Ethno-Botanical Study of Wild Medicinal Plants of Neelum Valley, Azad Jammu and Kashmir, Pakistan

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Abstract: The study was aimed to document the medicinal plants and their traditional uses in the Neelum Valley, Azad Jammu and Kashmir, Pakistan during 2010. Neelum Valley represents phyto-geographic features of Sino-Himalayan region and is rich in natural resources. The area supports moist temperate forest, dry temperate forest, sub-alpine scrub, alpine pastures and cold deserts. Data was ere collected through direct observations during field surveys, questionnaires and interviews of local inhabitants. A total of 67 medicinal plants were identified, traditionally used for remedial measures against 32 diseases. seven plant species were commercially extracted and sold to the market. Maximum (14) plant species were used as antiseptics followed by weakness (9) and anti worm (8). Leaves of these species were used more commonly (38.46%) as compared to roots (24.36%). There was a medium level of use of maximum plant species (44%) followed by low (34%) and high (22%) level. Low income and lack of facilities increased the dependence of majority of the local communities on the available natural resources for their subsistence. Study revealed that at least 16 species were threatened locally due to habitat degradation including deforestation, livestock grazing, over-exploitation and unscientific ways of collection from their natural habitat. Information gathered would be useful for the conservation of wild medicinal plants of the valley.

Keywords: sub-alpine scrub, alpine pastures, cold deserts, Sino-Himalayan reegion, Himalayan region, herbal medicines, medicinal plants.

INTRODUCTION

It is centuries old practice to extract and process the medicinal plants for daily human use, local economic uplift and for animal treatment (Ahmed, 1999; Khan, 1951). Around 700 plant species are used for medicinal and aromatic purposes in the Himalayan region (Shengji, 1992). Pakistan has a diverse flora containing about 6000 plant species. About 80% of the people belonging to the rural areas still depend upon the local herbal medicines (Ahmed, 1999). In the recent years, efforts have been made to document the traditional knowledge about local medicinal flora. In this regard traditional utilization and conservation status of 160 plants has been described form Margalla Hills National Park (Shinwari and Khan, 2000). Similarly, Shah (2001) listed about 58 species of medicinal plants from Ayubia National Park near Nathia Gali. Indigenous knowledge about the use of about 25 medicinal herbs from Kahuta, district Rawalpindi has been reported by Qureshi and Khan (2001).

In the Neelum valley, majority of medicinal plants are reported to be naturally occurring in moist temperate coniferous forest, sub-alpine and alpine pastures (Qamar and Minhas, 2006). These habitats are either occupied by permanent human settlements or visited by seasonal graziers and nomads (bakkarwals). In the lower part of Neelum valley (Kutla and Lachrat forest divisions) these plants have so badly been exploited in the past that new generation hardly knows their indigenous values (Qamar and Minhas, 2006). In remote areas about 60% of the local population is engaged in collection and processing of different medicinal herbs. These collectors are ignorant of the proper time of collection, methods of processing, storing and marketing. Their mishandling causes enormous damage to these plants as well as to other biodiversity.

Lack of scientific knowledge about the useable parts, proper time of collection and wasteful methods of collection lead to misuse of these plants. The proper timing of collection of desired part(s) of a plant often determines the yield percentage and quality of ingredients (Adnan *et al*. 2003). The medicinal flora of Neelum Valley is still unexplored and needs to be documented and studied for its status and traditional uses. Keeping this in view, the present study was conducted to explore and document the medicinal plants diversity of Neelum valley; indigenous knowledge of local people about uses

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of these plants; and also to find out the major threats to the medicinal flora of the valley.

MATERIALS AND METHODS

Study Area

The Neelum valley supports moist temperate and dry temperate forests, sub-alpine scrub, alpine pastures, high peaks and cold deserts (Champion *et al*, 1965). The area experiences long severe winters starting from mid November to end of April and a very short mild summer from mid-June to mid-August. These physiographic and climatic features offer a great ecosystem diversity supporting a wide variety of vegetation. Seven species of gymnosperms, 404 species of angiosperms, 46 species of grasses, 33 species of ferns and 14 species of fungi have been reported from the area. Many high quality herbs are collected for local as well as commercial uses, some of which are exported to other countries (Shah, 2006).

The main study sites in the Neelum Valley included Machiara National Park, Jagrain, Lawat, Surgen, Ghamot National Park, Shounther valley and Musk Deer National Park. Primary data were collected through personal field observations while walking along the transect lines during the organized survey of study sites. During the field survey, various geophysical, climatic and biological factors were recorded. Plant specimens were photographed, collected, preserved and got identified from the Botany Department of AJ&K University Muzaffarabad along with the citation of the available taxonomic literature (Nasir & Ali, 1971- 2001).

Field trips to the study area were conducted to collect data on medicinal plants and their ethno-medicinal uses from the local people during different seasons of the year 2010. A questionnaire was used to document the indigenous knowledge about medicinal plants and their uses from local communities and collectors. The interviews were also carried out from knowledgeable persons of the community and herdsmen who were the main users / collectors of medicinal plants. About 300 randomly selected informants were interviewed. Secondary data from various relevant departments was also collected. The medicinal plants having traditional utilization among the people were selected as reference specimens.

RESULTS AND DISCUSSION

During the study, a total of 67 plant species belonging to 39 families, having medicinal value were identified.

Medicinal plants are a valuable natural resource, regarded as safe medication and playing an important role in curing human sufferings particularly in rural and

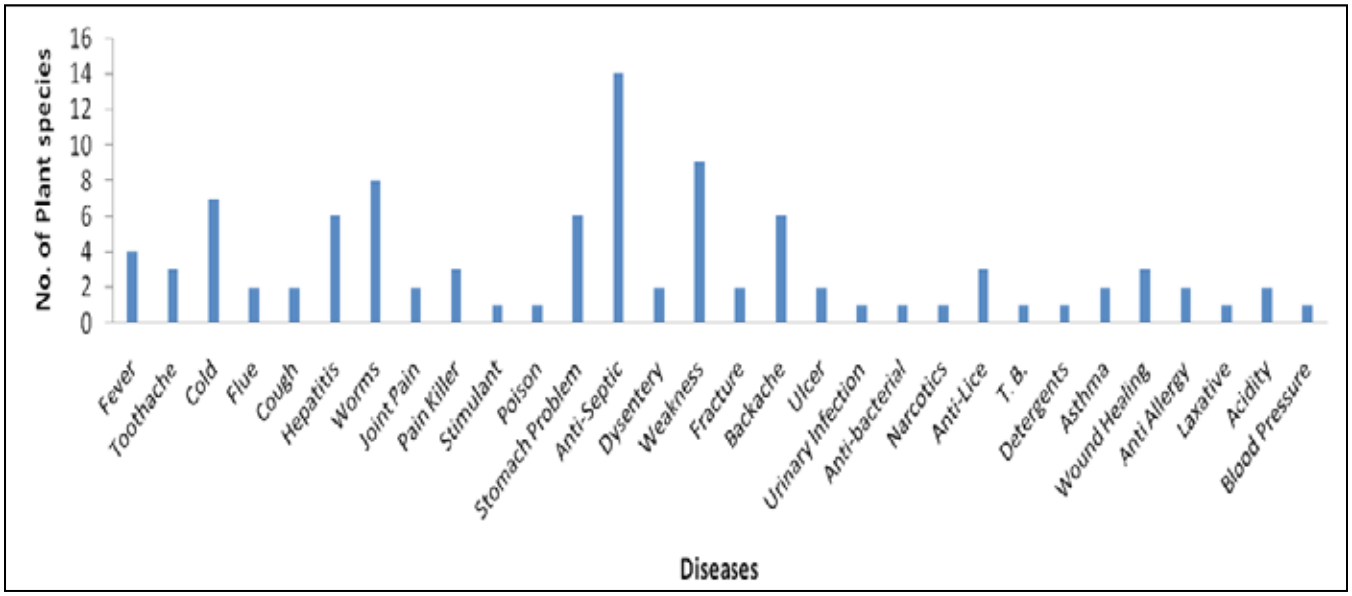

Fig 1. Number of plant species used by local people in the cure of different diseases in the study area during 2010.

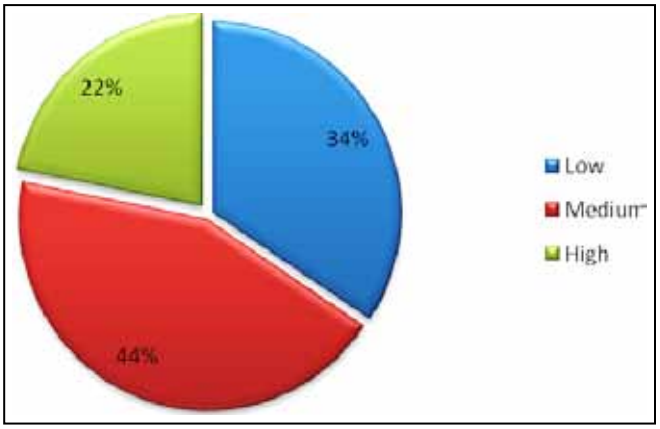

Fig 2. The percentage, level of the use of different plant species in the study area during 2010diseases in the study area during 2010.

remote hilly areas (Zaidi, 2001). Neelum valley is one of the remote and under developed hilly areas of Azad Jammu and Kashmir, lacking modern health facilities. Hence, local medicinal plants play a vital role in the remedy of various diseases. The other reason for their wide use is high prices of allopathic medicines and their side effects (Zaidi, 2001). It is believed that medicines of natural origin are harmless with no risk to consumers. However, precautionary measures are needed when using toxic plants by mistake or preparing herbal medicines where chemical contents of plants are not fully known (Ahmed and Sher, 2001).

A total of 30 diseases were reported to be cured with 67 different medicinal plant species. Fourteen plant species were used as antiseptics, nine for weakness (energetic) and eight as anti- worms. Important diseases cured using more than one medicinal plants species included hepatitis, blood pressure, cough, stomach problems, fever, ulcer, cold and dysentery (Fig 1).

We divided the use of plants into three categories including low, medium and high level use. Results revealed that the use of 44% plant species was of a medium scale, 34% plant species had the low use status and 22% plant species were rated as the most used (Fig 2).

Different parts of plants are used to cure various diseases. Leaves were the most used part (38.46%) of the plant as they were easily available, contained high amount of chemicals and could be easily extracted and used in various forms followed by roots (24.36%) and the whole plant (9%) (Fig. 3). Majority of the people residing in the periphery of the valley are poor, undernourished and illiterate. They need to cut the forests to sell as timber and fuel wood for making their living. Resultantly, forests of *Abies pindrow, Cedrus deodara, Juglans regia, Pinus roxburgii, Pinus wallichiana, Picea smithiana and Taxus wallichiana* are disappearing at an alarming rate.

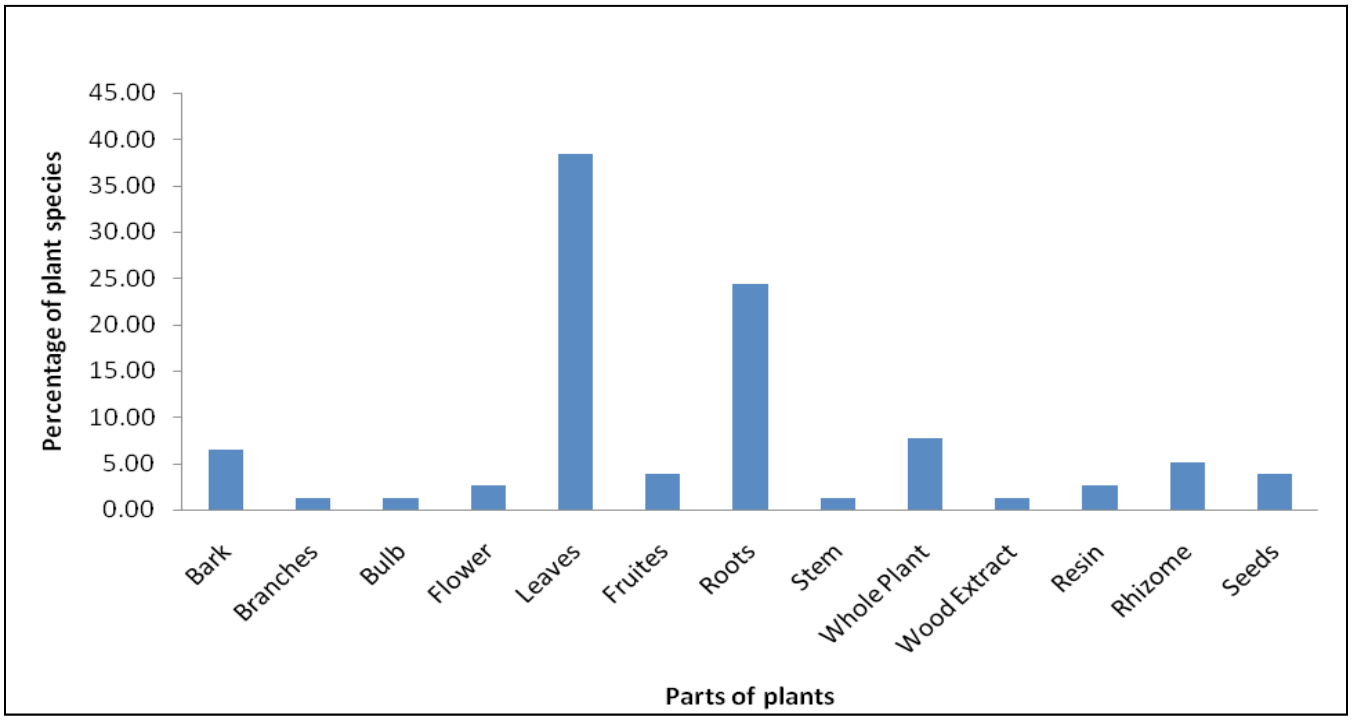

Fig 3. The use of various parts of the plant species in the remedy of different diseases in the study area during 2006

Threats to the medicinal plants

Medicinal plants are under heavy biotic pressure in the form of human related activities including deforestation, overgrazing, overexploitation and unscientific ways of collections of plants. Increase in human population has increased their daily needs which have accelerated natural resource depletion through unsustainable use. The natural forest cover which provides protection to the medicinal plants is shrinking with time. Rapid increase in the number of livestock has posed a serious threat to the natural ecosystems of the area. Naturally having low regeneration potential and constant high rate of extraction, medicinal plants are becoming sparse from their potential habitats. This condition is coupled with the loss of soil moisture and rapid soil erosion. Following are the major threats to the medicinal plants of this area.

1. Habitat degradation

Habitat degradation and fragmentation is the biggest immediate problem caused by human population, threatening medicinal plants in the valley. This trend is most evident in moist, dry and sub-alpine eco-zones of the valley. Study revealed that at least 17 species have

become threatened locally due to habitat degradation including deforestation, livestock grazing, over-exploitation and unscientific ways of collection (Table 1). Following factors are contributing towards this problem;

Timber and fuel wood cutting

During the cutting and collection of timber and fuel wood, local people haphazardly traverse the area damaging medicinal plants. Felling of trees from steep slopes damages the medicinal plants and the vegetation cover thus exposing soil that is readily eroded causing gullies and land sliding in the area.

Grass cutting for stall feeding

In the study area, land suitable for agriculture is very scarce, thus livelihood is supplemented through livestock rearing. Fodder needs of livestock are mostly met from adjacent forest areas and pastures. Grass cutting is the accepted right of the local people since the start of forest management. During this activity majority of the medicinal plants are also cut before maturity. This annual practice poses a great negative impact on the natural regeneration of medicinal plants.

Collections of black mushroom

Gucchhi or Black mushroom (*Morchella esculenta*) is a precious mushroom found in the moist and dry conifer forest zones of the study area. Traditionally, the local people collect the black mushroom from the forest floor which fetches high price in local market. Majority of remote areas of Neelum valley provide suitable habitat for black mushroom. Resultantly, local people search the forest to collect it damaging young seedlings of medicinal plants and disturb the moist humid layer as well, causing negative impact on propagation of mushroom and other natural flora.

Soil erosion

Soil erosion is a common phenomenon in the high hilly areas resulting from heavy grazing and exploitation of vegetation. Soil erosion occurs with a slight rain leading to landslides. This results in the loss of upper fertile soil layer which adversely affects floral diversity of the area.

Fires

During the collection of timber, fuel wood, medicinal plants and mushroom, illegal hunting, trekking and livestock grazing, the people often blow fire to warm up which are not extinguished properly. These fires spread in the forest damaging the medicinal plants and other natural flora. As majority of threatened medicinal plants are found in sub-alpine and alpine eco-zones, nomads using these areas from June to September are also a source of these fires.

Overgrazing and browsing

Livestock is major source of subsistence for the local people, also providing milk and meat for their food. Donkeys and horses are used for transportation and bullocks are used for ploughing. Moreover, nomads from Pothwar, Jhelum, Hazara and Kohistan also stay with their livestock in these areas from June to September. They own livestock numbers much beyond the carrying capacity levels thus overgrazing the natural vegetation and pastures. Resultantly, vegetation cover is depleted and the soil surface becomes vulnerable to erosion and land sliding. These livestock also compete with wild ungulates inhabiting these areas. Mixing with wild ungulates also causes transmission of diseases between them.

Over-exploitation

Local communities of the study area are not well aware of the modern values of the medicinal plants and the environmental consequences of loss of biodiversity and its effect on their livelihood. Their primary concern is to earn more and more from the existing resource of medicinal plants to meet their immediate needs for survival. Medicinal plants are being utilized unsustainably by the locals since long. AJ&K Forest Department auctions the collection of some plants, under which many medicinal plants are collected indiscriminately reducing the chances for their regeneration. A list of threatened plants of the valley is given in Table 1.

2. Poverty

Being underdeveloped and remote area, limited jobs or other income generating opportunities are available for local people. Therefore, they mostly rely on available natural resources for their livelihood. In early summer season local people and nomads start collecting the medicinal herbs and other plants. In order to earn more money, they extract all the plant parts without any consideration of their regeneration resulting in degradation of majority of plants. Medicinal plants exploited for commercial purposes in the valley are given in Table 2.

3. Lack of awareness

People in the study area are mostly illiterate and not aware of the environmental consequences of loss of biodiversity and its impact on their livelihood. They are exploiting the natural flora for their livelihood irrespective of its status in this area. Little efforts have been made for awareness raising in this regard in the past, therefore, the communities remained ignorant about the sustainable use of medicinal plants.

Table 1. Plant species threatened locally due to excessive use and habitat destruction in Neelum valley

S. No.	Scientific name	Local name
1	*Aconitum chasmanthum*	Mohri
2	*Aconitum heterophyllum*	Patrees
3	*Ajuga bracteosa*	Ratti Buti/Jan-e-Adam
4	*Angelica cyclocarpa*	Chora
5	*Arnebia benthami*	Gaozaban
6	*Berberis lycium*	Kala Sumble
7	*Bergenia ciliate*	Batbhyva
8	*Dioscorea deltoidea*	Kanees
9	*Ephedra garardiana*	Ephedra
10	*Inula royleana*	Poshgar
11	*Jurinea dolmiaea*.	Gugaldhoop
12	*Podophyllum hexandrum*	Ban Khakhri
13	*Rheum emodi*	Gol Chotial
14	*Rheum webbianum*	Chapti Chotial
15	*Saussurea lappa*	Kuth
16	*Taxus wallichiana* *	Barmi/Thuni
17	*Valeriana jatamansi*	Mushk Bala

Table 2. Plants species being extracted by local communities for revenue generation in the study area.

S. No.	Scientific name	Local name
1	*Aconitum heterophyllum*	Patrees
2	*Valeriana jatamansi*	Mushk bala
3	*Saussurea lappa**	Kuth
4	*Podophyllum hexandrum*	Ban Khakhri
5	*Morchella esculenta*	Guchi
6	*Dioscorea deltoidea*	Kanees
7	*Arnebia benthami*	Gaozaban

4. Smuggling

Smuggling of medicinal herbs is another severe threat to these plants in the area. AJ&K Forest department annually auctions the collection of some plants, under the cover of which many medicinal plants are collected indiscriminately. The contractors and their middle men extract the medicinal plants many times more than permitted. This extra quantity is smuggled to the local as well as to other markets in the country. Nomads are also involved in illegal extraction and smuggling. From upper Neelum Valley, bark of *Taxus wallichiana* is often smuggled to Gilgit Baltistan province of Pakistan. This debarking poses great negative impact on the population of this threatened species.

5. Weak law enforcement

AJ&K Forest Department is solely responsible to check the extraction process of medicinal plants in order to reduce their illegal exploitation. However, it seems to be their least priority to check this illegal practice. Instead they mostly remain involved in timber and fuel wood collection operations throughout the year. This attitude of forest staff often enhances the exploitation and smuggling of medicinal plant.

CONCLUSION AND RECOMMENDATIONS

The Neelum Valley contains diverse vegetation zones due to variation in climatic conditions and altitude. Hence, it is rich in medicinal and other economic plants, some of which are considered to have potential for curing Cancer, AIDS, blood pressure and Hepatitis. It is, therefore, imperative that those plants are further studied to explore their potential of curing such hard to cure diseases. There is also a need to properly protect the natural range of these valuable plants in the valley for their long term sustainability. The potential for propagation of the most important and threatened plants also needs to be explored for their sustained supply and conservation. The exploration and use of important medicinal plants will provide local material for many diseases saving foreign exchange spent on import of drugs. Furthermore, proper management and plantation of these plants could be source of foreign exchange earnings for the country.

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