

Full Length Research Paper

Ethnobotanical profile of some plant resources in Malam Jabba valley of Swat, Pakistan

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A study on the economically important plants was carried during summer 2007 in various parts of Malam Jabba valley, Swat. The principal aim of the study was to prepare an ethnobotanical inventory of the plant resources of the area, as well as to evaluate the conservation status of important medicinal and aromatic plants (MAPs). The study documented 90 species of ethnobotanical importance, out of these 71 spp used as medicinal plants, 20 spp fodder plant, 10 spp vegetables, 14 spp wild fruit, 18 spp fuel wood, 9 spp furniture and agricultural tools, 9 spp thatching, fencing and hedges, 4 spp honey bee, 2 spp evil eyes, 2 spp religious and 3 spp as poison. The current study suggests improvement in the ill effects of resources misuse especially of MAPs. This type of study may help in better understanding of local forest resources and potential MAPs.

Key words: Malam Jabba valley, medicinal and aromatic plants recourses, conservation, market study, traditional uses.

INTRODUCTION

In all mountainous regions of northern Pakistan, besides the threat of improper collection, the vegetation in general and medicinal plants in particular are under heavy biotic pressure in the form of human population growth, deforestation, over grazing, fuel wood extraction and encroachment for cultivation etc (Raziq et al., 2010; Sher et al., 2010b).

Traditionally forests and rangelands are the main sources of medicinal plants in Swat. And therefore, are commonly exploited commercially. Since these wild plants have been collected for decades, (Sher et al., 2010a, b; Hussain and Sher, 2005), their cultivation/*ex situ* management has been neglected in the past. The lack of knowledge about the part used and time of collection leads to misuse of the species. Presently a number of barriers exist to the sustainable cultivation, gathering and use of medicinal plants. These include lack of clear resource tenure and custodianships, little understanding

of sustainable management parameters and knowledge of market requirement (Sher et al., 2004). Beside health care, MAPs collected for trade make an important contribution to household economies (Saganuwan, 2010).

For centuries the collection of MAPs from the wild for healthcare has been possible without major negative effects. However, during the past few decades these resources have been highly exploited for trade, owing to increasing population pressure and demand from the expansion of international market for natural products (Azaizah et al., 2003; Hussain and Sher, 2005).

As a result a large number of species of MAPs have been considered as highly threatened throughout the Hindukush Himalayas (Yazicioglu and Tuzlaci, 1996). Nearly 34,000 plants species or 12.3% of the world's vascular flora, are threatened with extinction. There are many parts of the world where there is not enough information available, or where there is no information at all, to assess properly the conservation status of plants (IUCN, 2003). The present investigated area is one of the high Himalayan regions in the northern part of Pakistan. The area is known for its importance for biodiversity

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including MAPs, which are of high value in traditional system of medicine, of the MAPs some, are heavily traded and exported into national and international markets. The present study was, therefore, initiated to determine the conservation status of MAPs, as well as to prepare ethnobotanical inventory of the plant resources of the study area.

MATERIALS AND METHODS

Study area

A study on the economically important plant communities of coniferous forests was conducted during June, July and August, 2007 in various parts of Malam Jabba valley, district Swat. Malam Jabba is located in the north of Pakistan between the Himalayan and the Hindu kush foothills. It belongs to the Swat District, which is part of the Malakand division situated in the North Western Frontier Province. Malam Jabba lies at a distance of 52 km from Saidu Sharif, the capital of Swat District. It is bounded by the Shanglapar District in the North-East; Buner District in south-west and by main Swat River and road in the West. The area is situated between 35°-20' to 35°-45'N Latitude and 72°-12' to 73°-32'E Longitudes. The altitude of Malam Jabba ranges from 990 m (3260 ft) at the valley entrance to 2880 m (9508 ft) at the highest peak of Shagar Sar.

Ethnobotanical survey

Visits were made in June, July and August 2007. The study area is hilly, so it was divided into different altitudinal zones with the help of maps and topo sheets. Questionnaires were devised to get information about various aspects of the plants, such as traditional uses, collection methods, time of collection, part use, distribution, availability and abundance etc. The respondents of various age groups, especially 40 to 70 years old people were interviewed and in this way total 162 people were interviewed.

For every economically and pharmaceutically important plant species the local people were asked about its abundance, distribution and population size. This was judged by comparing 20 years old records with the current situation. In addition personal observations were made in the fields to note any pertinent events, which could help gain better understanding of the presence, relative abundance based on the ecological characteristics of the species such as local availability and extinction. Voucher specimens were collected of all species and identification was done with the help of available flora (Nasir and Ali, 1971-1995; Stewart, 1971) and the International Plant Names Index (IPI, 2008). The nomenclature was later on confirmed from National herbarium and the collected voucher specimens were lodged over there. Voucher specimens of commercially important medicinal plant species were also deposited at the herbarium of Botany Department, Government Post Graduate Jahanzeb College, Swat.

RESULTS

Ethnobotanical survey

The survey revealed that the study area harbors diverse valuable plant species and associated ethnobotanical knowledge. The study revealed the presence of about 90 species of ethnobotanical importance. These include 84

spp of angiosperms, 3 spp of gymnosperms, 2 spp of pteridophytes and 1 spp of fungi. The plant resources were grouped into medicine (71 spp), fodder (20 spp), wild fruit (14 spp), fuel wood (18 spp), furniture and agricultural tools (9 spp), vegetable (10 spp), thatching, fencing and hedges (9 spp), religious (2 spp), poison (2 spp), evil eye (2 spp), honey bee (4 spp) (Table 1).

Table 1 also revealed that 78% of the total MAPs reported from the area is used in medicine by local people in more than 20 ailments. The elder people have comparatively more knowledge than younger and collect MAPs for self medication and other uses.

Availability and distribution

The study area is very rich in MAPs. More than 90 MAPs have been identified in the area, although the local people may not use more than 50 MAPs, but the amount of MAPs in the area is decreasing day by day due to, deforestation, over grazing, unplanned urbanization and unauthorized collection. In contrast to previous years the distribution of MAPs in the area is quite variable. Among the selected MAPs the *Hypericum perforatum*, was present in good number in most of the area. *Morchella esculenta*, *Aconitum heterophyllum*, *Dioscorea deltoidea*, *Podophyllum hexandrum*, *Valeriana jatamansi* were recorded in a few site in the area, while *Dryopteris juxta-postia*, *Viola serpens* were restricted to moist and shady localities.

Detail description of 19 important MAPs identified (Table 1) in the area are give as follow:

(1) Botanical name: *Aconitum heterophyllum* Wall.ex Royle. Family: Ranunculaceae, Local name: Zaharmora. English name: Aconite. Habit: Herb. Description and distribution: It is an erect biennial herb; leaves are orbicular; Flowers are in a long raceme; sepal blue or white. It is distributed from 2700 to 4200 m. Part used: Rhizome, Uses: Tonic, febrifuge, aphrodisiac. Market value: Mingora and Peshawar are the two important local markets for Aconite. It is sold at Rs. 150 to170/ kg at national level.

(2) Botanical name: *Ajuga bracteosa* wall.ex Benth. Family: Lamiaceae, Local Name: Khwaga booti. English name: Bugle, Habit: Herb. Description and distribution: It is an erect perennial herb with opposite, elliptic and hairy leaves; Flowers bracteate, corolla pale blue. The plant is well distributed up to 2400 m. Part used: Whole plant. Uses: Sore throat, jaundice, hypertension. Cardiac stimulant, used in hepatitis. Market value: Mingora is the local market for the plant. It is sold at Rs. 55 to 60/kg.

(3) Botanical name: *Artimisia scoporia* Waldst. & Kitam. Family: Asteraceae, Local name: Jaukay, English name: Artimisia, Habit: Herb. Description and distribution: It is an erect plant with dissected leaves; Florets are all tubular, ray florets white; pappus absent. The plant is

Table 1. Ethnobotanical information of plants of Malam Jabba Valley, Swat District.

S. N	Botanical name	Family	Local name	Morphological type	Part used	Uses
1	<i>Aconitum heterophyllum</i> Wall.ex Royle	Ranunculaceae	Zaharmora	Herb	Rh.	Tonic, febrifuge, aphrodisiac.
2	<i>Adiantum capillus-veneris</i> L.	Polypodiaceae	Sumbal	Herb	WP	Ornamental, expectorant, fever and backache.
3	<i>Aesculus indica</i> (Wall. ex. Camb.) Hk	Hippocastanaceae	Jawaz	Tree	Fr,L,W	Fodder, furniture, chest diseases.
4	<i>Ailanthus altissima</i> (Mill) Swingle	Simarubaceae	Backyanra	Tree	L,S,B	Fodder, construction, furniture, Skin disease, anthelmintic.
5	<i>Ajuga bracteosa</i> Wall. ex. Benth.	Lamiaceae	Khwaga Bootei	Herb	WP	Sore throat, jaundice, hypertension.
6	<i>Amaranthus viridis</i> L.	Amaranthaceae	Chalwai	Herb	WP	Pot Herb, Fodder, emollient.
7	<i>Amaranthus spinosus</i> L.	Amaranthaceae	Chalwai	Herb	WP	Pot Herb, Fodder.
8	<i>Artemisia scoporia</i> Waldst& Kitam.	Asteraceae	Jaukay	Herb	F,L	Antispasmodic and stomachache. Otitis.
9	<i>Asparagus officinalis</i> L.	Liliaceae	Tendorai	Herb	WP	Vegetable.
10	<i>Berberis lyceum</i> Royle	Berberidaceae	Kwaray	Shrub	R	Stomachic, liver disorder, intestinal colic, wound treatment.
11	<i>Bergenia ciliata</i> (Haw.) Stermb.	Saxifragaceae	Maknar path.	Herb	Rh.	Anti-diabetic, expectorant.
12	<i>Bistorta amplexicaulis</i> (D.Don) Green.	Polygonaceae	Anjabar	Herb	Rh.	Sore throats, inflammation of mouth, laryngitis. General body tonic.
13	<i>Bunium persicum</i> (Boiss) Fedtsch.	Apiaceae	Zeera Siah	Herb	Fr.	Carminative, lactagogue, stomachic, antiseptic and vermifuge.
14	<i>Capesella bursa-pastoris</i> L.	Brassicaceae	Bambesa	Herb	WP	Diarrhea, diuretic astringent, Fodder.
15	<i>Canabis sativa</i> Linn.	Cannabenaceae	Bhang	Herb	L	Narcotic, anodyne, tonic.

Table 1. Contd.

16	<i>Caralluma edulis</i> (Edgew) Bth ex Hk.f	Asclepiadaceae	Pamankay	Herb	S	Carminative, anti-biabetic, febrifuge, stomachic.
17	<i>Calendula arvensis</i> L.	Asteraceae.	Zair gulae.	Herb	L, F	Tonic, diaphoretic and anthelmintic.
18	<i>Celtis caucasica</i> L.	Ulmaceae	Thaga	Tree	L,Fr,W	Fuel wood, fodder, colic, amenorrhoea.
19	<i>Chenopodium album</i> L.	Chenopodiaceae	Sarmay	Herb	WP	Vegetable.
20	<i>Cichorium intybus</i> L.	Asteraceae	Han	Herb	R	Jaundice and fever.
21	<i>Convolvulus arvensis</i> L.	Convolvulaceae	Prewathai	Herb	L	Fodder, antidandruff.
22	<i>Conyza canadensis</i> Conquist	Asteraceae	Malloch	Herb	L	Fodder, homeostatic, stimulant, diuretic, astringent.
23	<i>Cotoneaster microphyllus</i> Wall.ex Lindley	Rosaceae	Kharawa	Shrub	WP	Fencing, thatching and sheltering roof.
24	<i>Clematis grata</i> Wall.	Clemataceae	Ghrazela	Climbing herb.	L	Fodder.
25	<i>Crataegus oxycantha</i>	Rosaceae	Changa	Tree	Fr.	Edible, Heart tonic.
26	<i>Cynodon dactylon</i> L.	Poaceae	Kabal	Herb	WP	Blood purifier, Fodder.
27	<i>Daphne oloides</i> Schreb.	Thymellaeaceae	Laighonai	Shrub	R, Fr.	Edible, gonorrhea, anthelmintic.
28	<i>Datura stramonium</i> L.	Solanaceae	Harhanda	Herb	L, R	Earache, Antipyretic.
29	<i>Diospyrus lotus</i> L.	Ebenaceae	Toor amlook	Tree	Fr., W, L	Edible, fuel wood, Carminative, Purgative.
30	<i>Diospyrus kaki</i> L.	Ebenaceae	Ziar Amlook	Tree	Fr., W, L	Edible, fuel wood, laxative.
31	<i>Dodonea viscosa</i> (L.) Jacq.	Sapindaceae	Ghwaraskay.	Shrub	L, S, W	Astringent, rheumatism, thatching, hedges and fencing.
32	<i>Dryopteris jaxtaposta</i> Christ.	Pteridaceae	Kwanjay	Herb	WP	Vegetable.
33	<i>Eleagnus umbellata</i> Thumb.	Elagnaceae	Ghanam ranga	Shrub	F, Fr., Sd.	Heart problem, cough and chest pain.

Table 1. Contd.

34	<i>Euphorbia helioscopia</i> L.	Euphorbiaceae	Prewatki	Herb	WP	Poisonous, Laxative.
35	<i>Euphorbia wallichii</i> Hook.	Euphorbiaceae	Shangla	Herb	L, S	Anthelmethic.
36	<i>Ficus palmate</i> Forsk.	Moraceae	Inzat	Tree	Fr.	Edible.
37	<i>Fragaria indica</i> Andrew.	Rosaceae	Da Zamki Toot.	Herb.	Fr.	Edible, Laxative.
38	<i>Fumaria indica</i> Husskin.	Fumaraceae	Paprra	Herb	WP	Jaundice and blood purifier.
39	<i>Geranium wallichianum</i> D. Don ex. Sweat.	Geraniaceae	Srazela	Herb	WP	Kidney disease, cough, fever.
40	<i>Hypericum perforatum</i> L.	Hyperiaceae	Shin Chay	Herb	L	Stimulant, carminative.
41	<i>Indigofera heterantha</i> Wall. Ex Brand.	Papilionaceae	Ghoureja.	Shrub	YS, Br.	thatching, fencing, fodder.
42	<i>Jasminum officinale</i> L.	Oleaceae	Chambele	Shrub	R	Antihelmentic
43	<i>Juglans regia</i> L.	Juglandaceae	Ghuz	Tree	Fr., B.	Brain tonic, antiseptic, toothbrush.
44	<i>Justicia adhatoda</i> L.	Acanthaceae	Baikar	Shrub	R, L	Rheumatism, pneumonia, cough, Used in snakebites, eye and ear ailments. Honey bee species.
45	<i>Lathyrus aphaca</i> L.	Papilionaceae	Krukamany	Herb	Sd.	Wounds healing.
46	<i>Malva neglecta</i> L.	Malvaceae	Zangali Panerak	Herb	WP	Vegetable.
47	<i>Mentha longifolia</i> L. Huds	Lamiaceae	Velanay	Herb	WP	Diarrhea, vomiting.
48	<i>Mentha spicata</i> L.	Lamiaceae	Pudina	Herb	WP	Carminative, vomiting.
49	<i>Micromeria biflora</i> Buch-hamp ex. D. Don.	Lamiaceae	Narray shamakay	Herb	WP	Antiseptic.
50	<i>Morchella esculanta</i> L. Pers ex Fr.	Helvelaceae	Gujay	Mushroom	WP	Body tonic.

Table 1. Contd.

51	<i>Morus alba</i> L.	Moraceae	Toot	Tree	Fr., S,L	Edible, laxative, purgative, emollient, Fodder, thatching, basket making.
52	<i>Mysine africana</i> L.	Myrsinaceae	Marurrang	Shrub	Fr.	Edible, toothache.
53	<i>Nasturtium officinale</i> R. Br.	Brassicaceae	Talmira	Herb	WP	Vegetable, constipation, stomachache.
54	<i>Olea ferruginea</i> L.	Oleaceae	Khona	Tree	Fr., L,W.	Toothache, tooth brush, astringent, antiseptic, diuretic, antipatriotic, sore throat, fuel wood.
55	<i>Oxalis corniculata</i> L.	Oxalidaceae	Tarukay	Herb	L	Stomach problems, refrigerant, vermifuge.
56	<i>Paeonia emodi</i> Wall. ex. Hook.	Paeoniaceae	Mamekh	Herb	Rh.	Backbone ache. Tonic, emetic, cathartic, blood purifier. It is also used in dropsy, epilepsy, colic and body tonic.
57	<i>Picea smethiana</i> L.	Pinaceae	Mangazai	Tree	W, L	Fuel wood, furniture, rheumatism, kidney stone.
58	<i>Pinus wallichiana</i> L.	Pinaceae	Peoch	Tree	W	Fuel wood, furniture, healing agent.
59	<i>Pistacea integerrima</i> Stew. Ex. Brandis.	Anacardiaceae	Shnai	Tree	L, B.	Jaundice, antiseptic.
60	<i>Plectranthus rogous</i> L.	Lamiaceae	Sperkay	Shrub	Br.	Thatching and sheltering honey bee species.
61	<i>Plantago lanceolatum</i> L.	Plantaginaceae	Jabai	Herb	L,Fr., Sd.	Wound healing.
62	<i>Platanus orientalis</i> L.	Platanaceae	Chinar	Tree	W, B	Furniture, Fuel wood.
63	<i>Polygonatum verticellatum</i> (L.) Allioni	Liliaceae	Noorey alam	Herb	R	General BodyTonic.
64	<i>Portulacae oleracea</i> L.	Portulacaceae	Warkharray	Herb	WP	Vegetable
65	<i>Primula denticulata</i> D.Don.	Primulaceae	Manera	Herb	Rh., F	Improve eye sight, control ophthalmic problem.

Table 1. Contd.

66	<i>Quercus dilatata</i> Lindle. Ex. Royle.	Fagaceae	Toor Banj	Tree	Fr, W	Fuel wood, agricultural tools, indigestion asthma, urinary tract disease.
67	<i>Quercus incana</i> Husskn. H.N	Fagaceae	Banj	Tree	Fr, W	Fuel wood, agricultural tools, neurosis and dysuria.
68	<i>Quercus semicarpifolia</i> Sm.	Fagaceae	Mer, Tarra.	Tree	Fr, W	Fuel wood, body tonic.
69	<i>Robus fruticosus</i> L.	Rosaceae	Baganrra	Climbing shrub	Fr.	Edible, carminative, cough, fever, diuretic, fodder, fencing and hedges.
70	<i>Rosa moschata</i> L.	Rosaceae	Zangali Gulab	Climbing shrub	F, Br.	Stomach disorders, fencing and hedges.
71	<i>Rumex dentatus</i> L.	Polygonaceae	Shalkhay	Herb	Rh., L	Healing agent
72	<i>Rumex hastatus</i> L.	Polygonaceae	Tarukay	Herb	L	Vegetable, refrigerant enhance digestion.
73	<i>Salvia moorcroftiana</i> Wall. ex.Benth.	Lamiaceae	Khardag	Herb	L	Applied on skin to release puss, aphrodisiac.
74	<i>Sarcococa saligna</i> D. Don. Muell	Buxaceae	Ladanrr	Herb	L	Rheumatism, muscular pain.
75	<i>Skimmia laureola</i> DC. Sieb and Zucc.	Rutaceae	Nazar panrra	Herb	L	Evil eye, antiseptic dyspepsia.
76	<i>Solanum nigrum</i> L.	Solanaceae	Kachmachu	Herb	L, Fr.	Edible, cure eczema.
77	<i>Spiraea chinensis</i> Maxim.	Rosaceae	Krachay	Herb	F	Used in delivery.
78	<i>Stellaria media</i> L.	Caryophyllaceae	Oulalai	Herb	WP	Anti-diabetic.
79	<i>Taxus wallichiana</i> L.	Taxaceae	Banrraya	Tree	W, Br.	Fuel wood, furniture, emmenagogue and antispasmodic.
80	<i>Taraxacum officinale</i> Webber.	Asteraceae	Zair gulae.	Herb	F, R, L	Purgative, diuretic, laxative, Kidney and liver diseases.

Table 1. Contd.

81	<i>Thalictrum foliosum</i> D.C.	Rununculaceae	Mamera.	Herb	Rh.	Eye disorders.
82	<i>Thymus linearis</i> L.	Lamiaceae	Zangali sperkai	Herb	WP	Carminative, antispasmodic, cough, cold.
83	<i>Urtica dioica</i> L.	Urticaceae	Seezunkay	Herb	WP	Vegetable, constipation, pulmonary disorders.
84	<i>Valeriana jatamansi</i> Jones.	Valerianaceae	Mushkebala	Herb	Rh.	Epilepsy, antispasmodic, Carminative.
85	<i>Verbascum thapsus</i> L.	Scrophulariaceae	Khardag	Herb	L.	Antibiotic.
86	<i>Verbena officinalis</i> L.	Verbinaceae	Shamakay	Herb	WP	Anti-malarial, coolant agent.
87	<i>Viburnum grandiflorum</i> Wall. ex. Dc.	Caprifoliaceae	Ghaz	Shrub	F	Edible, stomach disorders.
88	<i>Viola canescens</i> Wall ex Roxb	Violaceae	Banafsha	Herb	F, L	Sore throat, carminative, astringent, demulcent, purgative, diaphoretic, antipyretic and febrifuge, anticancerous, epilepsy and other nervous disorders.
89	<i>Zanthoxylum armatum</i> Steud.	Rutaceae	Dambara	Shrub	B, S, Fr, Sd.	stomachic, carminative, tonic, antipyretic.
90	<i>Zizypus vulgaris</i> L.	Rhamnaceae	Markhanai	Tree	Fr, Br.	Edible, cough, cold, fencing and hedges, honey bee species.

R = Root, S = Stem, L = Leaves, F = Flower, Fr. = Fruit, Sd. = Seeds, YS = Young Shoots, B = Bark, Br. = Branches, Rh. = Rhizome, WP = Whole Plant.

present up to 4000 m. Part used: Whole plant. Uses: stomachic, used to cure otitis, Purgative and anthelmintic.

(4) Botanical name: *Berberis lycium* Royle. Family: Berberidaceae. Local name: Kwaray. English Name: Berberry. Habit: Shrub. Description and distribution: The stem and branches of the plant is whitish to grayish in color. Leaves are oblanceolate to oblong. Flowers pale yellow. Fruit; berry. The plant is well distributed in the area. Part

used: roots bark, berries. Uses: Stomachic, liver disorder, intestinal colic, wound treatment. Market value: Mingora and Madyan are the two local markets. It is sold at Rs. 40 to 110 /kg. The bark is also exported to Middle East and other countries.

(5) Botanical name: *Bergenia ciliata* (Haw.) Stermb. Family: Saxifragaceae, Local name: Maknarpath. English name: Stonebreaker, Habit: Herb. Description and distribution: it is a rhizome-tous perennial herb; leaves basal, large, round;

flower; white to pink, fruit; dehiscent capsule. The plant is sparsely distributed in the area and is found up to 4200 m. Part used: Rhizome. Uses: Anti-diabetic, expectorant. Market value: the plant is sold in Peshawar market. The rhizome is also exported to Middle East and Europe.

(6) Botanical name: *Bistorta amplexicaule* D.Don. Family: Polygonaceae. Local name: Anjabar, Habit: Herb. Part used: Rhizome. Uses: Locally the root is mixed with egg and fried in cow's ghee,

which is considered as a general body tonic. Also, it is used to cure sore throat. Market value: *Bistorata* is collected in huge amount by the locals. Its market value ranges from 120 to 300. At local market it is sold at 120, in national market at 200 and at international market at 300 kg.

(7) Botanical name: *Bunium persicum* (Boiss) Fedtsch. Family: Apiaceae. Local name: Zeera Siah. English name: Black cumin. Habit: Herb. Description and distribution: It is an erect perennial herb with 2-3 pinnatisect leaves. Flower white; fruit oblong, dark brown prominent ridges. It is found in dry areas of NWFP and is scantily present in the study area. Part used: Fruit. Uses: Fruit is used chiefly for flavouring purposes and medicinally it is used as carminative, lactagogue, stomachic, antiseptic and vermifuge. Market value: Mingora and Madyan are the main supply centre for this plant. According to a survey cumin has local, national and international market. At a local level it is sold at 200 to 250 per kg, at the national level at 450 and international level at 850 per kg. There is a high demand for cumin in the national and international Markets, as a result the plant is collected without any check. No conservation measures have been taken at local and at national level to protect this plant.

(8) Botanical name: *Caralluma edulis* (Edgew) Bth ex Hk.f, Family: Asclepiadaceae. Local name: pamankay, English name: Carrion. Habit: Herb, Description and distribution: it is leafless, perennial herb; stem erect fleshy and thick. It is sparsely distributed in the area. Part used: Stem. Uses: locally it is used as vegetable. It is febrifuge, stomachic and carminative. Market value: Due to its delicious taste and medicinal properties, the plant is heavily consumed in the whole area as a vegetable. It is sold in Mingora market at Rs. 60 to 110. The plant is also exported to other part of the country. 9. Botanical name: *Dioscorea deltoidea* Wall. Family: Dioscoraceae, Local name: Kanis. English name: Yam, Habit: Herb. Description and distribution: A perennial, tuberous twiner; leaves ovate to subdeltoid, often basally cordate, long-petioled; flowers unisexual, male in axillary spike, female in small cluster. Fruit is capsule. The plant is shade loving and grow on northern aspect of moderate slope from 1000 to 3300 m. Part used: Rhizome. Uses: Locally the dried rhizome of *Dioscorea deltoidea* is fried in cow's ghee and used early in the morning before break fast for the treatment of kidney problems. It is used to expel tapeworm. Market value: Due to the high medicinal properties of the plant, it has high market demand in the national and international market. It is sold at Rs 150 to 180 per kg in the national market. The plant is also exported to Japan, Germany, France and Middle East.

(10) Botanical name: *Hyoscyamus niger* Linn. Family: Solanaceae. Local name: Khurasani Ajwain. English name: Henbane. Habit: Herb. Description and distribution: henbane is a perennial herb with ovate-oblong, subamlexicaulus leaves. Flower 5-merous; sepals broadly triangular; petals obtuse, pale yellow. The plant is

distributed in a moderate amount in the area. Part used: Leaves and seeds. Uses: sedative, narcotic, and anodyne, used in asthma and whooping cough, tonic and astringent.

(11) Botanical name: *Morchella esculenta* St Amons. Family: Helvelaceae. Local name: Guchi. English name: Morels. Habit: Saprophyte. Description and distribution: *Morchella esculenta* is a saprophytic fungus, found in moist shady places under the crown projection of *Cedrus deodara*, *Pinus wallichiana*, *Picea smithiana*, etc. It is found in rich humus soil. It is found at altitude of 2500 to 3500 m in the forest habitat. Part used: Whole plant. Uses: Locally the morels are fried with cow's ghee and used after meal which is considered as a general body tonic. It is also used as a delicious food. Market value: *Morchella* has very high market value from 5000 to 20000 per kg. In the national market it fetch up to 12000/kg, while at international market at Rs 20000/kg. It is exported to Europe and Middle East.

12. Botanical name: *Paeonia emodi* Wall. ex. Hook. Family: Paeoniaceae. Local name: Mamekh. English name: Paeony. Habit: Herb. Description and distribution: Paeony is a perennial herb with ternate or bi-ternate, glabrous leaves; flower solitary, white or pale pink. Part used: Flowers, seeds and rhizome. Uses: backbone ache., tonic, emetic, cathartic, blood purifier. It is also used in dropsy, epilepsy, colic and body tonic. Market value: Due to its high medicinal value the plant is heavily collected in the area. The plant is sold at Rs. 60/kg at local market. The plant is also exported to other countries.

13. Botanical name: *Podophyllum hexandrum* Royle. Family: Podophyllaceae. Local name: Kakorra. English name: May apple. Habit: Herb. Description and distribution: A perennial herb; leaves long petioled, palmate, deeply 3-5 lobed; flower white; fruit oblong berry. It is distributed in moist shady places from 2200 to 4200 m. Part used: Rhizome. Uses: It is used as hepatic stimulant, purgative and emetic. The plant is also having anticancerous properties. Market value: Due to its high medicinal properties *Podophyllum* has high market value nationally and internationally. Its demand in pharmaceutical and herbal market is increasing day by day. It is sold in the market at a price of Rs 1500 to 2000/kg. It is exported to Germany and France for valuable foreign exchange.

(14) Botanical name: *Polygonatum verticellatum* (L.) Allioni. Family: Liliaceae. Local name: Noory alam. English name: Solomon's seal. Habit: Herb. Description and distribution: it is perennial herb, with oblong, sessile leaves; flowers white; fruit berry; seed round and few. It is rare plant in the area. Part used: Root. Uses: it is demulcent, used to stimulate mammary glands, especially in cattle. Market value: Due to its medicinal properties, the plant is collected in huge amount. It is sold at Rs. 140 to 180 at Mingora market.

(15) Botanical name: *Primula denticulate* Smith. Family:

Primulaceae. Local name: Mamera. English name: Dog's tooth primula. Habit: Herb. Description and distribution: Rhizomatous herb with compact rosette leaves; flowers purple in compact globular heads. It is scarcely distributed in the area. Part used: Rhizome. Uses: The rhizome possesses antibacterial properties; used in ophthalmia; it is also applied to leucoderma. Market value: The plant has high medicinal value, and is commercially exploited as a result it becomes threatened in the area. Mingora and Madyan are the two local market, it is also exported to Europe.

(16) Botanical name: *Saussurea lappa*. (Dene.) Sch. Bup. Family: Asteraceae. Local name: Kuth. English name: Kuth. Habit: Herb. Description and distribution: A tall perennial herb, with large triangular stalked pinnate basal leaves; flowers purple, in dense rounded heads. The plant is found very rare in the forest. Part used: Root. Uses: Locally the dried root of *S. lappa* is mixed with egg and fried with cow's ghee and used twice a day as an anti-spasmodic agent. The mixture is also used as a carminative agent. It is also useful in rheumatism and skin diseases. Market value: Mingora and Madyan are the main supply centres of herbal material for national markets. From here the plant is sent to other markets of the country. It is sold in the market at a price of Rs 250 to 300/kg.

(17) Botanical name: *Taxus wallichiana* L. Family: Taxaceae. Local name: Banrraya. English name: Himalayan Yew. Habit: Tree. Description and distribution: *Taxus* is an evergreen up to 30 m tall tree; leaves linear, flattened, spiny tipped, fruit red, fleshy. The tree is scantily present in the area. Part used: wood, leaves. Uses: Fuel wood, furniture, emmenagogue and antispasmodic. Leaves are used in bronchitis, asthma, epilepsy and as aphrodisiac. Market value: Due to its fine quality wood, valuable economy and medicinal effects the plant is extensively used in construction, furniture, fuel wood and various ailments. So the plant is becoming one of the high threatened species in the area.

(18) Botanical name: *Valeriana jatamansi* Jones. Family: Valerianaceae. Local name: Mashkebala. English name: Valerian root. Habit: Herb. Description and distribution: A small pubescent herb, with thick root stock and succulent stem; leaves, wavy or toothed margin, long stalk; flowers white of pink. It is sparsely distributed in the area, and especially it is found in moist places. Part used: Rhizome. Uses: Roots are aromatic, carminative, antispasmodic, and useful in neurosis, insomnia and habitual constipation. Market value: The plant is high national and international market value, as a result is overexploited in the area. Due to its valuable economics the local collectors collect it in huge amount. It is sold in market from 200 to 500, at national market it is sold at Rs 350/kg.

(19) Botanical name: *Viola canescens* Wall ex Roxb. Family: Violaceae. Local name: Banafsha. English name: Violet. Habit: Herb. Description and distribution: A

perennial herb with ovate heart shaped leaves. Flowers pinkish blue, spur straight to slightly curved; capsule globose, hairy. The plant is found in moderate amount in the area. Part used: Flower/Leaves. Uses: Locally it is collected for commercial purpose, only. The plant is medicinal properties as diuretic, demulcent, laxative and emollient. Market value: *Viola* is heavily collected in the area, due to its high national and international market value. It ranges from Rs. 500 to 1000/kg. However the plant is present in moderate amount in the area, but at current indiscriminate collection, the plant would become endangered.

DISCUSSION

Plants provide us ready made food, medicines for ailment, fodder and forage for our domestic animals, fuel wood for burning, flowers for aesthetics and celebration, raw materials for many industries, timber for construction and many more useful items. Humans are using these natural resources in some parts of the globe very ruthlessly and one such area is the Hindu-Kush, Himalayas region. The natural resources in the Hindu Kush - Himalayas is deteriorating more rapidly than many other global regions, but had received little attention internationally than other ecosystem. However, it is now time to realize that the traditional knowledge and management system are as important as the need to introduce modern innovative approaches to sustainable development and management of natural resources in order to sustain the livelihood of traditional societies in the Hindu Kush-Himalayan region (Abdillahi et al., 2010; IUCN, 2003; Aumeeruddy, 1996).

Most of the people of the Malam Jabba depend on mountain resources; however a large fraction of population also depends on agriculture and agro forestry. They collect a lot of medicinal plants, fodder, fuel wood and timber wood from the forest. Human existence, grazing and cultivation exert enormous stress on the vegetation and results in environment degradation (Salva et al., 2001). Similar situation also prevails in this valley. Some other causes include ignorance, poverty, joblessness and lack of scientific knowledge for the collection of medicinal plants.

The present study reported 90 important plants used for various purposes by the inhabitants of the area, such as food, fodder, fuel wood and timber, medicine etc. Due to the valuable economics of these plants they are ruthlessly collected by the locals and some outsider, as a result they are decreasing day by day. Collection of these medicinal and economic plants has threatened certain species. *P. haxandrum*, *V. jatamansi* are rare plants, while *T. wallichiana* is threatened species. There is a need of careful conservation of the plants resources of the region, otherwise many plants may be lost forever and become extinct. Similar results were also reported by Sher et al.

(2004), who reported 25 plants from Miadam valley. Among MAPs *A. heterophyllum*, *A. martima*, *Bergenia ciliata*, *Bunium persicum*, *Dioscorea deltoidea*, *P. emodi*, *P. haxandrum*, *V. jatamansi*, were once very wide spread in the area, but are now restricted in a small localized area. It is due to the over exploitation of these plants for its high therapeutic values. However, the plants are vulnerable and will be threatened in near future if the measures are not taken for its conservation. Local staff, local stock holders should be aware about the conservation of plants resources of the area (Aumeeruddy, 1996).

It was also observed that MAPs in the area are collected without any check, therefore, causing biodiversity loss and depletion of wild natural resources. Similarly Sher et al. (2010a, c) stated that the targeted plant species are collected from the wild of the study area on what is apparently a first-come, first-serve basis. There is no management structure tied to the harvesting of resources at present. Therefore, collection volume is much more and beyond their regeneration rate. Similar observations were also reported by Sikarwar (1996) and Lange (1998). They stated that the trade and collection of plant materials is mostly handled by unskilled persons. As a result valuable medicinal plants are damaged due to lack of scientific methods of collection. Secondly over-extraction, destructive harvesting techniques and habitat loss are severe threats to medicinal and aromatic plants in Europe and same is true for our study area. It was also discovered that collectors now have to put more efforts and to walk longer distances to collect the same materials of targeted plants when compared to twenty years ago.

The natural regeneration of economically important MAPs are adversely affected by habitat loss and degradation, introduction of alien species, over exploitation pollution and disease, human induce climatic change, deforestation, over grazing, unabated urbanization and by their unauthorized collection in the study area. This agree with Beg and Khan (1974), and Sher and Hussain (2009), they reported that unsustainable mode of medicinal plants collection and habitat loss has put the conservation status of many medicinal plants at risk in Swat District.

The livelihood of many people in the investigated site depends on the gathering of plants and their sale especially in case of medicinal plants and timber wood. This agree with the results given by Sher et al. (2010b) that about 5000 low income families in Malakand Division and northern area were involved in the collection and marketing of MAPs.

The natural vegetation of the area is under heavy biotic pressure, and Man is the prime source in removing the vegetation for fuel wood and the degradation of vegetation through slashing and burning, improper collection, deforestation etc. The present study therefore, conducted to take conservation measures with the involvement of local communities as well as to assess the conservation

status of these valuable plants of the study area. These ecological efforts with the involvement of local masses might lead to the rehabilitation of the deteriorated ecosystem, if the interference could some how be controlled, the vegetation will definitely take a turn toward improvement.

Conclusion

This study concluded that investigated area host many endemic and endangered species of plants, many of them are of medicinal and economic importance. Indigenous knowledge behind the uses, collection and management of medicinal plant species is fastly eroding. One reason for this is the lack of awareness among the local community regarding the economic and medicinal importance of medicinal plants. Another factor contributing in the declination of medicinal plants cover and eroding of indigenous knowledge is the inadequacy of the MAPs market and lack of government support. This is, therefore, an issue of national policies and must be address.

The approach to improve or restore the ill effects of resources misuse and economic degradation should be in multiple directions, from improving the economic standard to changing the attitudes of the local people should be adopted in future. This type of study may help in better understanding of local forest resources and potential MAPs. Lack of knowledge regarding the local potential at the national level would eventually lead to the genetic erosion of medicinal plant species and the related indigenous knowledge system. In order to ensure the management and conservation of MAPs, documenting of indigenous knowledge system and its constant and consisting support is essential.

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