COMPLETED EXTERNALLY AIDED PROJECTS

Project 1: Development of suitable model for inter-cropping of commercially important medicinal plants with horticultural plantations in temperate region of Himachal Pradesh [BT/PR4372/PBD/17/285/03]

Findings: Developed the package of cultural practices for intercropping of temperate medicinal plants viz. *Aconitum heterophyllum, Angelica glauca, Polganatum verticilatum, Picrorhiza kurrooa* and *Valeriana jatamansi* with horticultural crops i.e. Apple and Cherry in high hill temperate region of Himachal Pradesh. All the five selected medicinal plants were found suitable for inter cropping with horticultural plantation. It has been observed that active ingredient contents in intercropping samples was lower than the samples from natural habitat, however is not that significantly lower, that cannot be saleable. The net economic return from intercropping of medicinal plants was found to be in the order *Aconitum heterophyllum*> *Angelica glauca*> *Valeriana jatamansi*> *Polganatum verticilatum*> and *Picrorhiza kurrooa.* The finding gives an opportunity to the farming communities to go for diversification and generate extra income in a sustainable manner.

Project 2: Ecological and management studies in certain, dry temperate and alpine pastures of Lahaul and Spiti, Himachal Pradesh

Findings: Alpine pastures in the entire Himalayan region constitute approximately 1.7 million ha and over 2/3 of this area lie in Himachal Pradesh. The state is predominantly mountainous and more than 92 % of the population is mainly rural and is directly engaged in animal husbandry. However, indiscriminate use of the grazing areas has resulted in critically low biomass availability and accordingly, adversely affected the livestock production. The utility and usefulness of various species of livestock can not exploited fully unless and until the feed and fodder resources are fully developed and properly utilized. Hence, the importance of alpine pastures – which is not only a group of grasses but is an ecosystem in itself can not be underestimated.

Keeping all the above points in views, sites supporting alpine pastures in each part of the district of Lahaul and Spiti i.e. Miyad Nallah, Triloknath, Dalang and Kwaring in Lahaul valley and Gue, Tabo and Kunjam in Spiti valley were selected for detailed structural and functional aspects like floristics, phyto-sociological and biomass studies/ estimations. Management aspects were also worked out at length. The studies have revealed that these alpine pastures certainly require proper attention. A booklet on Flora of Miyad valley – The lesser known Lahaul was also brought out under the project.

Project 3: Development of ecologically viable and socio-economically acceptable integrated model for arresting Willow (*Salix* sp.) mortality in Lahaul valley of Himachal Pradesh

Findings: Benchmark surveys for assessing the causes behind large scale mortality in *Salix* were conducted in different areas of Lahaul valley of Himachal Pradesh. The planting stock of *Salix* both local and International clones was raised and maintained at Field Research Station

Tabo for establishment of demonstration plantations. *Salix fragilis*, *S. vitellina, S. matsudhana, S. babylonica, S. alba* and *S. corrulea* were the collections from the state of Jammu and Kashmir whereas International clones (given by code names) viz. UWA-1; UWA-2; UWE-1; UWM-1; UWM-2; UWM-3; UWU-1; UWU-2; UWK; UWHY-1; UWHY-2; and WO2-4 were procured from UHF, Solan. Beside this, planting stock from 8 different locations of dist. Kinnaur and Spiti falling within the state of Himachal Pradesh were also collected, raised and maintained at Tabo. As per the objectives of the project, demonstration plantations were established following different models in both farmers and in Govt. lands. Life cycle of the willow aphids were also investigated. Villagers meetings were also organized for generating awareness amongst the local population.

Project 4: Screening of potential germplasm of *Hippophae rhamnoides* (Seabuckthorn) for raising quality planting stock in the nursery and establishment of demonstration plantations in cold desert areas of Spiti valley, Himachal Pradesh [DDP/Spiti/SBT/2006-11/ 2006-09]

Findings: *Hippophae rhamnoides* commonly known as Seabuckthorn is a multipurpose plant species which can conserve the water and soil of fragile cold desert ecosystem. It also enriches the soil fertility through fixing atmospheric nitrogen. Its natural habitat includes river banks, valley and shady slopes and those sites where plenty of moisture is available. To exploit the species on a large scale, especially, in a cold desert areas of Himachal Pradesh, efforts to screen the potential germplasm of the species for raising quality planting stock were carried out. Under the project, population from different areas of Spiti valley were screened and finally planting stock from Shego, Tabo and Susna were collected for establishment of demonstration plantation. Demonstration plantation in an area of half ha was raised and maintained. Data recording were carried out. Different monitoring teams under Desert Development Programmes visited the demonstration plantation and appreciated the efforts of the institute.

Project 5: Inventorization, documentation and plant diversity and to evolve site specific management strategies for conservation of various sacred groves in Kullu valley of Himachal Pradesh

Findings: Plant samples were collected from all the 33 sacred groves as recorded in Kullu Valley and a total of 215 plant species belonging 68 families have been identified so far. Data on GBH and height of trees in seven sacred groves have also been collected. Ethno-botanical information on 62 species belonging to 28 families was documented and information on 9 venerated plants had also been collected during the survey. About 150 Deodar seedlings were planted in the degraded sacred groves of Nashala and Jana. A pamphlet on "*Dev van Ek Prachin Dhrohar*" was prepared for creating awareness amongst the local community for conservation and rejuvenation of the sacred groves. Villager's meeting/discussion on conservation and rejuvenation of sacred groves was organized at Jana and Rujak Villages in Kullu District. To create site-specific management strategies for the conservation and rejuvenation of sacred groves, data on existing management practices, threats affecting each sacred groves and type of rejuvenation required were collected from all the sacred groves.

Project 6: Quality planting material of *Picrorhiza kurrooa* Royle ex. Benth and *Valeriana jatamansi* Jones and extension of their cultivation technology to local communities [GO/HP-2/2004-07: NMPB]

Findings: Under this project the Institute raised 4.6 lacs of quality planting material of *Picrorhiza kurrooa* (Kutki) and *Valeriana jatamansi* (Mushakbala) in different nurseries of the Institute against 4.0 lakhs target given by National Medicinal Plant Board (NMPB), New Delhi. Also distributed 4.08 lakh nursery stock of Kutki and Mushakbala to various end users during the entire project period. Under extension activities of the project, Institute organized four two days training and demonstration programmes at Jagatsukh, Manali for 23 numbers of farmers of Kullu Valley. Such training and demonstration programmes were also organized at Shillaru and Model Nursery, Shimla for 34 numbers of farmers of Shillaru, Narkanda region of Shimla district. In the process trainings on commercial cultivation of Kutki and Mushakbala were organized at Jhungi and at Chail Chowk, for the farmers of Mandi district. Also organized one camp workshop-cum-training programmes on 'Commercial cultivation of temperate medicinal plants' for various stake holders at Totu near Shimla, which was attended by 50 farmers and field staff of Shimla Forest Division. Besides these, two open meetings were conducted at villages Sajla and Karjan near Manali and another open meeting at Nasogi for the farmers of Kullu valley so as to discuss about the prospects of commercial cultivation of medicinal plants in temperate region to diversify existing horticulture practices. These open meetings were attended by 125 farmers. The farmers, infact, were got sensitized through these open meetings and training programmes for adopting commercial cultivation of Kutki and Mushakbala in temperate areas. Published two booklets and two pamphlets in Hindi on cultivation of Kutki and Mushakbala in Himachal Pradesh for the benefit of various end users.

Project 7: Development of elite planting material, establishment of model plantations and extension of nursery and plantation techniques of Wild Apricot to local communities in Himachal Pradesh [27-114/NOVOD/2006-07: NOVOD]

Findings: Under this project the Institute has raised 11,000 no. of quality planting material of *Prunus armeniaca* (Wild Apricot) in different nurseries of the Institute. Demonstration plantations on 10 ha area in Mandi and Kullu districts of Himachal Pradesh were carried out during 2006-07 and maintained during 2007-08. Two no. training and demonstration programmes on 'Wild Apricot - Nursery, Plantation, Oil Production and Its Uses' were organized under this project for local communities (70 no.) at Jari village in Kullu district of Himachal Pradesh on 12th and 13th March 2007 and for field functionaries of Himachal Pradesh Forest Department (50 no.) at Forest Training Centre, Sunder Nagar, district Mandi of Himachal Pradesh on 27th and 28th December 2006. Published one booklet and one pamphlet in simple Hindi on Wild Apricot (Chuli) for the benefit of various end users.