



ETHNOMEDICINAL AND PHYTOECONOMIC ELABORATION OF LILOWNAI VALLEY, DISTRICT SHANGLA, PAKISTAN

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ABSTARCT

The flora of Pakistan and especially that of Northren Part has tremendous scope to evaluate their ethnomedicinal importance for more realistic way to justify their traditional usage and applications. Based on this, an ethnomedicinal survey was carried out in the Lilownai valley, District Shangla, Khyber Pakhtunkhwa, Pakistan in summer 2008 and reinvestigated during 2010-2011. The study showed that the local population not only use indigenous medicinal plants for curing various diseases but also earn their livelihood by selling some of them in the local market. One hundred and twenty five medicinal plants are being used by local people in the study valley in which a diversified application of these species have been observed. These include (24 species) astringent and for other skin problems, (16 species) laxative, (14 species) stomachic, (14 species) diuretic, (11 species) carminative, (10 species) anthelmintic, (10 species) used in reproductive disorders, (9 species) are used in various hepatic disorders, (9 species) used in various CNS disorders, (8 species) antispasmodic, (8 species) expectorant, (7 species) antirheumatic, (5 species) antiseptic, (4 species) antidiabetic, (4 species) purgative, (4 species) aphrodisiac, (3 species) anticancer, (2 species) antihypertensive and (2 species) for ophthalmic use. Similarly the remaining species have one or more medicinal use(s). Seventeen species of them are also collected for trade purposes that include *Ajuga bracteosa*, *Paeonia emodi*, *Berberis lycium*, *Mentha longifolia*, *Diospyrus lotus*, *Skimmia lauriola*, *Zanthoxylum alatum*, *Morchella esculenta*, *Bistorta amplexicaulis*, *Podophyllum emodi*, *Dryopteris jaxtapostia*, *Allium sativum*, *Cichorium intybus*, *Plectranthus rugosus*, *Dioscorea deltoidea*, *Juglans regia* and *Polygonatum multiflorum*. Market survey revealed that the collectors are often not aware of the high market value and medicinal application so most of the collected material is sold to local middle man at very low price. Furthermore they are also do not take care during plant collection.

KEYWORDS: Ethnomedicinal, phytoeconomy, medicinal plants, Lilownai valley

INTRODUCTION

The Lilownai valley is situated in the North Western part of District Shangla, at a distance of about 5 km from Alpurai, capital of the district. It is located between 34° 31' to 33° 8' north latitude and 72° 33' to 73° 01' east longitude. Elevation of the area varies from 1700m to 3040m from mean sea level. Climatically the area comes under sub tropical dry temperate zone. The average mean daily maximum and minimum temperature of the year is 15.96°C and 6.7°C. The mean maximum temperature during June and July remains above 25°C. December, January and February are the coldest months of the year having a mean daily maximum temperature of 0°C, 2°C and 2.95°C respectively. The average rainfall is about 1778mm while average monthly rainfall is 150 mm. Maximum snowfalls of about 24, 40, and 60 inches occur from November to March. The project area has great variation its flora as it occupies nexus of the five great mountains i.e. Changaser, Spenser, Bahadurser, Mahalo, Charai which give home to vast diversity of plants of food, medicinal and ornamental importance. Ethnographically two major tribes residing in the area i.e. Seyed (Mian) and Gujar with total population of 434563 individuals¹. Pashto is major language of the area. Main occupations of the people are farming, government services and collection of forest products therefore the forest is under severe biotic pressure. A forest reserve should be a constant source of maintaining genetic diversity of plants and animal and these resources should be available to man through proper conservation². The ethnomedicinal of any area can lead to valuable information, allowing research to be done based on the empirical knowledge that should be tested scientifically. For this purpose there should be an analysis of medicinal plants in

several aspects i.e. anthropological, botanical, pharmacological, chemical, ecological and others³. Similar ethnobotanic and ethnomedicinal studies have been done on plants by different researchers i.e. Gupta *et al*⁴, Singh *et al*⁵, Vedavathy & Mrudula *et al*⁶, Siwakoti & Siwakoti *et al*⁷, Khan *et al*⁸, Ghimireet *et al*⁹, Siddiqui *et al*¹⁰, Mustafa *et al*¹¹ and Sankaranarayanan *et al*¹². In Pakistan, some ethnobotanical studies have also been conducted by Tariq *et al*¹³, Badshah *et al*¹⁴, Durrani *et al*¹⁵, Gilani *et al*¹⁶ and Mahmood *et al*¹⁷. The ethnobotany of some vallies of neighboring district Swat has also been reported by Hussain *et al*¹⁸, Sher *et al*^{19,20}, Hussain *et al*^{21,22} and Hassan *et al*²³. In District Shangla ethnobotany of Ranyal valley has been explored by Ibrar *et al*² in 2007 similarly the ethnomedicinal potential of Changa valley has also been reported by Razaq *et al*²⁴ in 2010. Review of literature showed that no sufficient information regarding ethnomedicinals exist in Lilownai valley District Shangla, therefore the present study was carried out to explore the area ethnomedicinally for the first time that will help in further research for those working in the relevant disciplines of ethnopharmacy and Phytomedicines.

MATERIALS AND METHODS

Present study was carried out during May to August 2008 and reinvestigated recently in 2011-2012, in which the project area was visited twice a month for collection of data. Each study trip was well planned and arranged effectively. Field work was carried out in order to investigate the ethno botany, plant diversity and conservation status of the flora of Lilownai valley, District Shangla. The field work includes interviews, observations and guided field walks. Two methods were frequently used during the field work i.e. observations and field work.

Observations

This method is based on personal observations in the field conditions. These observations were made while visiting different villages. During this process, local methods of medicinal plants collection, storage, drying, harvesting time, processing and utilization were observed and noted. In the mean time all the plants during flowering/fruitlet stage were collected, pressed and preserved. Collected plant species were mounted on standard size of herbarium sheets. The data collected from the field was transferred to the slip pasted on the herbarium sheets department of Botany Hazara University, Mansehra, Pakistan. The plants were identified with the help of taxonomic literature, manuals and floras²⁵⁻²⁸.

Interviews

Beside personal observations, interviews were conducted with the local inhabitants, selected informants, herbalists, hakeems (practitioner of Unani system of medicine) and pensaries (medicinal plants traders in the local market) during field trips. During the interviews, semi-structured questionnaire was developed as per modification from Croom²⁹ and Lipp³⁰ in order to get qualitative and participatory approach about the plant resources and utilization. Questions concerning the utility of different plants, quantity of plant used, rate of consumption, availability, economic/market value were asked.

RESULTS

The present study showed that the local people of Lilownai valley utilize 125 species of medicinal plants for the curing of various ailments. These 125 species are distributed among 63 families comprising of 52 Dicots, 3 Gymnosperm, one family of Fungi and 2 families of Pteridophytes (Pteridaceae and Polypodiaceae). Among Dicots, family Rosaceae scored highest with 9 families, followed by Asteraceae and Papilionaceae with 7 species each. Similarly Lamiaceae, Polygonaceae, Ranunculaceae, Brassicaceae, Chenopodiaceae, Cucarbitaceae, Euphorbiaceae and Moraceae were represented by 6, 6, 4, 3, 3, 3, 3 and 3 species respectively. The remaining families have one species of ethno medicinal importance in the study area. The study showed that plants play an important role in the traditional system of medicine of local population. Some plants are used alone, while many others are used in combination with other plants or items such as wheat flour, sugar and ghee (clarified butter) etc. Similarly certain plants are useful as a single therapeutic agent while several others are used for their multiple therapeutic purposes. The local medicinal uses along with their local names, part(s) used, family and botanical name of medicinal plants in the area is presented in Table-1. It is clear from the result that the inhabitant of Lilownai valley use plants as therapeutic agents for the treatment of various ailments. Similarly they sell some of these in local market. Seventeen of these medicinal plants are sold in the local market. Summary of the plants sold in the local market is presented in Table-2. Medicinal plants collection is a marginal economic activity, mostly the freshly collected plants are sold in the market. Totally 17 plant species are used for marketing purposes, main exportable species of the area are *Morchella esculenta*, *Podophyllum emodi* and *Bistorta amplexicaule*. Some other species are also supplied to the local herb market. The highest purchase rate among these local medicinal plants is that of *Morchella esculenta*, which is PKR. 12000 to 15000/Kg. More details of marketable plants are highlighted in Table-2.

DISCUSSION

Medicinal plants collection and processing for human and livestock treatment is a centuries old practice, and have also been used virtually in all cultures²¹. Phytomedicinals play an important role in the healthcare of people around the world, especially in the developing countries, about 70-80% of the world population use traditional medicines for treatment of various diseases^{31,32}. In the early 1970, 84% of Pakistani population was reputed to be dependent on traditional medicines while an estimated 80% of the rural population of Pakistan still depends on traditional medicines for their primary healthcare needs³³. Our effort is also a step to document the indigenous knowledge of local people of Lilownai valley. Present study showed that medicinal plants play a significant role in the daily life of people of the study area. They use 125 medicinal plants for the treatment of various health disorders. Similar study was conducted by Sher *et al* in 2010 on Northern parts of Pakistan. However, traditional knowledge regarding the use of Phytomedicinals is not uniformly distributed among the people. The old aged people and Hakeems are more experienced and have more knowledge about the use of medicinal plants. Furthermore, the people of the area are poorly educated about proper collection of medicinal plants and they have no proper skills regarding harvesting, post harvest care, storage and marketing of medicinal plants and most importantly they are quit ignorant about conservation strategies. Plants generally and medicinal plants particularly in the study area are a finite and precious resource that requires efficient, wise and sustainable management and conservation strategies. Similarly 17 plants species are sold in local market as the livelihood of many people in the investigated area depends upon the gathering of plants and their sale especially in case of medicinal plants. This agrees with the results given by Sher *et al* in 2010 that about 5000 low income families in Malakand Division and northern area were involved in the collection and marketing of medicinal and aromatic plants³⁴. Mountains nexus of Lilownai valley is a part of Hindu Kush, Himalayas. The natural resources in the Hindu Kush, Himalayas is deteriorating more rapidly than any 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 region³⁵. Over exploitation, habitat loss, destructive harvesting techniques and low monetary return of the materials is among the most important problems at collector's level. Collectors are not aware of proper harvesting time and methods, resulting damage to the resource base. Secondly over exploitation and habitat changes, due to human population increase across most parts of the study area, have eroded the targeted plant population level. In the last three decades there has been a steady degradation of the rich floral landscape of the region.

RECOMENDATION

The study recommends that in order to have an effective natural resource management and sustainable utilization program, it is extremely important to ensure that the benefits of the resources are fairly shared with the communities, who are the real owners of the resources. The sense of ownership can only be generated when the communities at large see the benefits coming from the resource, not only for them, but

also for their next generations. Non equitable and exploited benefit sharing often lead to unsustainable practices. With the growing interest in medicinal plants, both nationally and internationally, it is necessary to develop a long term strategy to conserve and sustainably harvest these plant products. There is also a need for both community based efforts and better state control on the harvesting and trade of medicinal plants to enable the conservation of the resource base. An alternative source of income through cultivation should be generated for the community, thereby preserving precious wild plant resources. The study also suggests that one or two years protected area have an increased quantity and diversity of medicinal plants. The study therefore recommends that rehabilitation/ recovery practices of the present work in order to enhance restoring of vegetation in general and medicinal plants wealth in particular. Furthermore, it is also necessary to establish management conservation areas of adequate size in the natural habitats of medicinal plants with the participation of local communities. In case of species that are threatened, clear guidelines should be developed and annual quotas of plant parts which may be collected should be clearly established and made known to all concern parties and stakeholders. A proper mechanism of the implementation of collection quotas should be designed to enforce the conservation and management efforts.

CONCLUSION

Plant scientists work on the documentation of plants around the globe. These efforts have resulted in the preparation of complete record of the many thousands of plant species. Yet documentation and recording of the importance of specific plant species to communities and their traditional usage was ignored. This was simply because nobody foresaw the importance of such record and its impact on the improvement of phytomedicines. In recent years, however, there has been renewed scientific interest in the fundamental role played by plants in many cultures, including their use for medicinal purposes. Present project is also a step to such endeavors. One hundred and twenty five plant species are used by local people of the study area for various health disorders. Seventeen of these plants, having phytoeconomic value are sold by the local communities in the local market. Plants in general and medicinal plants in particular in the study area are a finite and precious resource that requires efficient, wise and sustainable management and conservation strategies.

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Table-1. Important medicinal plants of Lilownai Valley District Shangla and their uses

S.No	Botanical Name	Local Name	Family	Part used	Medicinal use(s)
1	<i>Allium sativum</i> L.	Ouga	Alliaceae	Whole plant	Carminative, diuretic, aromatic, antidiabetic.
2	<i>Allium cepa</i> L.	Piaz	Alliaceae	Bulb, leaves	Stimulant, diuretic, aphrodisiac, expectorant and antiseptic
3	<i>Allium griffithianum</i> Boiss.	Zangali Piaz	Alliaceae	Whole Plant	Carminative, use in dyspepsia, flatulence and colic
4	<i>Pistaceae integerrima</i> J. L. Stewart ex Gramdis	Shania	Anacardiaceae	Wood, leaves and fruit	Tonic, expectorant, asthma, jaundice, antiseptic and also for chronic wounds
5	<i>Coriandrum sativum</i> Linn.	Dhanial	Apiaceae	Leaves and seeds	Aromatic, stimulant, carminative, diuretic, tonic, stomachic and aphrodisiac.
6	<i>Arisaema utile</i> Hook .f.	Marjarai	Araceae	Rhizome, fruit	Stimulant, irritant, and as antidote in snake bites.
7	<i>Acorus calamus</i> Linn.	Skhawaja	Araceae	Rhizome	Dysentery and chronic diarrhea.
8	<i>Achyranthus aspera</i> L.	Ghiskay	Amaranthaceae	Whole plant	Diuretic, stomachic and laxative
9	<i>Asparagus adsendens</i> Roxb.	Tindorai	Asparagaceae	Root and shoots	Aphrodisiac
10	<i>Artimisia vulgaris</i> L.	Tarkha	Asteraceae	Shoots	Antispasmodic, stomachic and hepatotonic
11	<i>Calendula officinale</i> Linn.	Ziar Gulay	Asteraceae	Flowers and leaves	Stimulant, astringent, diaphoretic, anthelmintic and antispasmodic.
12	<i>Cichorium intybus</i> L.	Han	Asteraceae	Root	Various types of fever and jaundice.
13	<i>Taraxacum officinale</i> Weber	Ziar Gulay	Asteraceae	Leaves and roots	Tonic, laxative, diuretic, kidney and liver disease.
14	<i>Helianthus annuus</i> Linn.	Nowar Parast	Asteraceae	Seeds and flowers	Laxative and diuretics.
15	<i>Achillea millefolium</i> Linn.	Yarkand	Asteraceae	Leaves and roots	Carminative, antispasmodic, use in flatulence and colic.
16	<i>Silybum marianum</i> (L) Gaertn.	Kandyara	Asteraceae	Whole plant	Demulcent, toxic and hepatic disease.
17	<i>Ahnus nitida</i> (Spach) Enal.	Geray	Batulaceae	Bark	Tanneries and natural staining.
18	<i>Nasturtium officinale</i> R. Br.	Talmeera	Brassicaceae	Vegetative portion	Vegetable, constipation, Stomachic and diuretic.
19	<i>Capsella bursa-pastoris</i> (Linn.) Medic	Bambaisa	Brassicaceae	Leaves, seeds	Stimulant, anti diarrheal, diuretic and astringent.
20	<i>Brassica campestris</i> Linn	Sharshum	Brassicaceae	Leaves seeds	Wound healing, skin rupture due to cold in winter.
21	<i>Sarcococa saligna</i> (Don) Muell	Ladanr	Buxaceae	Leaves	Rheumatism, arthritis and muscular pain.
22	<i>Berberis lyceum</i> Royle	Kwaray	Berberidaceae	Leaves, stem and root bark	Stomachic, colic, expectorant, anticancer and astringent.
23	<i>Stellaria media</i> (L.) Cyr.	Oulalai	Caryophyllaceae	Whole plant	Appetizer and use as vegetable.
24	<i>Silene vulgaris</i> (Moench) Garcke.	Pravatai	Caryophyllaceae	Whole plant	Emollient, fumigant and juice are used in ophthalmic.
25	<i>Cannabis sativa</i> Linn.	Bhang	Cannabindaceae	Leaves	Sedative, tonic, narcotic, anodyne and refrigerant.
26	<i>Viburnum foetens</i> (D.Don) Wall ex. D.C.	Ghaz meva	Caprifoliaceae	Fruits and branches	Stomach disorders.
27	<i>Chenopodium album</i> Linn.	Sarmay	Chenopodiaceae	Roots	Laxative, anthelmintic and diuretic.
28	<i>Chenopodium ambrosioids</i> L.	Skha botay	Chenopodiaceae	Whole plant	Antispasmodic, stomachic, laxative, stimulant, carminative, diuretic.
29	<i>Chenopodium botrys</i> L.	Skha harawa	Chenopodiaceae	Whole plant	Cough, vermifuge and hepatitis.
30	<i>Cucumis sativa</i> L.	Badrang	Cucarbitaceae	Fruit and seed	Colic, cooling and diuretic.
31	<i>Cucurbita maxima</i> Linn.	Khoog kado	Cucarbitaceae	Fruit and seed	Stomachic and anthelmintic.
32	<i>Cucurbita pepo</i> Linn.	Gharangi kado	Cucarbitaceae	Fruit	Cardio tonic and stomachic.
33	<i>Dioscorea deltoidea</i> Wall.	Kanis zelai	Dioscoraceae	Tuber	Jaundice, ulcer, anthelmintic and kidney problems.
34	<i>Euphorbia wallichii</i> Hk.f	Mandanro	Euphorbiaceae	Latex and shoots	Laxative and anthelmintic.
35	<i>Ricinus communis</i> Linn.	Arhanda	Euphorbiaceae	Seeds, oil	Emetic, narcotic and purgative.
36	<i>Euphorbia helioscopia</i> L.	Mandanro	Euphorbiaceae	Whole plant	Laxative and poisonous.
37	<i>Diospyrus lotus</i> L.	Toor Amlook	Ebenaceae	Fruit	Carminative and purgative
38	<i>Eleagnus umbellata</i> Thumb.	Ghanum ranga	Elaeagnaceae	Flower and seeds	Heart problems, cough and chest pain (angina).
39	<i>Fumaria indica</i> (Husskin) H.N	Papra	Fumaraceae	Whole plant	Jaundice, coolant and blood purifier.
40	<i>Corydalis govaniana</i> Wall.	Bhutkis	Fumaraceae	Whole plant	Bitter tonic and diuretic.
41	<i>Quercus dialata</i> Lindl. ex. Royle	Toor Bhang	Fagaceae	Seeds and bark	Astringent, asthma, urinary tract disease and diuretic
42	<i>Quercus incana</i> Roxb.	Spin banj	Fagaceae	Wood	Gonorrhea, neurosis and dysuria.
43	<i>Morchella esculenta</i> (Linn.) Pers ex Fr.	Gojai	Helveliaceae	Whole	Aphrodisiac and general body tonic
44	<i>Aesculus indica</i> (wall.Ex.Cambl.) Hk.f	Jawaz	Hippocastanaceae	Fruit	Anthelmintic, chest congestion and colic.
45	<i>Juniperus communis</i> L.	Ghoghar	Juniperaceae	Dry ripe fruit	For curing itching.
46	<i>Juglans regia</i> Linn.	Ghuz	Lamiaceae	Nut, Bark	Brain tonic, antiseptic and tooth brush.
47	<i>Ajuga bracteosa</i> Wall. Ex. Benth	Booti	Lamiaceae	Whole plant	Sore throat, Jaundice, hypertension purifying blood and epilepsy.
48	<i>Mentha longifolia</i> (L.) Huds.	Villanay	Lamiaceae	Whole plant	Stomachic, carminative, anti diarrheal, antiemetic and expectorant.
49	<i>Mentha spicata</i> Linn.	Podina	Lamiaceae	Leaves	Stimulant, carminative and antiemetic.

50	<i>Origanum vulgare</i> Linn.	Shamakay	Lamiaceae	Leaves	Toothache, earache and as diuretic.
51	<i>Plectranthus rugosus</i> Wall. Ex. Bth	Spirkay	Lamiaceae	Branches	Antiseptic, aromatic and antidiabetic.
52	<i>Prunella vulgaris</i> Linn.	Shinbotay	Lamiaceae	Whole plant	Expectorant, antiseptic, tonic, antispasmodic and anti rheumatic.
53	<i>Polygonatum verticellatum</i> (L.) Allioni.	Noryalam	Liliaceae	Root	Demulcent, useful in female weakness and mammary glands stimulant.
54	<i>Polygonatum multiflorum</i> (C.) Allioni.	Noryalam	Liliaceae	Leaves, fruit, seeds, rhizome and bark	Rhizome is administered for removal of placenta in buffaloes.
55	<i>Melia azadarachta</i> Linn.	Tora bakyana	Meliaceae	Whole tree	Cathartic, emetic and poultice.
56	<i>Bistorta amplexicaulis</i> (D. Don) Green.	Anjabar	Polygonaceae	Rhizome	Sore throat, anti inflammatory, laryngitis and general body tonic.
57	<i>Hibiscus esculentus</i> (L.) Moench	Bandai	Malvaceae	Fruits	Emollient, demulcent and diuretic.
58	<i>Ficus caria</i> Forsk	Inzer	Moraceae	Fruit and latex	Laxative and demulcent.
59	<i>Morus alba</i> Linn.	Spin toot	Moraceae	Fruit and leaves	Laxative, purgative and emollient.
60	<i>Olea ferruginea</i> Royle	Khona	Oleaceae	Fruits	Antidiabetic, toothache, astringent, antiseptic, diuretic and sore throat.
61	<i>Morus nigra</i> Linn.	Tor toot	Moraceae	Fruits and leaves	Emollient, astringent and demulcent
62	<i>Jasminum officinale</i> L.	Spin Rambail Chambail	Oleaceae	Whole plant	Diuretic, antiemetic, anthelmintic use in skin diseases and headache.
63	<i>Papaver somniferum</i> Linn.	Qash qaash	Papaveraceae	Latex, seeds	Narcotic, anodyne and sedative.
64	<i>Paeonia emodi</i> Wall ex Hk. F	Mamaikh	Paoniaceae	Rhizome	Tonic, emetic, cathartic, backache, blood purifier, epilepsy, colic and also use in dropsy.
65	<i>Phytolacca acinosa</i> Roxb.	Tamako sag	Phytolaccaceae	Whole plant	Narcotic and pain in joints.
66	<i>Platanus orientalis</i> Linn.	Chinar	Platanaceae	Whole tree	Toothache and diarrhea.
67	<i>Plantago lanceolatum</i> Linn.	Jabai	Plantaginaceae	Leaves and fruit	Laxative, mouth soar and lesions.
68	<i>Plantago major</i> L.	Ghata jabai	Plantaginaceae	Leaves and seeds	Stimulant, expectorant, mouth soar, throat soar and antimycotic.
69	<i>Portulaca olearacea</i> Linn.	Warkharay	Purtolaceae	Vegetative portion	Refrigerant and laxative.
70	<i>Podophyllum emodi</i> Wall. Ex Royle	Kakora	Podophyllaceae	Rizhome	Anticancer, hepatic stimulant, purgative and emetic.
71	<i>Indigofera heterantha</i> Wall. Ex Brand	Ghoureja	Papilionaceae	Shoots	Scabies and stomach disorders.
72	<i>Robinia psendacacia</i> L.	Kikar	Papilionaceae	Whole plant	Stimulant, laxative.
73	<i>Lathyrus aphaca</i> L.	Korkaman	Papilionaceae	Root	Wound healing and appetizer.
74	<i>Zanthoxylum armatum</i> Steud.	Dambara	Rutaceae	Seeds	Stomachic, carminative, tonic, expectorant and antipyretic.
75	<i>Trigonella foenumgracaem</i> L.	Methi	Papilionaceae	Whole plant	Antihyperlipidemic, mammary glands stimulant, antidiabetic, hepatotonic and carminative.
76	<i>Pisum sativum</i> L.	Mutter	Papilionaceae	Seeds and leaves	Use as vegetable and appetizer.
77	<i>Abies pindrow</i> Royle.	Achar	Pinaceae	Trunk and cones	In kidney stone and antirheumatic.
78	<i>Pinus roxburghii</i> Sargent.	Nakhtar	Pinaceae	Whole tree	Ulcer and snake bites.
79	<i>Pinus wallichiana</i> A.B. Jackson	Peach	Pinaceae	Resin	Anthelmintic, acne, and wound healing.
80	<i>Pinus gerardiana</i> Wall. Ex. Lamb.	Chalghoza	Pinaceae	Seeds	Wounds and ulcer.
81	<i>Picea smethiana</i> (Wall) Boiss.	Mangazaye	Pinaceae	Whole tree	Kidney stone and rheumatism.
82	<i>Bisforalo amplexicaulis</i> Hk.F.	Tarva parna	Polygonaceae	Rhizome	Ulcer, rheumatism and gout.
83	<i>Polygonum barbatum</i> L.	Pulpuluk	Polygonaceae	Shoots	Anthelmintic.
84	<i>Rumex hastatus</i> Linn.	Tarokay	Polygonaceae	Leaves and young shoots	Carminative, purgative, astringent, diuretic, stomachic and flavoring agent.
85	<i>Rumex dentatus</i> L.	Shalkhay	Polygonaceae	Leaves and roots	Diuretic, astringent and demulcent.
86	<i>Spiraea chnensis</i> Maxim.	Krachay	Polygonaceae	Flower	Used in delivery.
87	<i>Adiantum venustum</i> D. Don.	Sumbal	Polypodiaceae	Whole plant	Sexual disability, fever, backache and blood purifier.
88	<i>Avena sativa</i> Linn.	Jamdaray	Poacea	Whole plant	General body tonic and aphrodisiac.
89	<i>Zea mays</i> Linn.	Jowar	Poacea	Whole plant	Antiseptic and urticaria.
90	<i>Cynodon dactylon</i> L.	Kabal	Poacea	Whole plant	Blood purifier and controlling bleeding from nose.
91	<i>Primula denticulata</i> Smith.	Mamera	Primulaceae	Rhizome	Antibacterial and used in ophthalmia.
92	<i>Dryopteris jaxtapostia</i> Christ.	Kowanjay	Pteridaceae	Whole plant	Enhance digestion.
93	<i>Aconitum violaceum</i> Jacq. Ex. Staf.	Zahar mora	Ranunculaceae	Rhizome	Rheumatism, arthritis, anthelmintic and body tonic. Poisonous in larger Quantity.
94	<i>Caltha alba</i> Jacb.	Mokand pat	Ranunculaceae	Rhizome	Muscular pain and as a tonic.
95	<i>Delphinium roylei</i> Munz.	Lajward	Ranunculaceae	Seeds	Neuralgia and cardiac depressant.
96	<i>Ranunculus aquatilis</i> L.	Ziar gulay	Ranunculaceae	Whole plant	Asthma, periodic fever and as purgative for goats.
97	<i>Zizyphus sativa</i> Gaertn.	Markhanai	Rhamnaceae	Fruit and branches	Astringent and cooling.
98	<i>Skimmia lauriola</i> Sieb. Zucc. ex Walp.	Nameer	Rutaceae	Leaves	Antiseptic, dyspepsia.
99	<i>Sarbaria tomentosa</i> L.	Gera	Rosaceae	Whole plant	Astringent.
100	<i>Fragaria vesica</i> L.	Zmakin toot	Rosaceae	Fruit	Carminative and laxative.

101	<i>Contoneaster microphyllus</i> Wall.ex Lindley.	Kharawa	Rosaceae	Fruit	Expectorant and astringent.
102	<i>Prunus cornuata</i>	Changa	Rosaceae	Fruit	Digestive and stomach disease.
103	<i>Rosa moschata</i> L.	Zangali gulab (Qorach)	Rosaceae	Flowers	Delivery cases and stomach disorders.
104	<i>Diospyrous kaki</i> Linn.	Sor Amlook	Rosaceae	Fruits	Laxative.
105	<i>Malus pumila</i> Mill.	Manra	Rosaceae	Fruit	Anemic condition, expectorant.
106	<i>Prunus domestica</i> Linn.	Alucha	Rosaceae	Fruit	Laxative.
107	<i>Prunus armeniaca</i> L.	Khubanai	Rosaceae	Fruit	Anti Cancer.
108	<i>Prunus presica</i> Linn.	Shal talo	Rosaceae	Fruit	General tonic.
109	<i>Duchesnia indica</i> (Andr.) Focke.	Zangali toot	Rosaceae	Fruit	Nerve tonic, laxative and diarrhea.
110	<i>Dodoneae vescosa</i> (L.) Jacq.	Ghowaraskay	Sapindaceae	Leaves	Astringent, antirheumatic and aromatic.
111	<i>Bergenia ciliata</i> (Haw.)	Ghat pana	Saxifragaceae	Rhizome	Wound healing.
112	<i>Ailanthus altissima</i> (Mill) Swingle.	Bakyana	Simarubaceae	Leaves and bark	Anthelmintic and used in skin diseases.
113	<i>Verbascum thapsus</i> Linn.	Khardug	Scrophulariaceae	Leaves and seeds	Analgesic and antiseptic.
114	<i>Solanum tuberosum</i> Linn.	Aloe	Solanaceae	Underground tubers	Tuberculosis (T.B).
115	<i>Solanum nigrum</i> Benth. Ex. Wild	Kachmachu	Solanaceae	Berries and leaves.	An expectorant, poultice, carminative, eczema, tonic and diuretic.
116	<i>Taxus wallichiana</i> Zucc.	Barnya	Taxaceae	Bark	Antispasmodic and emmenagogue.
117	<i>Daphne oloides</i> Schreb.	Laighonai	Thymeliaceae	Fruit	Purgative, gonorrhea and anthelmintic agent.
118	<i>Celtis caucasica</i> Linn.	Tagha	Ulmaceae	Leaves and fruits	Anti allergic, colic and amenorrhea.
119	<i>Urtica dioica</i> Linn.	Sizunkay	Urticaceae	Leaves	Constipation, antispasmodic and pulmonary disorders.
120	<i>Debregeasia saeneb</i> (Forssk) Hepper and Wood	Ajai	Urticaceae	Wood and fruit	Skin rashes, dermatitis and eczema.
121	<i>Valeriana jatamansi</i> Jones.	Mushk bala	Valerianaceae	Rhizome	Epilepsy, antispasmodic carminative and constipation.
122	<i>Vitex negundo</i> L.	Marvandai	Verbenaceae	Leaves, roots and branches.	Astringent and tonic.
123	<i>Vitis vinifera</i> L.	Angoor	Vitaceae	Fruits and leaves	Coolant, stomachic and laxative.
124	<i>Vitis jacquemontii</i> Parker.	Gidar Kowar	Vitaceae	Fruit	Tonic and laxative.
125	<i>Thymus linearis</i> Benth.	Zangali Sperkai	Umbelliferae	Whole plant	Colic, cough, cold, carminative and flatulence.

Table-2 Purchase rates of medicinal plants in the local herbs market.

S.No	Botanical name of plant	Plant Material Status	Purchase rate, PKR/Kg	Local trader to whom the plant is sold
1	<i>Ajuga bracteosa</i>	Dried	35 to 40	Hakeems
2	<i>Paeonia emodi</i> Wall ex Hk. F	Dried	40 to 50	Hakeems and Shopkeepers
3	<i>Berberis lycium</i> Royle	Dried	40 to 85	Hakeems
4	<i>Mentha longifolia</i>	Dried	50 to 65	Hakeems and Shopkeepers
5	<i>Diospyrus lotus</i> L.	Dried	20 to 30	Shopkeepers
6	<i>Skimmia lauriola</i> Sieb. Zucc.ex Walp.	Fresh	40 to 45	Shopkeepers
7	<i>Morchella esculenta</i> (Linn.) Pers ex Fr.	Dried	12000 to 15000	Exporters
8	<i>Podophyllum emodi</i> Wall. Ex Royle	Dried	30 to 45	Exporters
9	<i>Dryopteris jaxtapostia</i> Christ.	Fresh	20 to 35	Shopkeepers
10	<i>Allium sativum</i> L.	Dried	100 to 150	Shopkeepers
11	<i>Cichorium intybus</i> L.	Dried	50 to 55	Shopkeepers and Hakeems.
12	<i>Plectranthus rugosus</i> Wall. Ex. Bth	Dried	50 to 60	Hakims
13	<i>Juglans regia</i> L.	Dried	100 to 120	Exporters.
14	<i>Zanthoxylum armatum</i> Steud.	Dried	100 to 115	Shopkeepers
15	<i>Bistorta amplexicaulis</i> (D.Don) Green.	Dried	100 to 150	Hakeems.
16	<i>Dioscorea deltoidea</i>	Dried	100 to 150	Shopkeepers.
17	<i>Polygonatum multiflorum</i> (C.) Allioni.	Dried	120 to 130	Shopkeepers.

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