

HIMALAYAN FOREST RESEARCH INSTITUTE (HFRI), SHIMLA

RESEARCH PROJECTS (PLAN) OF HFRI COMPLETED DURING 2009 -2010

S. No.	Projects	Name of PI	Thrust Area	Research Findings
1.	<p>Standardization of Nursery Techniques of Five Prominent Indigenous Species (<i>Capparis spinosa</i>, <i>Collutea nepalensis</i>, <i>Caragana gerardiana</i>, <i>Ribes orientale</i>, <i>Cratagus songairca</i>) besides <i>Elaegnus angustifolia</i>, <i>Hippophae rhamnoides</i> & <i>Rosa webbiana</i> of cold deserts.</p> <p>8 years (April, 2002)</p>	<p>Dr. K.S. Kapoor, Scientist-F</p>	<p>Forest Productivity (Silviculture)</p>	<p>Trials to understand the (i) Effect of different concentration of Indole-3 Butyric Acid on rooting in shoot cuttings of <i>Ribes orientale</i>, <i>Colutea nepalensis</i>, <i>Elaegnus angustifolia</i>, <i>Hippophae rhamnoides</i> & in root suckers of <i>Rosa webbiana</i> & <i>Capparis spinosa</i>, (ii) Effect of pre-sowing (hot-water and Gibbrellic Acid) treatment on germination behaviour in the seeds of <i>Ribes orientale</i>, <i>Colutea nepalensis</i>, <i>Hippophae rhamnoides</i>, <i>Capparis spinosa</i> & <i>Rosa webbiana</i> and (iii) Effect of medium (various ratios of sand & soil) on germination behaviour in the seeds of <i>Ribes orientale</i>, <i>Colutea nepalensis</i>, <i>Hippophae rhamnoides</i>, <i>Capparis spinosa</i> & <i>Rosa webbiana</i> were conducted both in poly house and in nursery conditions. Besides this, experiments on the effect of mulching treatments on <i>Ribes orientale</i>, <i>Hippophae rhamnoides</i>, <i>Rosa webbiana</i> and <i>Capparis spinosa</i> were also undertaken. Detailed ecological studies for the identified species were carried out in the selected sites at Mane, Ladang, Kurith, Hurling, Tabo and at Samdoh falling in Spiti Valley of H.P. Some more site in Lahaul part of the district and in parts of the district Kinnaur werev also undertaken.</p> <p>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 <i>Elaegnus angustifolia</i>, <i>Hippophae rhamnoides</i>, <i>Rosa webbiana</i> and <i>Colutea nepalensis</i> were established those are giving the excellent performance. Mortality replacements in field trials of species like, <i>H. rhamnoides</i>, <i>C. nepalensis</i> & <i>R.webbiana</i> carried out. Repeat ecological studies of the identified species in field conditions were also conducted. Major emphasis was laid on <i>Cratagus songarica</i> – 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.</p>

			<p>In nutshell, data on various nursery trials revealed that hot water treatment for 24 hours in case of seeds of <i>Hippophae rhamnoides</i> gave maximum (75%) germination percent. In case of <i>Eleaegnus angustifolia</i> the 5000 ppm and 6000 ppm concentrations of IBA using quick dip method were found to be more suitable in soil and sand medium whereas 6000 ppm and 7000 ppm concentrations using the same method were found to be best when the growth in open nursery conditions was observed. Only 31 per cent of germination was recorded in case of <i>Ribes orientale</i> when sown after hot water treatment for 24 hours whereas in case of <i>Rosa webbiana</i> the germination recorded was 68.80 percent when sown in pure sand medium.</p> <p>It was also 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 <i>Eleaegnus angustifolia</i>, <i>Hippophae rhamnoides</i>, <i>Rosa webbiana</i> and <i>Colutea nepalensis</i> were established those are giving the excellent performance.</p> <p>Experiments to assess the effect of density, depth of sowing, mulching, irrigation schedules in all these species as laid during the last year were maintained and additional experiments on these aspect were repeated during the year and relevant recordings made accordingly. Detailed ecological studies were conducted near Spillo, Kinnaor; Kaw, Spiti and in some other locations of Spiti. Besides, demonstration plantations as laid in the field were maintained and the growth data was recorded. It was observed that the performance of plantation of <i>Elaeagnus angustifolica</i> showed the best results as far as growth and height of the species was concerned.</p> <p>Small experiments to observe the behavior of some these prominent species under trail were also undertaken so as to have some basic information for further studies in the nursery and in field conditions as well. It was seen that new growing shoots of at least 15 cm length of <i>Elaeagnus angustifolica</i> has the capability to growing to a new plant. It was also found that keeping the seeds of these species in hot water for 24 hours and thereafter taking up the subsequent experiments always gave good results. <i>Ribes orientale</i> gave better</p>
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				<p>performance in shade house conditions while compare to polytunnels and under ground polytunnel. Seeds of these species when collected in the month of November were shown to give best germination per cent amongst the different time of collections tried.</p> <p>Objectives and their per cent thereof have been achieved as per the proposed targets. Besides, additional activities like establishment of field plantations were also undertaken certainly, by not raising the allocation of the project.</p> <p>Field and nursery activities under the project are being appreciated by the various stakeholders including the authorities from the desert development programme. Recently, a team from Planning Commission of India visited the Research Station and appreciated the outcome as achieved under the said project.</p>
2.	<p>Survey, Biology and Control of Insect-Pests of Important Medicinal Plants in Himachal Pradesh [HFRI-033/06(FPT-06)/ PLAN/2005-2010]</p>	<p>Dr. Ranjeet Singh, Scientist-E</p>	<p>Forest Protection (Insect-pests, diseases and control)</p>	<p>In total 37 insect species belonging to 5 insect orders viz. Lepidoptera, Coleoptera, Hemiptera, Orthoptera, Hymenoptera and 24 families, Class Arachnida, were collected from the selected 5 medicinal plants raised in the nurseries. The study on the biology of <i>Plusia orichalcea</i> Fab. on <i>Saussurea costus</i> infesting <i>Picrorhiza kurroo</i> Royle ex Benth., <i>Acrtium lappa</i> Linn., <i>Heraclium candicans</i> Wall. ex DC, <i>Angelica glauca</i> Edgew., <i>Saussurea costus</i> Falc. and <i>Valieriana jatamansi</i> Jones revealed that the insect was most active from second week of April to last week of June. Four overlapping generations were studied from March to June. The moth was reddish brown with conspicuous triangular golden patch on each forewing toward the outer margin. There were 5 – 6 larval instars, 16.25 ± 5.4 days larval period, 10.75 ± 2.6 days pupal period and total lifecycle has been completed in 35 days in the laboratory. Three generation of the pest has been studies in the laboratory. The pest starts appearing in the field in March, and Maximum activities recorded in May and June. In the laboratory, heavy larval (3rd and 4th instars) mortality has been recorded. 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. Two species of larval parastoids viz., <i>Apanteles glomeratus</i> and <i>Apanteles ruficrus</i> (Haliday) has been reported and the extent of parasitisation during by these species was 13.3, 21.2</p>

				and 25.0 per cent in April, May and June, respectively. Entomopathogen, which resulted in large scale mortality of larval and pupal population in field as well as in laboratory, was identified as <i>Bacillus cereus</i> Var. Mycoides (Flugge) Smith, Gorden and Clark. The study indicated that these biological control agents can play an important role in eco friendly management of pest. Different insecticides and biopesticides viz. Grownim @ 5.0 %, Monocrotophos @ 0.03%, Endosulphan @0.1%, Furadan3G @ 30 gm/m sq., Dursban @ 0.02% Rogar @ 0.05%, Neem cake @ 500 gm / m sq and Summer oil @ 5.0 % in <i>Valeriana jatamansi</i> were evaluated in nursery and found that endosulphan @0.1% and Chloropyriphos@ .02 % was effective in controlling pest in nursery. Insecticidal residual analysis of treated plants has been carried out from 3 research organizations viz. UH&F Nauri, IHBT Palampur and IIM, Jammu revealed that Endosulfan @0.1%, Monocrotophos@.03%, Carbofuran@ , Chloropyriphos@ .02 % have shown the residual effect in the used part of plant, since , these insecticides is not a good option to control the insect pest in nursery.
3.	Survey and bioecology of potential insect-pests and pathogens of cone and seeds of <i>P. gerardiana</i> Wall. 2 years (April, 2008)	Dr. Pawan Kumar, Scientists-B	Forest Protection (Insect-pests, diseases and control)	Eight sites in the districts of Kinnaur and Distt. chamba i.e. Pangi 2750m, Labrang 2915m, Jhangi (Akpa) 2742m, Kilba 1894m, Akpa FRH 2503m, Korathi 2753m, Bharmour 2143m and Rispa 2406m were surveyed for the insect pest and pathogen infestation on Chilgoza cones and seeds. Cones were heavily infested by the cone borer in the natural conditions and seeds are severely attacked both by seedborer and pathogens during storage. It was observed that cones are infected by cone borer <i>Dioryctria abietella</i> throughout the range of natural occurrence of Chilgoza pine. No pathogen attack was found on the cone, whether infected by insect borer. It was observed that cones are heavily infested by insect borers and at some places e.g. at Kilba, around 69% of cones are damaged by insect borer, <i>Dioryctria abietella</i> but not affected by pathogens. Coarse frass without resin and some webbing on the outside of cones indicate infestation by cone worms. Chilgoza seeds which are economically important are heavily infected by both insect borer and pathogens. The seed borer identified as <i>Cateremna tuberculosa</i> Meyrick is reported for the first time infesting the seeds of the Chilgozapine. Taxonomy of the

				<p>same is updated by studying the wing venation and genitalia. It has been observed that symptom of the seed borer attack start appearing during month of July and in august almost 50% of seeds were found damaged when observed externally and the damage by seed borer continue till December and 94% seeds were found damaged. After which no insect activity was observed in stored seeds. As the borer stop all physiological and morphological changes till favorable condition again up to May-June.</p> <p>In total, ten fungal species i.e. <i>Alternaria alternata</i>, <i>Aspergillus niger</i>, <i>Cephalosporium</i> sp., <i>Chaetomium globosum</i>, <i>Cladosporium</i> sp., <i>Fusarium equiseti</i>, <i>Fusarium oxysporum</i>, <i>Penicillium citrinum</i>, <i>Rhizopus stolonifer</i> and <i>Trichothecium roseum</i>. <i>Penicillium citrinum</i> was the most predominant fungus affecting Chilgoza seed in storage. It was observed that 40.07% of seed rot was found at 25⁰C and even 8.27% seed rot was observed at 0⁰C due to <i>Penicillium</i>.</p> <p>It was concluded that cones are heavily attacked only by <i>Dioryctria abietella</i> in natural conditions whereas, seeds are damaged by 1. <i>Dioryctria abietella</i> 2. <i>Cateremna tuberculosa</i> and 3. Fungal species. This led to the formulation of sequel project for developing the management strategy for control of pests and diseases of Chilgoza seeds during storage.</p>
4.	<p>Planting Stock Improvement Programme in <i>Cedrus deodara</i>. 5 years (April, 2003-2008) Extended for 2 years</p>	<p>Sh. K.S. Thakur, IFS (Repatriated)/ Dr. Rajesh Sharma, Scientist-E</p>	<p>Genetic Improvement (Tree Improvement)</p>	<p>The project has been completed with the establishment of progeny trial in the field. Since deodar is a slow growing species this progeny test need to be maintained for 20 years. However, the SPAs are yet to be established as the matter to execute culling in selected seed stands have been sent to CEC for obtaining culling permission. Since the selected seed stands will become SPAs after removal of the inferior trees from the stand , this objective is yet to be achieved and with best of the efforts made the case has now been referred to CEC. The second objective to raise progeny test has been achieved but progeny test need to be maintained not only for interpretation of genetic variation but will also serve as base population for future studies in deodar. The conventional procedures for selection of seed stands, CPTs and raising progeny test have been followed to achieve the objectives of the project.</p>

