Secretary (Forests) to the Govt. of Himachal Pradesh on 22nd November, 2008 at Forest Training School, Sundernagar.
- International Seminar on "Role of Plant Taxonomy in Biodiversity Management and Human Welfare" and presented the research paper on "Plant diversity in Lippa-Asrang Valley of District Kinnaur, Himachal Pradesh: Repository for Human Welfare" held at FRI, Dehradun from 1st to 3rd December 2008.
- Training Programme on "Agroforestry" at NRCAF, Jhansi from 24th November to 5th December 2008.
- An Interactive meeting on Network Project titled, "Population Assessment and Identification of Superior Stock of *Picrorhiza kurrooa* Royle ex. Benth and *Valeriana jatamansi* Jones by Screening Different Populations from North-East-West Himalayas (H.P. and Uttarakhand)" on 11th December 2008.
- The Meeting of Board of Governors of ICFRE Society held on 3rd October 2008 at New Delhi.
- The Meeting of ICFRE Society held on 22nd November 2008 at New Delhi.
- The meeting of Directors of ICFRE Institutes held on 19th and 20th November 2008 at ICFRE, Dehradun.
- The meeting of Research Policy Committee (RPC) held at ICFRE, Dehradun from 11th to 13th February 2009. Four research projects were presented before the Research Policy Committee (RPC) of ICFRE, out of which the two research projects were approved for their implementation from April 2009 onwards.
- Symposium on Functional Biodiversity and Ecophysiology of Animals from 21st to 23rd February 2009 at Department of Zoology, Banaras Hindu University, Varanasi.

Organized

- Director, Himalayan Forest Research Institute, Shimla along with team of his officers visited Srinagar from 25th to 29th June 2008. During his visit to the valley, he along with Director State Forest Research Institute, Jammu & Kashmir, met Janab Qazi Mohammad Afzal, Hon'ble Minister of Environment & Forests, Govt. of Jammu & Kashmir and apprised him of the various activities of the council, in general and the institute in particular, in his state. However, the research station scheduled to be inaugurated by him at Ganderbal, Kashmir on 27th June 2008, could not be



Meeting of Director, HFRI, Shimla with
Hon'ble Minister of Environment & Forests,
Government of J&K

inaugurated due to disturbances in the state.

- One day brainstorming interactive workshop on 6th August 2008 for "Identification and Prioritization of Forestry Research Needs in Himachal Pradesh" in the Conference Hall of the institute.
- A workshop titled, "Need of Forestry Research and Diagnostic Studies for Rural Development" was organized by HFRI, Shimla on 24th March 2009. This workshop was attended by about 40 delegates.
- The institute organized two days Research Advisory group (RAG) Meeting on 23rd and 24th October 2008, where scientific work as carried out by the Scientists during the year was evaluated by the Hon'ble member of RAG.

MISCELLANEOUS

- A workshop was organized by HFRI, Shimla in association with Wildlife Wing of State Forest Department of H.P. on the occasion of World Environment day on 5th June 2008 at Potter's hill Shimla. Establishment of Temperate Arboretum and Botanical Garden (TABG) have also been initiated at the same location for which Wildlife Wing of the State Forest Department of Himachal Pradesh had signed a Memorandum of Understanding for technical collaboration with Himalayan Forest Research Institute, Shimla.
- To make the farmers of Model Village, Lana Baka and Van Vigyan Kendra, Sundernagar, aware of the activities carried out by the Council in forestry research and also by other Research Organizations, two Exposure Visits from 24th February to 1st March 2009 were conducted. During these visits, the farmers were taken to Research station Dhaulakuan (Paonta Sahib), Model village Shyampur, Medicinal plant nursery at Forest Research Institute Dehradun, Shushila Tiwari Herbal Garden, Rishikesh, Medicinal Plant Marketing Depot of Forest Corporation at Bibiwala, Medicinal plant pharmacies/market in Haridwar, Van Vigyan Kendra at Dehradun, Hara Farms near Yamunanagar. The Farmers were also shown the fields of Progressive Farmers for assessment and adopting the models suitable to their respective areas.



Visit to Green House at Shyampur