

Indigenous Utilization of Plant Biodiversity in Malakkheil-Kotkay Village, District Shangla, Pakistan

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Abstract. The present study was carried out in village Malakkheil-Kotkay, District Shangla, Pakistan that revealed 84 plants belonging to 51 families utilized for the treatment of different diseases. Rosaceae was leading family with 10 species followed by Asteraceae and Lamiaceae with 7 species each, Araceae and Polygonaceae with 3 species each and Amaranthaceae with 2 species. The remaining families had one species each. The life form spectra showed 31 (39.74%) therophytes, 17 (21.79%) megaphanerophytes, 12 (15.38%) cryptophytes, 11 (14.10%) nanophanerophytes, 5 (6.41%) hemipterophytes and 2 (2.56%) chamaephytes. The leaf size spectra was dominated by microphyll with 31 (39.74%) species, mesophyll 17 (21.79%), nanophyll 14 (17.94%), macrophyll 6 (7.69%), leptophyll 5 (6.41%), megaphyll 2 (2.56%) and one (1.28%) was aphyllous species. Abdominal problems, jaundice, fever, wound healing, cardiac problems, eye pain, kidney pains and mouth diseases are some of diseases cured through these plants. The locals are directly dependent on the available natural resources for their subsistence. The unawareness of the collectors of medicinal plants, deforestation and overgrazing will cause endangerment and extinction of medicinal plants of the area in near future.

Keywords: indigenous utilization, plant biodiversity, Malakkheil-Kotkay Valley, Shangla, Pakistan

Introduction

Ethnobotany deals with the interaction between plants and people with particular importance on traditional tribal cultures (Mesfin *et al.*, 2013). It addresses all types of relationships between people and plants which generally highlight the importance of plants in human life, as a rich source of medicine, food, fodder, fibre and goods. Local communities use indigenous plants for the treatment of various diseases on the basis of their traditional knowledge, experience, practices, skills or on the advice of elders, hakeems and herbal practitioners (Shinwari *et al.*, 2002). Ethnobotanists explore that how plants are used by local people as food, shelter, medicine, clothing and in religious ceremonies. Medicinal plants are cheap source and easily available to the people living in remote mountainous areas (Mahongue *et al.*, 2006).

Due to unique geography and suitable climatic conditions, Pakistan is floristically very rich with about 6000 identified vascular plants with more than 400 medicinal species. In Pakistan 39,584 hakeems and 130,000 homoeopaths are registered and about 457 herbal dispensaries/clinics provide medication to the people with 300-350 herbal medicine manufacturing companies in the country (Shinwari and Qaiser, 2011).

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The present study area Malakkheil is a small village located on the main road towards Puran Valley in district Shangla at 34° -31' to 33°-08' North latitude and 72° -33' to 73°-01' East longitude. The biodiversity of the area is in danger due to deforestations, grazing, browsing, lopping, grass cutting, torch wood extraction, illicit filling, smuggling and conversion of forest area to agricultural (cultivated) land. The general elevation of the area is 2,000 to 3,000 meters above the sea level and area comes under moist temperate region. The precipitation occurs both in the form of snow and rain. Snow fall generally starts at the end of November on the high peaks of the mountains and continues sometimes upto the middle of March. The climate here in winter season remains extremely cold while summer is moderate and very pleasant. The temperature in summer remains between 17 to 30 °C, while in winter the temperature ranges from 0 to 18 °C.

The aim of the present study is to explore the medicinal plants of the area, documentation of indigenous knowledge about these plants and their use in the treatment of different diseases.

Materials and Methods

Frequent study trips were made during years 2014-15 for the collection of medicinal plants from Malakkheil-Kotkay Valley, District Shangla, Pakistan. The collected

species were dried, pressed and identified with the help of different volumes of flora of Pakistan (Ali and Qaiser, 1993-2015; Ali and Nasir, 1989-1991; Nasir and Ali, 1970-1989) and other available literature. The leaf size and life form spectra were determined after Raunkiaer (1934) and Hussain (1989). The local inhabitants, the herbalists and Hakeems (local physicians) were interviewed through simple questionnaires for collection of data about the uses of the plants. The ethno-ecological inventory of the plants consisted of botanical names, local names, medicinal uses and phenology were prepared.

Results and Discussion

Medicinal plants species (84) belonging to 51 families were documented from the research area used locally for the treatment of various diseases and ailments. Among these, Rosaceae with 10 species was dominant family followed by Asteraceae and Lamiaceae with 7 species each, Araceae and Polygonaceae 3 species each, Amaranthaceae 2 species and Anacardiaceae, Apiaceae, Asparagaceae Berberidaceae, Convolvulaceae and Lamiaceae were represented by one species each (Table 1 and Table 3). Major uses of these plants were curing cough, diarrhoea, tooth pain, gastro intestinal disorders, anemia, wounds healing, as tonic and controlling obesity. One species *Toxicodendron succedanea* (L.) Mold. (Family Anacardiaceae) found to be highly toxic causing dermatitis and majority of plants were used for multi purposes. The main collectors of these plants were men,

women, children, hakeems and practitioners and were unaware, illiterate and untrained as they have no knowledge about the importance, conservation, proper collection and preservation of these medicinal plants. Most of the species were found to be threatened due to habitat degradation, deforestation, grazing, over exploitation and unscientific collection. Low income and lack of facilities increased the dependence of majority of the local communities on the available natural resources for their subsistence. Our findings agree with Ibrar *et al.* (2007) who reported 97 medicinal plant species from Ranyal Hills, District Shangla, Pakistan among which most of the plants are similar. Shah and Hussain (2012) reported 127 medicinal plants from Chakesar Valley, District Shangla, among these 47 (37%) were critically endangered and mostly were infrequent due to unawareness and unsustainable collection by local peoples. Ali and Qaisar (2009) reported 82 taxa used locally for various purposes. Unsustainable collection methods, poor post harvest methods, soil erosion and intense deforestation are the main causes of depletion of local flora. Khan *et al.* (2012) studied ethnobotanical knowledge of Poonch Valley, Azad Kashmir (Northern Pakistan) and found 56 medicinal plant species used for treatment of kidney stones, diarrhoea, respiratory disorder, asthma and rheumatism etc. Qamar *et al.* (2010) documented medicinal plants and their traditional uses in the Neelam Valley, Azad Jammu and Kashmir, Pakistan and reported 67 medicinal plants used for treatment of 32 different diseases.

Table 1. Plant species with their botanical names, life forms, leaf size, phenology, part used and ethnobotanical uses in Malakkheil-Kotkay Valley, District Shangla, Pakistan

Family	Botanical name	Vern. name	Life form	Leaf size	Fl-Fr	Part used	Ethnobotanical uses
Araceae	<i>Acorus calamus</i> L.	Skhawaja	Th	Meg	Apr-Oct	Rhizomes	Cough, dyspepsia, flatulence, colic and diarrhoea.
	<i>Arisaema flavum</i> (Forsk.) Schott	Marjarai	Cr	Mac	May-July	Roots	Stomach problems and kill worms in Cattles.
	<i>Arisaema jacquemontii</i> Blume	Marjarai	Cr	Meg	May-July	Fruits and rhizome	Fruits and rhizomes are poisonous and cause sedation. Very small quantity is used during meal for relieving body pain. Also used in small quantities in various preparations by "Hakeems" for psychic and nervous disorders.
Asteraceae	<i>Artemisia vulgaris</i> L	Tarkha	Th	Mic	Apr-Nov	WP	Intestinal worms and skin diseases.
	<i>Artemisia brevifolia</i> Wall	Jawkay	Th	Mic	Apr-Nov	Inflo-rescence	Respiratory stimulant, Intestinal worms, purgative and earache.
	<i>Heliantus annuus</i> L.	Nwarparas	Th	Mic	July-Sep	Seeds & leave	High fever, asthma & lung problems.

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	<i>Taraxacum officinale</i> Weber.	ZiarrGulay	Th	Mac	Feb-May	Leaves	Leaves are ground and are taken & roots with a glass of milk as tonic. Decoction of roots is used orally to cure the disorder of kidney and liver.
	<i>Xanthium strumarium</i> L.	Gishkay	Th	Mac	Apr-Nov	WP	Leaves are used for treatment of asthma. Stem ash is used as pain killer. The plant is also used as fuel. Leaves are grazed by cattle
	<i>Tagetes minuta</i> L.	Hamesha	Th	Na	Apr-Oct	WP	Injuries and wounds.
	<i>Fragaria vesica</i> L.	Zmakintoot	Th	Na	May-July	Fruit	Its edible fruits are carminative and laxative and thus improve digestion.
Lamiaceae	<i>Mentha longifolia</i> L. (Huds)	Valanay	Cr	Mic	Aug-Sep	WP	Vomiting, flatulence and indigestion.
	<i>Mentha piperata</i> (SM.) L.	Podina	Cr	Mic	Jul-Sep	Leaves	Loss of appetite and acidity.
	<i>Mentha arvensis</i> L.	Podina	Cr	Mic	May-Oct	Leaves	Against pimples on the Face and as astringent.
	<i>Ajuga bracteosa</i> Wall.ex Benth.	Booti	Th	Mes	Apr-May	Leaves	Treatment of fever, vomiting and stomachache Tonsillitis,throat pain, throat swelling.
	<i>Prunella vulgaris</i> L.	Parharbotay	H	Na	Jun-Oct	WP	Wounds, injuries, acnes and wrinkles.
Saxifragaceae	<i>Bergenia ciliata</i> (Haw.) Sternb	Mukanpat	H	Mes	Apr-May	Leaves & rhizome	Ulcer, piles, vertigo, headache, wounds.
Alliaceae	<i>Allium cepa</i> L.	Pyaz	Cr	Na	Apr-July	Bulb & leaves	Cholera, diarrhoea, dysentery and acnes.
	<i>Allium sativum</i> L.	Oga	Cr	Na	Apr-July	Bulb & leaves	Obesity, acnes, earache.
Apiaceae	<i>Bunium persicum</i> B. fedtsc	Kali zeri	Th	Na	Apr-May	Seeds	Stomach and abdominal pain.
	<i>Coriandrum sativum</i> L.	Dhanya	Th	Na	Mar-May	Leaves & fruits	Joints pain, headache, cold and flu.
Plantaginaceae	<i>Plantago lanceolata</i> L.	Jabai	Th	Mes	May-Sep	Leaves & seed	Sores, wounds and inflammation shealing, laxative, mouth diseases and dysentery.
	<i>Plantago major</i> L.	Ghatajabai	Th	Mes	July-Sep	Leaves & seeds	Fresh leaves are wrapped around the boils, after a day or two the pus drains out and the heal fills up within three days. Leaves are chopped and used for skin discoloration caused by injury. Seeds are used in dysentery.
Ranunculaceae	<i>Aconitum violaceum</i> Jacq. ex Stap	Zahar Mora	Cr	Mes	Mar-July	Roots	Rheumatism, gout (Joints pains).
	<i>Anemone coronaria</i> L.	Torabooti	Cr	Mes	Mar-July	Leaves	Headache and dental pain.
Chenopodiaceae	<i>Chenopodium album</i> L.	Chaweray	Th	Mic	Apr-Sep	Leaves & shoots	The young shoots are cooked in milk, and are eaten with maize (corn) bread, as a local vegetable.
	<i>Chenopodium murale</i> L.	Skhabotay	Th	Mes	Apr-Sep	Leaves & young shoots	Indigestion,piles,dysentery young and grippe.
Urticaceae	<i>Urtica dioica</i> L.	Jalbang	Th	Mic	May-Oct	WP	It is used as a local vegetable (Sag), for curing constipation, also used in pulmonary diseases. Smoked as cigarette for the curing of asthma and also for urticaria.
Rosaceae	<i>Rubus elipticus</i> Smith.	Gooraj	NP	Mic	Oct-Nov	Fruit	Fruits are edible and are considered as tonic and are used as aphrodisiac. Fruits are carminative and are also used for diarrhoea and looseness of bowel.

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	<i>Rosa brunonii</i> L.	Khurach	NP	Lep	Jun-July	Flower	The powder of petals is stomach tonic, hedge plant, honey bee species. Heart diseases, eye diseases, constipation, leucorrhoea and skin diseases.
	<i>Rosa indica</i> L.	Gulab	NP	Mic	Mar-Aug	Flower	
	<i>Rubus fruticosus</i> L.	Gobanai	NP	Mic	May-Sep	Fruit	Used to improve digestion power.
	<i>Pyrus communis</i> L.	Nashpati	MP	Mic	Mar-Aug	Fruits	Anemia, obesity, constipation, diabetes and colitis.
	<i>Pyrus malus</i> L.	Manra	MP	Mes	Apr-May	Fruit	Anemia, gout, muscle pain, bleeding gums, weak memory and dandruff.
	<i>Pyrus pashia</i> Buch-Ham ex. D	Tango	MP	Mic	Mar-Apr	Fruit & leaves	Wood used for walking sticks, combs and as fuel. Leaves and twigs lopped for fuel. The ripe fruits are chewed to cure the injuries of the tongue.
	<i>Prunus domestica</i> L.	Aloocha	MP	Mes	Aug-Sep	Fruit	Used for digestion and asperities; useful in biliousness and heart of body.
	<i>Prunus persica</i> (L.) Batsch	Shaftalo	MP	Mic	Apr-May	Fruit	Demulcent, laxative, and refrigerant, often added to cathartic decoctions for improvement of flavor.
	<i>Sorbaria tomentosa</i> (Lindl.) L.	SraBakayana	NP	Mic	Sept-Nov	Inflorescence	Mixed with mustard oil and applied on the newborn child skin to remove skin rashes and also applied to the wound as an antiseptic agent.
Fabaceae	<i>Indigofera gerardiana</i> Wall.	Ghureja	NP	Na	June-Sep	Leaves, shoots & roots	Combat headache and chest pain. The dried powdered root is taken with a glass of water to cure scabies. Powdered dried leaves are also taken with a glass of milk for stomach disorders.
	<i>Desmodium elegans</i> DC. ghwareja	Spin	NP	Mic	Aug-Oct	Leaves	The paste is layered on the infection and use against Eczema.
Polygonaceae	<i>Polygonum aviculare</i> L.	Palpolak	H	Mes	July-Aug	WP	Powdered root mixed to sugar, eaten with glass of milk as a tonic by female.
	<i>Rumex hastatus</i> L.	Tarukay	Ch	Mic	Apr-May	Leaves	The leaves are used as local vegetable, which enhances digestion. It is also used as refrigerant in cooling drinks.
	<i>Rumex dentatus</i> L.	Shalkhay	Th	Mes	May-June	Leaves	Leaves cooked as vegetables that act as diuretic, astringent. The paste is applied externally to soothe the irritation caused by nettle sting.
Ebenaceae	<i>Diospyrus kaki</i> L	Sur Amlok	MP	Mic	July-Aug	Fruit	fruit have high content makes the immature fruit and bitter.
	<i>Diospyrus lotus</i> L	TurAmlok	MP	Mic	June-July	Fruit	Carminative, purgative and flatulence.
Moraceae	<i>Morus nigra</i> L. <i>Morus alba</i> L.	Toor toot Spin toot	MiP MiP	Mi Mi	June-July June-July	Fruits Fruits	Tonsillitis, pharyngitis throat pain. Treatment of jaundice and Hepatitis
Adiantaceae	<i>Adiantum incisum</i> Forsk.	Sumbal	Cr	Na	Apr-Sept	Leaves	Diarrhoea, Dysentery, Jaundice.
Amaranthaceae	<i>Amaranthus viridis</i> L.	Ganhar	Th	Mic	May-Nov	WP	Eye diseases.
Caprifoliaceae	<i>Viburnum nervosum</i> L.	Gutla	MP	Mes	Mar-June	Fruit	Curing of stomachache.
Berberidaceae	<i>Berberis lyceum</i> Royle.	Kwaray	NP	Na	Apr-Sep	Roots & barks	Back pain, bone fractures, wounds.
Cannabinaceae	<i>Cannabis sativa</i> L.	Bhang	Th	Na	July-Sep	Leaves & young shoots	Loss of appetite & body inflammation.

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Caryophyllaceae	<i>Stellaria media</i> (L.) Cyr.	Oulalai	Th	Na	May-June	WP	The decoction of plant is considered as purgative.
Fagaceae	<i>Quercusincana</i> (Husskn.) H.N	Banj	MP	Mic	May-Aug	Leaves, seeds	The powdered fruit is given to children before going to bed for curing of enuresis and diarrhoea., for a period of three weeks.
Platanaceae	<i>Platanus orientalis</i> L.	Chinar	MP	Mac	Apr-May	Bark	Powdered dried bark is taken with a glass of milk twice in a day to control diarrhoea.
Simarubaceae	<i>Ailanthus altissima</i> (Mill.) Swing.	Shandai	MP	Mic	Apr-Sep	Seeds	The ripened seeds are crushed to extract oil, which is used for the treatment of a skin disease, "urticaria" locally called larrama.
Salicaceae	<i>Salix tetraspermum</i> Roxb.Pl.Corom	Kharwala	MP	Na	Jan-Mar	WP	Thin flexible branches are bent for making baskets. Leaves are eaten by cattle and the wood is used for fuel and other domestic purposes.
Eleagnaceae	<i>Ealeagnus umbellata</i> Thumb.	Ghanam-ranga	NP	Mic	Apr-May	Flowers	The decoction of flowers is heads & fruit used twice a day to combat the heart problem, cough and chest pain and fruits are edible.
Pinaceae	<i>Pinus wallichiana</i> L.	Pewoch	MP	Lep	Feb-Apr	Resin	Locally 3-4 drops of resin are mixed with mustard oil and is applied to the ruptured skin as a healing agent.
Pteridiaceae	<i>Dryopteris odontoloma</i> (Moore)	Kwanjay	H	Lep		Young shoots	It is used as a local vegetable and is believed to improve digestive power.
Violaceae	<i>Viola biflora</i> L.	Banafsha	Th	Mic	May-June	Flower	Diaphoretic, antipyretic, febrifuge, cancer, epilepsy and nervous disorders.
Podophyllaceae	<i>Podophyllum hexandrum</i> Royle.	Kakorra	Th	Mic	May-June	Rhizome	Hepatic stimulant, purgative and emetic.
Fumariaceae	<i>Fumaria indica</i> (HaussKan)	Papra	Th	Lep	Mar-May	WP	Jaundice, urinary tract & bladder inflammation.
Geraniaceae	<i>Geranium wallichianum</i> Oliv.	SraJarai	Th	Mic	June-Sep	Leaves & rhizome	Peptic ulcer, toothache and eye diseases.
Juglandaceae	<i>Juglans regia</i> L.	Ghoz	MP	Mic	May-June	Leaves, fruits & bark	Bark (Dandasa) is used for cleaning and sparkling teeth. Decoction of leaves is given in eczema and intestinal worms.
Cucurbitaceae	<i>Memordica charantia</i> L.	Karela	Th	Mes	June-July	Fruits	Obesity, breast cancer & diabetes.
Brassicaceae	<i>Nasturtium officinale</i> R. Br. <i>Brassica compistress</i> L.	Talmera	Th	Mac	May-Oct	Leaves	Its leaves and young shoots are boiled in water and are taken as local vegetable for the treatment of constipation and stomachache.
Oxalidaceae	<i>Oxalis corniculata</i> L.	Tarokay	Th	Na	June-Sep	WP	Bleeding, fever, liver, Intestinal, stomach and urinary inflammation.
Paeoniaceae	<i>Paeonia emodii</i> Wall. Ex Royle	Mamekh	Cr	Mes	Apr-June	Roots	Back pain, joint pains bone fracture, hysteria, colic diseases, epilepsy.

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Papaveraceae	<i>Papaver somniferum</i> L.	Khaskhash	Th	Mic	Apr-June	Leaves, fruits & seeds	Cough, asthma, gout, Influenza, flu & pain.
Solanaceae	<i>Datura stramonium</i> L.	Harhanda	Ch	Mac	June-Aug	Root & flowers	Decoction of fresh root is taken orally twice a day for a week to treat fever. Drops of the decoction are also applied to the ear for the treatment of earache.
	<i>Solanum nigrum</i> L.	Kachmacho	Th	Mic	July-Sept	Fruits	Mouth sores, joint swelling, skin diseases and mouth ulcers.
Araliaceae	<i>Hedera helix</i> L.	Palol	MP	Mic	Oct-Nov	WP	Anti-diabetes.
Cuscutaceae	<i>Cuscuta reflexa</i> Roxb.	Benakai	Th	Ap	May-Aug	WP	Anti-diabetes, general body tonic and Anti-dandruff.
Hippocastinaceae	<i>Plectranthus rugosus</i> L.	Sperkay	NP	Mic	Aug-Oct	Leaves	Mouth sores, pain and throat swelling.
Portulacaceae	<i>Portulaca oleracea</i> L.	Warkharay	Th	Mes	June-Sept	WP	Abdominal pain and skin inflammation.
Rhamnaceae	<i>Ziziphus sativa</i> Gaertn.	Markhanai	MP	Na	Apr-May	Fruit	Weak immune system, heart diseases, ulcer, inflammation, cold and flu.
Euphorbiaceae	<i>Ricinus communis</i> L.	Arhanda	NP	Mac	July-Aug	Seeds	Earache & fever.
Scrophulariaceae	<i>Verbascum thapsus</i> (Linn).	Kharghwag	Th	Mac	June-Aug	WP	Wounds, burns, bone fracture and cough and antiseptic.
Valerianaceae	<i>Valeriana jatamansi</i> Jones.	Shingatai	Cr	Mes	July-Aug	Rhizome	Insomnia, anxiety, delirium tremens, hysteria, cholera, snake bite, asthma, ulcers, tremors, headache and eurosis.
Anacardiaceae	<i>Toxicodendron succedanea</i> (L.I. Mold).	Rakkhal	MP	Mes	May-June	Fruit	Poisonous. Cause dermatitis

Leaf form: Mes = Mesophyll; Mic = Microphyll; Le = Leptophyll; Na = Nanophyll; Meg = Megaphyll; Mac = Macrophyll; Ap = Aphyllous; **Life form:** MP = Megaphanerophytes; Th = Therophytes; Ch = Chamaephytes; G = Geophytes; H = Hemicryptophytes; NP = Nanophanerophyte; Cr = Cryptophytes; WP = whole plant.

The life form spectra showed 31 (39.74%) therophytes, 17 (21.79%) megaphanerophytes, 12 (15.38%) cryptophytes, 11 (14.10%) nanophanerophytes, 5 (6.41%) hemicryptophytes and 2 (2.56%) chamaephytes (Table 2, Fig. 1). The leaf size spectra was dominated by microphyll with 31 (39.74%) species followed by

mesophyll (17 sp., 21.79%), nanophyll 14 (17.94%), macrophyll 6 (7.69%), leptophyll 5 (6.41%), megaphyll 2 (2.56%) and one (1.28%) species was aphyllous (Table 2, Fig. 2). Badshah *et al.* (2013); Khalik *et al.* (2013) and Shah and Rozina (2013) reported that therophytes were dominant life forms in their study

Table 2. Life forms and leaf size classes of the plants of Malakkheil-Kotkay, District Shangla, Pakistan

Life-form classes	No. of species	Percentage	Leaf size classes	No. of species	Percentage
Therophytes	31	39.74	Microphyll	31	39.74
Megaphanerophytes	17	21.79	Mesophyll	17	21.79
Nanophanerophytes	11	14.10	Nanophyll	14	17.94
Cryptophytes	12	15.38	Macrophyll	06	7.69
Hemicryptophytes	05	6.41	Leptophyll	05	6.41
Chamaephytes	02	2.56	Megaphyll	02	2.56
			Aphyllous	01	1.28

areas which supports our findings. Hussain and Chudhary (2009) found that microphyll was the dominant leaf size in Azad Kashmir having similar climatic conditions. This is in line with our findings.

Phenology is appearance of plants in different seasons of the year. Mostly wild species of different families appeared in Malakkheil-Kotkay, District Shangla during early summer of the year (Table 1). Some species appear throughout the year. These species become prominent in different seasons of the year thus showing seasonal dominance.

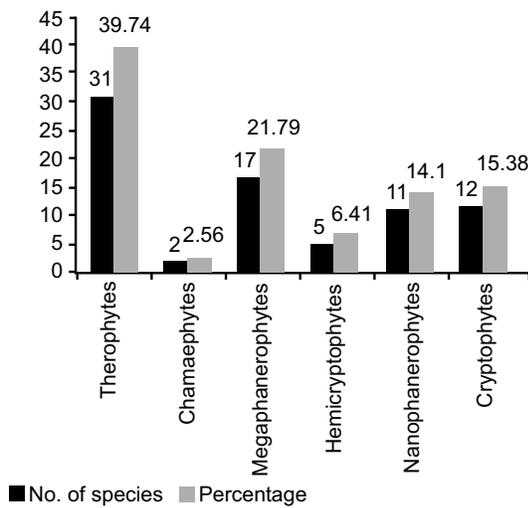


Fig. 1. Life form spectrum of different plant species of Malakkheil-Kotkay, District Shangla, Pakistan.

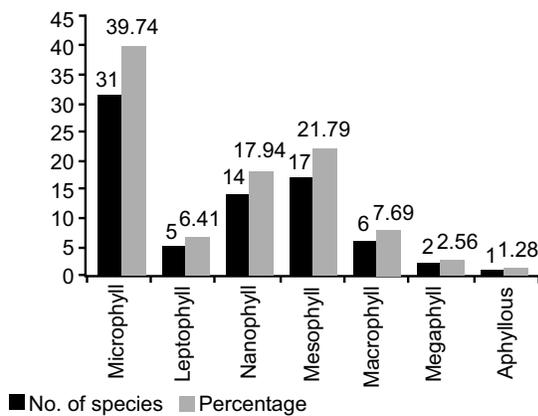


Fig. 2. Leaf size spectrum of different plant species of Malakkheil-Kotkay, District Shangla, Pakistan.

Table 3. Family wise check list of flora of Malakkheil Kotkay, District Shangla, Pakistan

S.no.	Family	No. of species
1	Araceae	3
2	Eleagnaceae	1
3	Ebenaceae	2
4	Asteraceae	6
5	Pinaceae	1
6	Adiantaceae	1
7	Lamiaceae	6
8	Pteridiaceae	1
9	Amaranthaceae	1
10	Saxifrigaceae	1
11	Voilaceae	1
12	Caprifoliaceae	1
13	Alliaceae	2
14	Podophyllaceae	1
15	Berberidaceae	1
16	Apiaceae	2
17	Fumariaceae	1
18	Araliaceae	1
19	Plantaginaceae	2
20	Geraniaceae	1
21	Cuscutaceae	1
22	Ranunculaceae	2
23	Moraceae	2
24	Chenopodiaceae	2
25	Urticaceae	1
26	Juglandaceae	1
27	Hippocastinaceae	1
28	Rosaceae	10
29	Cucurbitaceae	1
30	Cannabinaceae	1
31	Fabaceae	2
32	Brassicaceae	1
33	Caryophyllaceae	1
34	Polygonaceae	3
35	Oxalidaceae	1
36	Fagaceae	1
37	Simarubaceae	1
38	Papavernaceae	1
39	Platnaceae	1
40	Salicaceae	1
41	Solanaceae	2
42	Valerianaceae	1
43	Anacardiaceae	1
44	Portulacaceae	1
45	Paeoniaceae	1
46	Serophulariaceae	1
47	Rhamnaceae	1
48	Euphorbiaceae	1

Conclusion

Malakkheil-Kotkay Valley occurs in district Shangla of Pakistan and is rich in plant natural resources including medicinal plants. Therefore, the present study was conducted to document the medicinal plants of the area and to collect information regarding their indigenous utilization. Abdominal problems, jaundice, fever, wound healing, cardiac problems, eye pain, kidney pain and mouth diseases are some of the diseases cured through these plants by the locals. However, due to urbanization and modernization, the knowledge of older people regarding the uses of these plants is perishing gradually and the young generation has least interest in getting information about these plants. Therefore, the present study can provide first hand information on the medicinal plants of the valley and will be helpful in further botanical studies.

Recommendation

The area hosts many endemic and endangered species of medicinal plants having valuable economic importance. The study confirmed that small quantity of important medicinal plants species were known while several were completely unknown to the community as a whole. It is concluded that the area possessed great potential for cultivation and harvesting of economically important plants. It is suggested that local community should provide education about the identification, collection, uses and commercialization of important plants and aware them about the economic and pharmaceutical importance of plants. Establishment of nurseries and botanic gardens may be the best *ex-situ* conservation for sustainable utilization of plant resources of the area while local community awareness and involvement to protect these national assets will be the best *in-situ* conservation measures.

Conflict of Interest. The authors declare no conflict of interest.

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