

Utilization of Valuable Higher Altitude Plants as a Source of Income Generation and Traditional Medicine in Bharmour Forest Division, Himachal Pradesh, India

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Abstract

The present study was conducted in Holi and Bharmour areas of Bharmour Forest Division of Himachal district in Himachal Pradesh state of India. Seven (07) valuable and conservation demanding traditionally used medicinal plant species were covered under the study. The information includes traditional knowledge of the plants used by the local people of the area. The species reported are highly exploited for various purposes as different parts like root, leaves and even whole plant is harvested for reasons. The informants from the study area blame the excessive extraction for reducing population of these species. Therefore, suggested *ex situ* and *in situ* conservation measures can be helpful for conservation of the species for sustainable utilization.

Keywords: Ethno botanical use; Extraction; Conservation; Sustainable use

Introduction

Over 50,000 plant species are used for medicinal purposes worldwide [1]. Two-third of the estimated medicinal species in use is still harvested from the wild, out of which 4,000-10,000 species may now be endangered [2]. Due to rising demand for MPs; along with degradation and fragmentation of natural habitats, more than 300 species of Indian medicinal plants have now been pushed to the 'Threatened' category as per IUCN criteria [3].

The use of plants and plant products as medicine can be traced as far back as the beginning of human civilization. The earliest record of medicinal plant use in the Himalayas is found in the Rigveda [4]. After the Rigveda, Ayurveda describes the medicinal importance of 1200 plants. The Charak or Charaka Samhita (900 BC) and Susruta Samhita (500 BC) enumerate the art of surgery, therapeutics and medicines in detail on the basis of Atharvaveda [5]. Medicinal and aromatic plants are local heritage of global importance [6]. Total 60 percent of the population of world and 80 percent of the population in developing countries rely on traditional medicine, mostly plant drugs, for their primary health care needs [7]. An account of 70 percent of the population of India [8] is dependent on traditional plant based medicines. Due to changing life, perception and lifestyle changes of the forest dwellers, the plants are exacerbated and that indigenous knowledge on resource use is being degraded severely [9,10]. Due to lack of organized, sustainable cultivation based on scientific data and lacking awareness of social factors influencing plant use and market, no proper management of traditional medicines is in place, and the numbers of these plants are decreasing at an alarming rate [11]. Medicinal herbs are regarded as free commodity (zero private cost) to be collected from nature [12]. Ethnomedicinal studies are a suitable source of information regarding useful medicinal plants that can be protected by domestication and scientific management [13].

Ethnobotany is widely regarded as the science of human interaction with plants and their environments. Ethnobotanical knowledge is the result of successful experimentation with plants since time immemorial and has given us our recognized foods and medicines. Ethnobotany illuminates the direct relationship between human beings and plants

and has proven to be of great utility in the health care programs [14].

Materials and Methods

The present study was conducted in Holi and Bharmour area falling under Bharmour Forest Division of district Himachal in Himachal Pradesh state of India. The study area falls at an altitude ranges from 2,300 m to 3,800 m with Latitude of 076°35'262' & 076°32'342' and longitude 32°18'079' & 32°17'412' in the Holi Forest Range and 1,700 to 3,800 m in the Bharmour Forest Range with Latitude of 076°32'327' & 076°41'250' and longitude 32°26'634' & 32°25'040'. The climate of the study area is temperate. The mean annual rainfall is 1500 mm, and the mean annual temperature lies between 3°C and 30°C [14].

In the present study seven (07) important species of ethno botanical importance have been taken for the study (Table 1). The information of the plants were taken based on the intensive interviews and discussions with elderly people, herbal healers, grazers (Gaddis and Gujjars) using a well-structured questionnaire. The information on plants was collected randomly by taking a minimum of 30 informants in Holi area and 20 informants in Bharmour range. All the information was obtained after receiving prior informed consent from the participants. The information covered includes the traditional application, plant parts used and perception on the use of plant species. Amount extracted, harvested, sold and consumed by local inhabitants was also covered in the questionnaire. The local inhabitants are familiar with these plant species and can identify them on the spot. However the voucher specimens of each plant was collected and deposited in the herbarium

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	Ethno botanical uses	Category	People perception for species use		Collected Season	Quantity (kg/year)		
			Holi	Bharmor		Consumed	Sold	Total
<i>Jurinea dolomiaea</i> Boiss. Compositae	Roots used as incense, decoction of the root is cardial	Vulnerable	39%	18%	Oct-Nov	100	1500	1600
<i>Gentiana kurrooa</i> Royle Gentianaceae	Leaves are eaten during fever	Engendered	32%	NIL	Oct-Nov	-	900	900
<i>Valeriana jatamansi</i> , <i>V. wallichii</i> Valerianaceae	Roots and stems are used for incense, skin disease	-	32%	9%	Oct-Nov	-	700	700
<i>Morchella esculenta</i> (L.) Pers. Morchellaceae	Fresh as well as dried morel is eaten as delicious delicacy	-	78%	32%	April-May	3	22	25
<i>Picrorhiza kurrooa</i> Royle ex Benth Scrophulariaceae	Roots powder consumed during stomachache, jaundice, and diarrhea	Engendered	25%	9%	Oct-Nov	10	70	80
<i>Viola serpens</i> Wall. ex Ging. Violaceae	Decoction of flowers is used in case of cough and cold	-	86%	36%	April-May	2	8	10
<i>Carum carvi</i> L. Apiaceae	Digestive problems	Engendered	82%	27%	April-May	2	14	16

Table 1: Ethnobotanical uses of plant species in Holi and Bharmor area.

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Results and Discussion

The seven plant species reported in the present study belonging to seven different families are used to cure various day to day prevailing diseases like fever, stomach, jaundice, cold and cough and diarrhea. Different parts of the plants like root, leaves, bark and sometimes whole plant is used for medicinal purpose. The harvested and consumption percent was found higher in Holi area than in Bharmour (Figure 1). Similar trend was observed for plant part used to treat various diseases (Figure 2). The species found in the Holi area are *Jurinea dolomiaea*, *Gentiana kurrooa*, *Valeriana jatamansi*, *Morchella esculenta*, *Viola serpens*, *Carum carvi* and *Picrorhiza kurrooa*. Among them *Viola serpens*

is collected maximum followed by *Carum carvi*. Similarly, in Bharmour area the species collected are *Jurinea dolomiaea*, *Valeriana jatamansi*, *Morchella esculenta*, *Viola serpens*, *Carum carvi* and *Picrorhiza kurrooa*. *Viola serpens* is again collected in maximum amount followed by *Morchella esculenta*.

The study revealed that the selected seven (7) valuable species are highly exploited for various purposes. The plant species are collected excessively by local people either for self-consumption or sold in the market for economic generation. As these plants occur on higher altitude and hence mostly collected by male folk during October and November and some times in the April to May (Table 1). The harvested material from these plant species is mostly sold to middle men locally and sometime at regional market for income generation. *Jurinea dolomiaea* is the highest extracted plant followed by *Gentiana kurrooa* with harvested yield of (1600 kg/yr) and (900 kg/yr). Whereas, *Viola serpens* (10 kg/yr) is the least extracted medicinal plant species in the study area. The respondents believe that most of the species are disappearing at faster rate because of its excessive extraction due to forest fire and over grazing.

Three plant species i.e., *Gentiana kurrooa*, *Carum carvi* and *Picrorhiza kurrooa* are reported endangered whereas one species *Jurinea dolomiaea* is vulnerable. The available evidences have shown that the reduction of plant species is due to excessive extraction of species by licenses holders along with the illegal extraction. Five (5) per cent of the respondents were of the view that over grazing affects the availability of different plant species. Twenty (20) per cent respondents have the view that forest fire also reduces the availability of plant species. Other major threats in the study area are construction of hydro projects, increasing population pressure, soil erosion and cloud bursts/flash floods. The following conservation practices can be helpful to minimize effect of species declining.

Ex-situ conservation

- Development of nursery and planting technology for rare and threatened taxa.
- Development of gene bank (field oriented).
- Networking for coordination and collaboration at inter disciplinary and inter institutional levels.
- Application of cost effective ways for conserving the biological parts of medicinal flora.
- License should not be allowed to the extraction of all species.

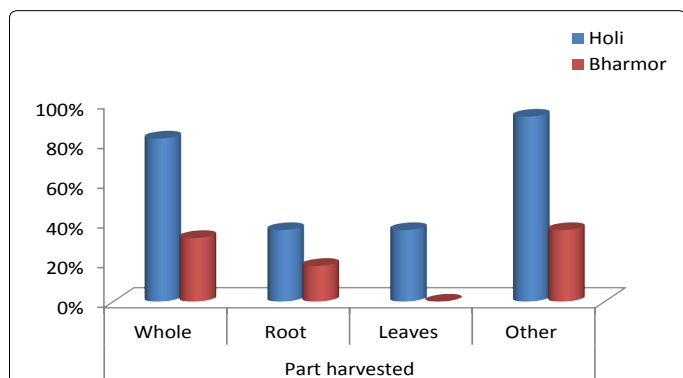


Figure 1: Informants perception on harvested percentage in two study areas.

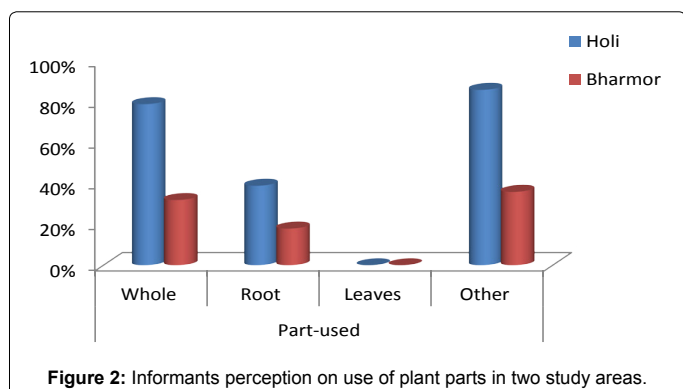


Figure 2: Informants perception on use of plant parts in two study areas.

- Illegal extraction should be stopped.
- Villagers should be awakened about the importance of biodiversity conservation.
- Villagers should check illegal extraction.

***In-situ* conservation**

- Development of microhabitats, endemic centers, hotspots. A separate working plan circle in forest department may be constituted.
- Application of recent trends in the field of biodiversity conservation to the existing preservation plots, sacred grooves and specific sites falling under various other key area of conservation.
- Evaluation of the target species that are to be conserved on the basis of extensive surveys.
- Protecting ecosystems, natural habitats, and maintenance of viable population.
- Establishment of buffer zones in order to rehabilitate and promote recovery of medicinal plants.
- Enrichment of the species and associates by seed sowing/ planting.
- To develop alternative sources of economic gain related to conservation of the natural environment such as Eco-tourism, cultivation medicinal herbs, organic farming practices, etc.
- To develop facilities for raising large germplasm of the endangered species.
- Last but not the least, to mount a massive awareness campaign for the benefit of communities.
- Grazing should be on rotational basis.

Conclusion

The present study assessed strategies to determine appropriate measures to conserve threaten medicinal species, due to their rising demand; along with degradation and fragmentation of natural habitats. Indigenous knowledge and use have to be analyzed to develop appropriate management measures that build on both scientific and local knowledge. Due to changing perception of the local people, and the ever increasing influence of global commercialization and socio-economic transformation, indigenous knowledge on plant resource use is constantly diminishing. Due to the lack of organized sustainable and scientifically monitored cultivation and harvesting, proper management techniques, and lack of awareness of social factors, the number of useful plant resources is decreasing at an alarming rate. Furthermore, the indigenous knowledge on the use of lesser known plants is also rapidly declining. Hence illegal extraction at hilly areas needs to be stopped. Licenses holders shall be allowed to extract limited amount of material for harvesting or even if possible; they may be stopped until the population of these species will increase.

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