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Ethnobotanical Study of the Alpine-Subalpine Flora of Neelum Valley, Azad Jammu and Kashmir

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Abstract. Ethnobotanical study of Angiosperms, procured in association with timberline vegetation of the Neelum Valley, Azad Jammu and Kashmir, resulted in a floristic list, represented by 136 species belonging to 98 genera of 33 Angiospermic families. The family Asteraceae was the largest, represented by 26 species. The second largest family was Ranunculaceae, consisting of 12 species. Other families were represented by varying number of species ranging from 1-7 at the study areas.

Keywords: ethnobotanical study, alpine-subalpine flora, angiosperms, Kashmir, Neelum valley

Introduction

Ethnobotany is a branch of economic botany which deals with the role of plants in the life and culture of tribal people who do not have access to the modern facilities (Tosh, 2004). The subject of ethnobotany encompasses various aspects of human life in which plants are used, for instance, as food, fodder, medicine, as timber in house construction and many more uses from socio-economic point of view. Misra (2004) had given a comprehensive review on this subject. There is substantial work on ethnobotany and ethnomedicinal value of plants of various regions of the globe. In this respect, notable work relating to the Indo-Pak sub-continent has been rendered by the Indian ethnobotanists, for example Ranjan (2004), Senapati *et al.* (2001) and Sharma (1991) etc.

The climate and flora of the subcontinent of India and Pakistan, especially those of the northern areas of Pakistan and India, have similarities. Besides, the cultural and medicinal uses of plants in the remote trible areas are also more or less similar. None the less a vast territory of Pakistan is yet un-explored from ethnobotanical point of view; only a few workers have made efforts to record the data, for example Shinwari and Gilani (2003), Shinwari and Khan (1997) and Leporatti and Lathanzi (1994), reported several plant species from different parts of Pakistan that are in traditional use for ages. The present work is an attempt to ellucidate the ethno-cultural importance of the flora of Neelum valley of Kashmir.

Study area. Neelum valley is situated in District Muzaffarabad (capital of Azad Jammu and Kashmir), in the north-eastern part of Azad Kashmir. It is linked to Muzaffarabad by Neelum valley road along the river Neelum. The valley is about 175 km long and runs parallel to Kaghan valley; towards north-east, it is linked to Astor (Gilgit Agency) via Shounter-Astor pass (Astore Gali) situated at an elevation of 16,500 feet. Small valleys, steep slopes and small terraces are common. Several mule tracts and footpaths are also present. Freshwater springs are abundant (Blatter, 1929). Winter lingers long in the alpine zone of Neelum valley, during which snowfall measures 3-10 meters. Old snow deposits/glaciers (vern. Neeli-Burf or Blue Snow) are common, but in recent years these are deteriorating rapidly. The rainfall during summer is due to microclimatic factors. The best season for any type of floristic/fieldwork is from July to September.

Due to remoteness of this area, no attempt has ever been made to evaluate the plant wealth of the alpine zone of Neelum valley in detail. The present investigation was confined to the alpine peaks and the meadows of different areas of Neelum valley. The following four main areas were selected for the study of flora:

i. Ratti Gali (RG)
ii. Nori Nar (NR)
iii. Chitapur/Nareel (CP)
iv. Shounter areas/Nar (SA)

Ratti gali is about 35 km towards north from Dowarian, 30 km from Athmuqam-subdivisional headquarter; altitude varies from 2900-3900 m. Nori Nar is another alpine area, 25 km from Sharda towards northern side; altitude varies from 3000-4800 m. Chittapur/Nareel is 8 km towards north from Kel (prominent town of Neelum valley); altitude varies from 3500-5300 m (Coventry, 1927). Shounter Nar area is somewhat vast, possessing many alpine peaks, meadows, small terraces, old snow deposits/glaciers (also known as snow fields) and several fresh water streams or nallahs (Blatter, 1929). It is

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List of species, uses and distribution

Family	Name of species	Uses	Distribution in study areas			
			RG	NR	CP	SA
1.Alliaceae	*Allium carolinianum* DC.	MD, FD,OL,CND	-	-	+	+
	A. fedtschenkoanum Regel.	MD,FD,OL,CND	+	+	+	+
	A. miserabile Wend.	MD,FD,OL,CND	+	-	-	-
	A. victorialis L.	MD,FD,OL,CND,	-	-	-	+
2.Apiaceae	*Angelica glauca* Edgew.	MD,	+	+	-	+
	Bupleurum candolei Wall. ex DC.	MD	-	+	-	+
	B. longicaule Wall. ex DC.	MD	+	+	+	+
	Chaerophyllum villosum Wall. ex DC.	MD	+	-	-	+
	Heracleum candcans Wall. ex DC.	MD,FDR,	+	+	+	+
	Pimpinella diversifolia DC.	MD,	+	-	-	-
3.Asteraceae	*Carduus edelbergii* Rech.f.	MD	+	-	-	+
	Centaurea iberica Trevir ex Spreng.	MD	+	+	+	+
	Chrysanthemum pyrethroides (Kar. & Kir.) B. Fedtsch.	MD	-	-	-	+
	Cirsium arvense (L.) Scop.	MD	+	+	+	+
	Conyza Canadensis (L.) Cronq.	MD,FDR	-	+	+	-
	C. japonica (Thunb.) Lessing	MD	-	-	-	+
	C. stricta Willd.	MD	+	-	-	-
	Inula obtusifolia Kerner	MD	-	+	+	+
	I. royleana C. B. Clarke	MD	+	+	+	+
	Jurinea ceratocarpa (Decne.) Benth.	MD	+	-	-	+
	Lactuca auriculata Wall. ex DC.	MD	+	+	-	-
	L. dissecta D. Don.	MD	+	+	-	-
	L. sativa L.	MD	+	-	-	+
	Launaea nudicaulis Less.	MD,FDR	+	+	+	+
	Ligularia fischeri (Ledeb.) Turcz.	MD,OL	+	+	-	-
	Saussurea albescens (DC.) Sch.-Bip.	MD	+	+	-	-
	S. lappa (Decne.) Sch.-Bip.	MD,OL	+	+	-	+
	Senecio chrysanthemoides DC.	MD,	+	+	+	+
	S. graciflorus DC.	MD	+	+	+	+
	S. nudicaulis Ham. ex D. Don.	MD	+	+	-	-
	Serratula pallida DC.	MD	-	+	+	+
	Solidago virga-aurea L.	MD	+	-	-	-
	Sonchus arvensis L.	MD,WD,FDR	+	+	+	+
	S. asper (L.) Hill	MD,WD	+	-	-	-
	Tanacetum dolichophyllum (Kitam.) Kitam.	MD,OL	-	-	+	+
	Taraxacum leucanthum (Ledeb.) Ledeb.	MD,OL	+	+	-	+
4.Balsaminaceae	*Impatiens brachycentra* Kar. & Kir.	MD	-	+	-	+
	I. meeboldii Hook. f.	MD	-	+	+	+
5.Betulaceae	*Betula utilis* D. Don.	FW,MD,FDR,TMB	+	+	+	+
6.Boraginaceae	*Arnebia benthamii* (Wall. ex G.Don.) Johnston	MD	+	+	+	+
	A. euchroma (Royle ex Benth.) Johnston	MD	-	-	-	+
	Cynoglossum lanceolatum Forssk.	MD	+	+	-	+
	Heliotropium strigosum Willd.	MD	-	-	+	+
	Onosma hispida Wall. ex G. Don.	MD	-	-	+	+
	Pseudomertensia echioides (Benth.) Rield.	MD	-	+	+	-
7.Brassicaceae	*Arabidopsis himalaica* (Edgew.) Schulz.	MD	+	+	+	+
	Capsella bursa-pastoris (L.) Med.	MD,WD	+	+	-	-
	Cardamine impatiens L.	MD	+	-	-	+
	Chorispora sabulosa Camb.	MD	+	-	+	+

	Erysimum hieracifolium L.	MD	-	+	+	+
	Sisymbrium irio L.	MD,WD	+	+	-	+
8.Campanulaceae	*Campanula latifolia* L.	MD	+	+	+	+
	Codonopsis clematidea (Schrenk) C. B. Clarke	MD	+	-	-	+
9.Cannabinaceae	*Cannabis sativa* L.	MD	+	-	-	-
10.Caryophyllaceae	*Cerastium fontanum* Baumg.	MD	+	+	-	+
	Dianthus barbatus L.	MD	-	+	-	+
	Lychnis coronaria (L.) Desr.	MD	-	-	+	+
	L . nutans Benth.	MD	+	+	-	-
	Myosoton aquaticum (L.) Moench	MD	-	+	-	+
	Silene arenosa C. Koch.	MD	-	+	+	+
	S . vulgaris (Moench) Garcke	MD	+	+	+	+
11.Chenopodiaceae	*Chenopodium album* L.	MD,FDR	+	+	+	+
	C . foliosum (Moench) Aschers.	MD	+	+	-	-
12.Convolvulaceae	*Convolvulus arvensis* L.	MD,WD	+	-	-	-
13.Crassulaceae	*Sedum ewersii* Ledeb.	MD	+	+	+	+
14.Euphorbiaceae	*Euphorbia wallichii* Hook. f.	MD	+	-	-	-
15.Fabaceae	*Indigofera heterantha* Wall. ex Brandis	MD	+	-	+	+
	Lathyrus humilis (Ser.) Fisch. ex Spreng.	MD,FD,FDR	-	-	-	+
	Lespedeza juncea Pers.	MD,WD,FDR	+	-	-	-
	Lotus corniculatus L.	FDR	-	-	-	+
	Trifolium pratense L.	MD,FDR	+	+	+	+
	T . repens L.	MD,FDR	-	+	+	+
	Trigonella emodi Benth.	MD	-	-	+	+
16.Fumariaceae	*Corydalis diphylla* Wall.	MD,WD,FDR	-	+	+	+
	C . govaniana Wall.	MD	-	+	+	+
17.Gentianaceae	*Gentiana cachemirica* Decne.	MD	-	-	-	+
	G . carinata Griseb.	MD	-	-	-	+
	Swertia alata (D. Don.) C. B. Clarke	MD	-	-	+	+
	S . petiolata D. Don.	MD	+	+	+	+
18.Geraniaceae	*Geranium wallichianum* D. Don. ex Sweet	MD	-	+	-	+
19.Lamiaceae	*Clinopodium umbrosum* (M. Bieb.) C. Koch.	MD	+	+	-	+
	Lamium album L.	MD,OL	-	+	+	+
	Nepeta hindostana (Roth) Haines	MD	+	-	-	-
	Origanum vulgare L.	MD,FDR	+	-	-	-
	Prunella vulgaris L.	MD,FDR	-	+	+	+
	Salvia coccinea Entlinger	MD	+	-	-	-
	S . plebeia R. Br.	MD	+	-	+	+
	Thymus linearis Benth.	MD,WD,OL	+	+	+	+
20.Liliaceae	*Polygonatum verticillatum* (L.) All.	MD	-	+	-	+
	Trillium govanianum Wall.ex Royle	FD	-	-	+	+
21.Orchidaceae	*Dactylorrhiza hatagirea* (D. Don.) Soo.	MD	-	-	-	+
22.Oxalidaceae	*Oxalis corniculata* L.	MD	+	+	+	+

23.Parnassiaceae	*Parnassia nubicola* Wall. ex Royle	MD	+	-	-	-
24.Phytolaccaceae	*Phytolacca latbenia* (Moq.) Hans Walter	MD,FD,FDR	+	+	+	+
25.Plantaginaceae	*Plantago lanceolata* L.	MD,FD	+	-	+	+
26.Podophyllaceae	*Podophyllum emodi* Wall. ex Royle	MD,FD	+	+	+	+
27.Polygonaceae	*Fagopyrum cymosum* (Trevir) Meissn.	MD,WD,FDR	+	-	-	-
	Oxyria digyna (L.) Hill.	MD,FD	+	+	+	+
	Polygonum affine D. Don.	MD	-	+	+	+
	P . alpinum Allioni	MD	+	-	+	+
	P . amplexicaule D. Don.	MD,FD	+	+	+	+
	P . aviculare L.	MD	+	+	+	+
	P . viviparum L.	MD	+	+	+	+
	Rheum webbianum Royle	MD,FD	-	+	+	+
	Rumex chelepensis Mill.	MD,FD	+	+	+	+
28.Ranunculaceae	*Aconitum chasmanthum* Stapf ex Holmes	MD	+	+	+	+
	A . heterophyllum Wall. ex Royle	MD	+	+	+	+
	A . leave Royle	MD	-	+	-	+
	Actaea spicata L.	MD	+	+	+	+
	Aquilegia fragrans Benth.	MD	+	-	-	+
	Caltha plustris L.	MD	+	+	+	+
	Delphinium pyramidale Royle	MD	+	-	-	-
	Ranunculus hirtellus D. Don.	MD	-	-	+	+
	R . kohistanensis Qureshi & Chaudhri	MD	+	+	-	-
	R . laetus Wall. D. Don.	MD	+	+	-	+
	Thalictrum minus L.	MD	-	+	-	+
	Trollius acaulis Lindl.	MD	+	-	+	+
29.Rosaceae	*Cotoneater microphyllus* Wall. ex Lindl.	MD	-	+	+	+
	Fragaria nubicola Lindl. ex Lacaita	MD,FD	+	+	+	+
	Geum urbanum L.	MD,FDR	+	-	-	-
	Potantilla argyrophylla Wall. ex Lehm.	MD	+	+	+	+
	P . gelida C. A. Mey.	MD	-	+	+	+
	P . nepalensis Hook.	MD	+	+	-	+
	Rosa macrophylla Lindl.	FW,MD	-	-	-	+
	R . webbiana Wall. ex Royle	FW,MD	+	+	+	+
	Sorbaria tomentosa (Lindl.) Rehder	FW	-	-	+	-
	Sorbus cuspidata (Spach) Hedlund	FW,FD	+	+	-	+
30.Rubiaceae	*Galium aparine* L.	MD,WD	+	+	-	+
	G . tetraphyllum Nazim & Ehrend.	WD	-	+	-	+
31.Salicaceae	*Salix denticulata* N. J. Anders.	FW	-	-	+	+
32.Scrophulariaceae	*Verbascum thapsus* L.	MD,OL	+	+	+	+
	Veronica mellissifolia Desf. & Poir.	MD	+	-	-	-
33.Violaceae	*Viola biflora* L.	MD	+	-	+	+
	V . canescens Wall. ex Roxb.	MD	+	+	+	+
	V . fedtschenkoana W. Becker	MD	-	-	+	+
	V . odorata L.	MD,OL	-	+	-	+

Study areas: RG = Ratti Gali; NR = Nori Nar; CP = Chita Pur/Nareel; SA = Shounter areas/Nar
Distribution: + = presence; - = absence
Uses: FW = firewood; WD = weed; FDR = fodder; CND = condiments; MD = medicinal; FD = food; OL = oil; TMB = timber

toward northeast from Kel and is linked to Astore (Gilgit Agency) via Shounter Astor pass (Gali); altitude ranges from 3000-5400 m. In all these areas Bhahks (temporary summer dwellings) are present. People stay there for 3-4 months, during summer.

Materials and Methods

For the study of the alpine-subalpine flora of the four areas of Neelum valley, fieldwork was undertaken during summer season of the years 2002-2003. All sites were studied at least once at the beginning of the flowering season (June), during the peak of the flowering season (July-August) and during fruiting months (September - October). During the fieldwork, important information concerning field characteristics was collected. Different people of the area were interviewed and information about the use of plants was gathered through questionnaires. The plants were collected, pressed, dried, mounted on the herbarium sheets, identified and submitted to the Herbarium of Quaid-i-Azam University, Islamabad.

Results and Discussion

The present study relates to be ethnobotanical investigation of 136 plant species collected from the study areas of Neelum valley of Azad Jammu and Kashmir which belonged to 98 genera of 33 Angiosperm families. Family Asteraceae (Compositae) was the largest family, represented by 26 species. Family Ranunculaceae and Rosaceae were represented by 12 and 10 species, respectively. The family Lamiaceae (Labiatae) and Polygonaceae were represented by 8 and 9 species, respectively. The rest of the families were represented by various number of species ranging from 1-7. The floristic list, with families, locations and economic uses of plants is self-explanatory.

Alpine flora mainly consised of mountainous vegetation found above the timberline. An important feature of alpine herbs was the cushion habit. The plants were gregarious, small, the stems had short internodes and branches were clothed with small densely arranged hairy leaves. Most of the plants persisting here were chaemophytes or hemi cryptophytes. Mosses, liverworts and some ferns were also present. Lichens were abundant in the alpine zone of Neelum valley, present even near perpetual snow, i.e. the upper limit of alpine zone or snowline (Stewart, 1972) beyond which there was no macroscopic flora. In the subalpine zone, the only tree found was *Betula utilis*. In the alpine zone, shrubs and small trees were extensively used as fuel by the local herdsmen.

The main flora of alpine zone of Neelum valley is herbaceous. The flora that, we studied in the present investigation concur with that of Palandri, District Poonch (Azad Kashmir) reported by Haq and Hussain (1995). They mentioned 47 medicinally important species. Likewise, Khan (1996), reported more than 202 plant species from Machyara National Park, Muzafarabad (Azad Kashmir) on which the local community depends for its common requirements. He further mentioned about 80 species, extensively used by the local people. In our study, those species were also found and similar results were observed. The results obtained by Bukhari (1996) are also in line with our findings.

Conclusion

It is concluded from the present investigation that a vast area of Neelum valley of Azad Jammu and Kashmir contains plants of economic importance especially from medicinal point of view. However, the unabated use of these species especially as fuel may endanger them. Hence, a proper planning is required for the utilization of the indigenous medicinal plants for producing herbal medicines. Modern or alternate energy resources would have to be provided to the inhabitants, of the area for saving these plants of economic importance from extinction. Moreover, the plants must also be enlisted and people of the area be educated about the importance and proper utilization of these plant species.

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