

Original Research Article

Ethnobotanical Wealth of Jandool Valley, Dir Lower, Khyber Pakhtunkhwa (Kpk), Pakistan

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Abstract

The present study contributes to enlist the wealth of ethnobotanical important plants of Jandool valley, Dir lower, Khyber Pakhtunkhwa (KPK), Pakistan. A total of 67 plants species, belonging to 39 families of herbs (57 %), shrubs (6 %), trees (34 %) and mushrooms (3 %) were found to be used by the local inhabitants generally for medicinal, timber wood, fuel, food and fodder purposes. Majority of the plants identified were used for more than one purpose. The human and cattle pressure has resulted in loss of the indigenous ethnobotanical important plant species. Therefore reforestation followed by proper protection is a need of time.

Keywords: Ethnobotanical plants, Jandool valley, Dir lower, Khyber Pakhtunkhwa (KPK)

Introduction

Medicinal Plants have been used throughout the world by human beings as a drug and remedies for various diseases since time immemorial [1] and these are a good source of income as well [2]. About 0.259 million species of higher plants have been reported worldwide [3] and from these about 53,000 plant species are used for medicinal purposes [4]. On the other hand about 80 % of world population use medicinal plants for their basic health care, because they are conveniently available and have fewer side effects than other pharmaceuticals [5]. Globally the medicinal and aromatic plants worth was \$62 billion in the year 2002 and if the situation will go on as it is today, its worth will reach \$5 trillion by 2050 [3, 6]. It has been reported that approximately 10,000 medicinal plants worldwide are currently under sever threat [4] due to deforestation, over grazing etc.

In Pakistan about 6000 species of higher plants have been reported and from these 600 to 700 species are used for medicinal purposes [3]. 50 % of Pakistani population is commonly treated by some 50,000 practitioners of traditional medicine [7]. Mostly due to lack of proper health facilities the indigenous medicinal plants have been especially used by the villages community as a medicine based on long experiences of elders, and this knowledge has been passed on orally from generation to generation without any written documents [1,8-11].

Muslims rulers introduction to India and mix their knowledge of medicinal plants with the native Ayurvedic medicines, the mixture/combination is called Unani medicine or in broad sense Eastern medicine. The traditional system of Indian medicine is known as Ayurvedic system, which evolved long before around 2500 B.C and documented in 6000 B.C. The Hindu community followed the Ayurveda and the Muslims followed the Unani. Both the sub-continent medicinal systems benefited and complemented from each other [12]. Data of ancient civilizations shows that some of drugs used by the modern doctors/ pharmacist were already use in the Egyptian, Babylonians, Greeks, Romans, Chinese and peoples of the sub-continent (India & Pakistan) [12, 13].

Similar works regarding the importance of ethnobotanical plants been previously reported in Malakand division of Pakistan [5,12-20]. Review of literature study confirms that earlier no ethnobotanical research work has been carrying out on the present study area. The present study amid to enlist the important plants of the study area and to explore their medicinal wealth and other daily life uses.

Material and Methods

Study area: Dir is an important District of Khyber Pakhtunkhwa (KPK) Province of Pakistan. It is located in the south of Chitral between 35° 50' and 34° 22' N and 71° 2' and 72° 3' E, taking its name from the village of Dir, the headquarter of the former rulers



[12]. The District is surrounded by Chitral in North West, Malakand Agency in South, Swat in east and Bajaur Agency in South West, while in the West it adjoins Afghanistan. Dir is administratively subdivided into Dir (Upper) and Dir (Lower), having an area of 5,280 km². Dir is lying in the temperate zone of the Northern mountainous ranges of Indo-Pak Sub-continent, therefore the weather is affected by all the climatic factors "Latitude, altitude and rain bearing wind (Cyclone and monsoon wind). January is the coldest month in which temperature ranges from 2 °C to -2 °C and the hottest month is July in which the temperature rises to more than 32 °C [21]. Basically the area is mountainous, surrounded on all sides by high mountains and is floristically rich for medicinal plants [12].

Collection, preservation and identification: The present study was conducted between March 2009 - April 2010, to explore and document the local flora and their local uses of Jandool valley, Dir lower, Khyber Pakhtunkhwa (KPK), Pakistan. Regular trips were made to the selected area and plants specimens were collected, dried and preserved in the Herbarium of University of Malakand. The plants specimens were identified with the help of taxonomists, previous available literature [22, 23] and flora of Pakistan [24, 25]. A questionnaire was design to interview the local inhabitants during field trips and ethanobotanical information were gathered. Normally, the elderly people including men and women, who were familiar with traditional uses of indigenous plants, were interviewed for the extraction of folk knowledge.

Results and Discussion

The present study revealed that the study area contain diverse flora of ethnobotanical importance. A total of 67 plants belonging to 39 families were studied for ethnobotanical uses (Fig. 1). Of these 40 plants were herbs (57 %), 23 trees (34 %), 4 shrubs (6 %) and 2 mushrooms (3 %). Some of the plants are of high market value in respect of medicinal, timber and vegetable and also a primary source of income for the local inhabitants.

In lower parts of Jandool Vallay (i.e Mayar, Munda and Samarbagh) the people mainly depend on government hospital, private clinics and pharmacies for their health care while the people of upper parts (i.e Maskiny, Kakas and mainbanda) of Vallay mainly depend on the surrounded medicinal plants. Usually the elders (mostly woman) of a village or family prescribed treatment to a patient.

Pak- Afghan border present in west is a rich home for ethnobotanical important plants and these plants are transported throughout the country for different purposes. Due to lack of education, poverty, proper awareness, overgrazing, no legislations form government and no reforestation followed by proper protection about the medicinal plants, Some of the trees species (e.g. *Cedrus deodara* (Roxb.ex Lamb) G. Don, *Olea ferriginea* Royle and *Juglan regia* L.) and high medicinal value plants (e.g. *Ajuga bracteosa* Wall.ex Benth, *Artimisia vulgaris* L. and *Berberis lycium* Royle etc) present in Valley are under high biotic pressure due to high market prices and are now infrequent in Valley. Most of inhabitants are poor and they can't afford Liquefied petroleum gas (LPG), therefore they use medicinal plants (*Olea ferriginea* Royle and *Accacia*) as a source of fuel..

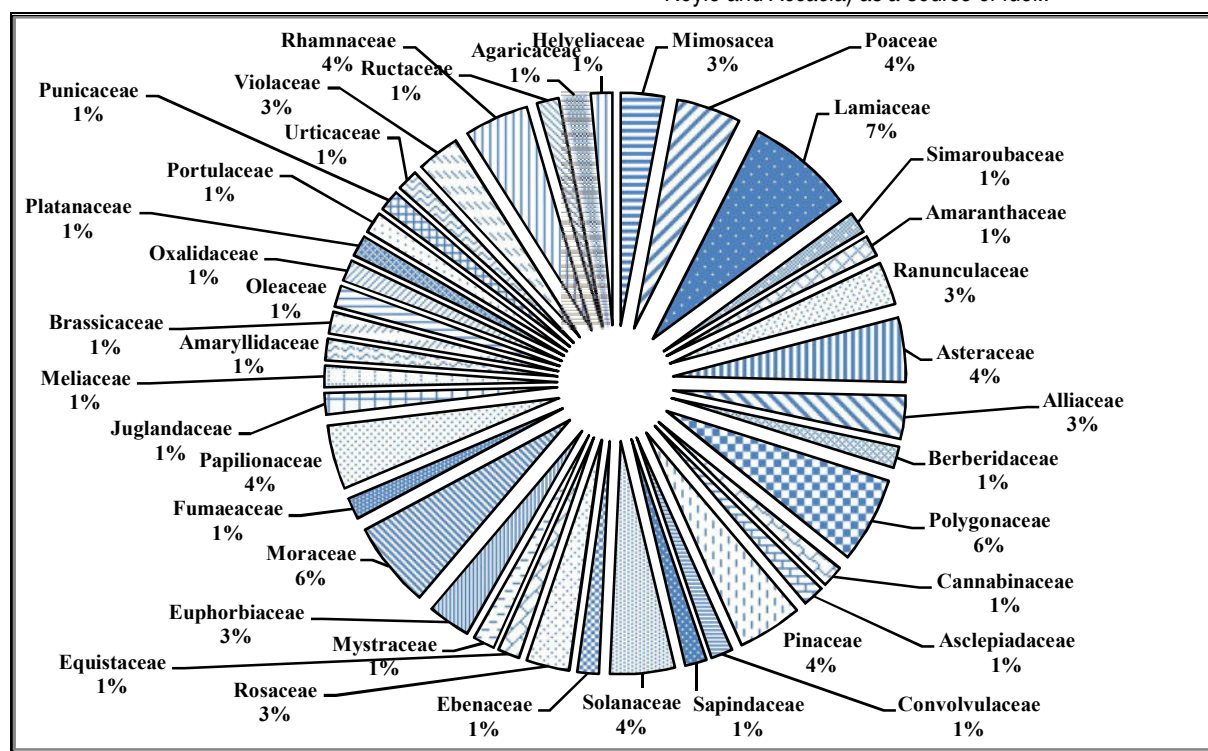


Fig: 1 Ethnobotanical important plants families distribution in the Jandool Valley of Pakistan.

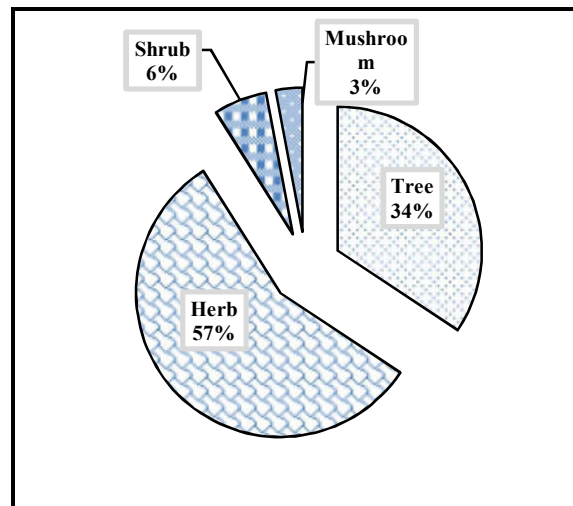


Fig: 2 Percentages of habits of ethnobotanical plants in Jandool valley of Pakistan.

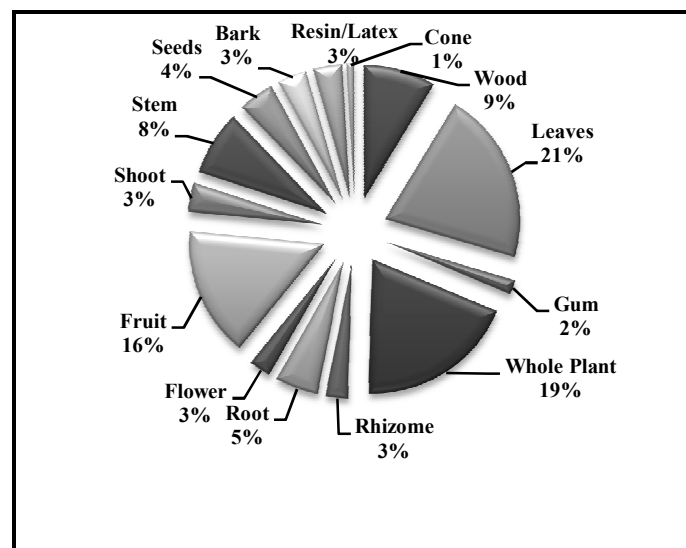


Fig: 3 Different part of the ethnobotanical plants used for different purposes in Jandool valley of Pakistan.

Conclusion

The present study concluded that the medicinal plants of the selected area are of great medicinal and economic importance. The area is under high biotic pressure in the form of deforestation and overgrazing. Especially the woody plants are under threat. So, Education, awareness and government legislation about the local flora is the need of time

Acknowledgement

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References

- [1]. Malik F, Hussain S, Mirza T, Hameed A, Ahmad S, Riaz R, Shah PA and Usmanhani K. Screening for antimicrobial activity of thirty-three medicinal plants used in the traditional system of medicine in



- Pakistan. J Med Plant Re. 2011; 5(14): 3052-3060.
- [2]. World Bank. Medicinal plants; Rescuing a global heritage. Washington, D.C. 1997; 20433, USA.
- [3]. Shinwari ZK. Medicinal plants research in Pakistan. J Med Plant Re. 2010; 4(3):161-176.
- [4]. Hamilton AC. Medicinal plants, conservation and livelihoods. Biodiversity and Conservation. 2004;13:1477-1517.
- [5]. Barkatullah and Ibrar M. Plants profile of Malakand Pass Hills, District Malakand, Pakistan. African Journal of Biotechnology. 2011;10(73):16521-16535.
- [6]. Shinwari S, Qureshi R, and Baydoun E. Ethnobotanical Study of Kohat Pass (Pakistan). Pak. J. Bot. 2011; 43: 135-139.
- [7]. Gill MA. Cultivation of medicinal and aromatic herbs: experience of IMHSC. In: Ahmad H, Khan AA, editors. Proceeding of international workshop on conservation and sustainable uses of medicinal and aromatic plants in Pakistan, WWF-Pakistan. 2003; pp. 22-30.
- [8]. Perumal SR, Ignacimuthu S. Screening of 34 Indian medicinal plants for antibacterial properties. J. Ethnopharmacol. 1998; 62:173-182.
- [9]. Perumal SR, Ignacimuthu S. Antibacterial activity of some of folklore medicinal plants used by tribals in Western Ghats of India. J. Ethnopharmacol. 2000; 69: 63-71.
- [10]. Shinwari MI and Khan MA. Folk use of medicinal herbs of Margalla hills National Park, Islamabad. J. Ethnopharm. 2000; 69: 45-56.
- [11]. Qureshi R, Waheed A, Arshad M and Umbreen T. Medico-Ethnobotanical Inventory of Tehsil Chakwal, Pakistan. Pak. J. Bot. 2009; 41(2):529-538.
- [12]. Hazrat A, Shah J, Ali M and Iqbal I. Medicinal value of Ranunculaceae of Dir valley. Pak. J. Bot. 2007; 39(4):1037-1044.
- [13]. Khan N, Ahmed M, Ahmed A, Shaikat SS, Wahab M, Ajaib M, Siddiqui MF and Nasir M. Important Medicinal Plants of Chitral Gol National Park (Cgnp) Pakistan. Pak. J. Bot. 2011; 43(2):797-809.
- [14]. Ahmad S, Ali A, Beg H, Dasti AA and Shinwari ZK. Ethnobotanical studies on some medicinal plants of Booni Valley, District Chitral Pakistan. Pak j. Weed Sci. Res. 2006; 12(3):183-190.
- [15]. Hazrat A, Nisar M, Shah J, and Ahmad S. Ethnobotanical Study of some elite Plants belonging to Dir, Kohistan Valley, Khyber Pakhtunkhwa, Pakistan. Pak. J. Bot. 2011; 43(2): 787-795.
- [16]. Sher H and Hussain F. Ethnobotanical evaluation of some plant resources in Northern part of Pakistan. Afri J of Biotech. 2009; 8 (17):4066-4076.
- [17]. Jan G, Khan MA, Gul F, Ahmad M, Jan M and Zafar M. Ethnobotanical Study of Common Weeds of Dir Kohistan Valley, Khyber Pakhtunkhwa, Pakistan. Pak. J. Weed Sci. Res. 2010; 16(1):81-88.
- [18]. Jan G, Khan MA, Farhatullah, Jan FG, Ahmad M, Jan M and Zafar M. Ethnobotanical Studies on Some Useful Plants of Dir Kohistan Valleys, KPK, Pakistan. Pak. J. Bot. 2011; 43(4):1849-1852.
- [19]. Ahmad I, Ibrar M, Barkatullah and Ali N. Ethnobotanical Study of Tehsil Kabal, Swat District, KPK, Pakistan. Hindawi Publishing Corporation Journal of Botany. 2011; Article I D 368572, 9 pages.
- [20]. Ali H, Sannai J, Sher H and Rashid A. Ethnobotanical profile of some plant resources in Malam Jabba valley of Swat, Pakistan. J of Med Plant Res. 2011; 5(17): 4171-4180.
- [21]. Nisar M, Nausheen and Nasrullah. Genetic Diversity in *Phaseolus vulgaris* L. A report from the unexplored area of Khyber Pakhtunkhwa, Pakistan. 2011; VDM Verlag Dr. Muller GmbH & Co. KG, Dudweiler Landstr. 99, 66123 Saarbrücken, Germany. ISBN: 978-3-639-37674-6.
- [22]. Nasir E, Ali SI. Flora of Pakistan. 1971-95; Nos. 1-190. Department of Botany, Karachi University, Karachi. Pak. Agric. Res. Council Islamabad, Pakistan.
- [23]. Ali SI & Qaiser M. Flora of Pakistan. 1995-2004; Department of Botany, University of Karachi, Pakistan.
- [24]. Stewart RR. Checklist of plants Swat state, Northwest Pakistan. Pak. J. For. 1967; 4(2): 457-528.
- [25]. Stewart RR. History and exploration of plants in Pakistan and adjoining areas. 1982; National Herbarium, NARC, Islamabad.

Table: 1 Ethanobotanically important plants of Jandool vally, District Dir lower, KPK, Pakistan

S/No	Botanical name	Family	Local name	Habit	Part used	Ethanobotanical uses
1-	<i>Accacia nilotica L.</i>	Mimosacea	Kikar	Tree	Wd, L & Gu	Wood is used for timber and fuel purposes, leaves is fodder and gum for curing diabetes.
2-	<i>Acacia modesta Wall.</i>	Mimosacea	Palosa	Tree	Wd & Gu	Wood is used for timber and fuel purposes and gum is used as a tonic.
3-	<i>Avena sativa L.</i>	Poaceae	Jawdar	Herb	WP	Powder is used for nervous problems, and feeding cattles
4-	<i>Ajuga bracteosa Wall.ex Benth</i>	Lamiaceae	Buty	Herb	L	Used for jaundice, fever and joint pains.
5-	<i>Alianthus altissimab L.</i>	Simaroubaceae	Spena Bakyanra	Tree	WP	Timber, fuel and fodder
6-	<i>Amaranthus viridis L.</i>	Amaranthaceae	Chalwai	Herb	WP	Vegetable, emollient
7-	<i>Aconitum heterophyllum Wall.ex Royle</i>	Ranunculaceae	Zaharmora	Herb	Rhi	As a growth enhancer, general body tonic, fever and pains killer.
8-	<i>Aconitum chasmanthum</i>	Ranunculaceae	Ghra Zahar	Herb	R	As a tonic, appetizer and vomiting.
9-	<i>Artemisia vulgaris L.</i>	Asteraceae	Tarkha	Herb	L & Fl	Nervieous problems and cure skin problems.
10-	<i>Allium sativum L</i>	Alliaceae	Ooga	Herb	Rhi	Used for spicy test in cooking and sexual strength, high blood presure, flu
11-	<i>Allium cepa L.</i>	Alliaceae	Piaz	Herb	Rhi	Slightly warmed bulb used as poultice for the treatment of abscesses, used in different foods.
12-	<i>Berberis lycium Royle</i>	Berberidaceae	Kawary	Shrub	R, Ba & Fr	Jaundice, Throat pains, diarrhoea, and fruit is edible.
13-	<i>Bistorta amplexicaulis (D.Don) Green</i>	Polygonaceae	Tarva panra	Herb	Sh & L	Mouth inflammation and treatment of Ulcer.
14-	<i>Canabis sativa L.</i>	Cannabinaceae	Bhang	Herb	Se, Fl, R & Re	Used as pain killer, and as a cooling agent during summer.
15-	<i>Calotropis procera (Ait) R. Br</i>	Asclepiadaceae	Spalmay	Herb	St & L	Leaves milk is used for the treatment of asthma, previously it was used for Snake bite treatment, oil are used for scabies and pain killer.
16-	<i>Cedrus deodara (Roxb.ex Lamb) G. Don.</i>	Pinaceae	Diyar	Tree	Wd and Re	Wood is used for furniture and other house accessories because it resistant to water and worm and resin is used for skin problems.
17-	<i>Cynodon dactylon (L.) Pers,</i>	Poaceae	Kabal	Herb	WP	Used as a podder, grown in lawn for beauty and previously used for stomach ulcer.
18-	<i>Convolvulus arvensis L.</i>	Convolvulaceae	Prewatay	Shrub	L, St, R & Fl	Used as laxative, fodder and for epilepsy
19-	<i>Dalbergia sissoo Roxb. ex DC.</i>	Papilionaceae	Shawa	Tree	Wd, L	Timber, fuel and furniture
20-	<i>Dodonea viscosa L. Jacq</i>	Sapindaceae	Ghwaraskey	Shrub	WP	Used as a fuel, thatching material in building and anti-inflammatory
21-	<i>Datura stramonium L.</i>	Solanaceae	Harhanda	Herb	L & R	Fruits are poisonous, used as antipyretic as well.
22-	<i>Diospyrus lotus L.</i>	Ebenaceae	Toor amlook	Tree	Fr, Wd, L	Fruits are edible, carminative and wood source of fuel.
23-	<i>Duchensea indica (Andr)</i>	Rosaceae	Zmake tooth	Herb	Fr	Fruits are edible, laxative and wood source of fuel.

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24-	<i>Equisetum arvensis L.</i>	Equistaceae	Bandaky	Herb	Sh	Used as hair tonic and in urine problems
25-	<i>Eugenia jambana Lam.</i>	Mystraceae	Jaman	Tree	Fr & Ba	Used to cure diabetes, mouth wash, and fruits are edible.
26-	<i>Euphorbia helioscopia L.</i>	Euphorbiaceae	Prewatki	Herb	WP	Plant are poisonous, used in skin problems and laxative.
27-	<i>Ficus caricca L.</i>	Moraceae	Inzar	Tree	Fr, L & La	Fruits are edible, milk is used for skin problems.
28-	<i>Fumaria indica Husskin</i>	Fumaeaceae	Paprra	Herb	WP	Laxative, purgative, fodder and diuretic.
29-	<i>Indigofera heterantha Wall. ex Brandis</i>	Papilionaceae	Ghoreja	Herb	Sh	Shoot are used for making baskets, wood for fuel and as a fodder.
30-	<i>Juglan regia L.</i>	Juglandaceae	Ghoz	Tree	Fr, Ba & L	Fruits are edible, the leaves and bark are used espicially by womens for cleaning teath locally called Dandasa as a source of makeup, wood are used for making furniture, Dandasa are also used as hair dye.
31-	<i>Mentha longifolia L. Huds</i>	Lamiaceae	Vilanay	Herb	WP	Used for gastic problems, Leaves flavour are used in several local food.
32-	<i>Mentha spicata L.</i>	Lamiaceae	Podina	Herb	WP	Used in different food as a flavouring agent espicially in Chatni, also used as a cooling agent and in gastric problems.
33-	<i>Morus alba L.</i>	Moraceae	Spin Toot	Tree	Fr, St & L	Fruits are edible, Stem is used as a source of fuel, timber and for furniture, leaves as fodder.
34-	<i>Morus nigra L.</i>	Moraceae	Toor toot	Tree	Fr, St & L	Fruits are edible and used for jaundice, Stem is used as a source of fuel, timber and for furniture, leaves as fodder.
35-	<i>Melia azadarach L.</i>	Meliaceae	Tora Bekanrha	Tree	L & Wd	Leaves are used for treatment of diabetes, Wood for fuel.
36-	<i>Morus lavaegata Wallich. Ex Brandis</i>	Moraceae	Shah toot	Tree	Fr, St & L	Fruits are edible and used for jaundice and digestion problems, Stem is used as a source of fuel, timber and for furniture, leaves as fodder.
37-	<i>Narcissus poeticus L.</i>	Amaryllidaceae	Gule gangus	Herb	WP	Used for ornamental purposes, usually grown on graves.
38-	<i>Nasturtium officinale R.Br</i>	Brassicaceae	Tarmira	Herb	WP	Cooked as Saag for eating, Used for tratment stomach problems and as cooling agent.
39-	<i>Ocimum basilicum L.</i>	Lamiaceae	Kasmalay	Herb	WP	Ornamental plant due good smell and tratment of flu.
40-	<i>Olea ferrginea Royle</i>	Oleaceae	Khona	Tree	Fr, St & L	Fruit are edible, Oil are highly used for body pain espicially joint pain, leaves are used for treatment of sore throat and antiseptic, the wood is highly used for preparing agriculture tools, furniture and fuel.
41-	<i>Oxalis corniculata L.</i>	Oxalidaceae	Threwakay	Herb	St & L	Used as a cooling agent and for stomach problems. Fresh leaves are eaten due to good taste.
42-	<i>Pinus roxburgii Sargent.</i>	Pinaceae	Nakhtar	Tree	Wd and Re	Timber, furniture and fuel, the dried leaves locally called "Barwaza" are use to spread in floor of Mosque, and as a packing material in local fruits.
43-	<i>Pinus gerardiana Wall. ex Lamb.</i>	Pinaceae	Chilghoza	Tree	Wd, L, Se and Co	Timber, fuel and furniture. Cones have edible seeds locally called Chagoza, having high market value used as tonic.
44-	<i>Plantnus orientalis L.</i>	Platanaceae	Chinar	Tree	WP	Used as in Tember, fuel and furniture purposes.

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45-	<i>Portulacaceae oleracea L.</i>	Portulacaceae	Warkharay	Herb	WP	Used as a vegetable.
46-	<i>Polygonum glabrum L.</i>	Polygonaceae	Palpolak	Herb	WP	Plant powder used for fish hunting.
47-	<i>Pyrus communis L.</i>	Rosaceae	Naspatay	Tree	Fr & St	Fruit are edible and wood used as a fuel.
48-	<i>Punica granatum L.</i>	Punicaceae	Anangori	Tree	Fr	Fruit are edible, used as blood purifier and in digestive problems.
49-	<i>Ricinus communis L.</i>	Euphorbiaceae	Arhanda	Tree	Se	Used as a Laxative and treatment of cough and fever.
50-	<i>Rumex dentatus L.</i>	Polygonaceae	Shalkhy	Herb	WP	Cooked as a vegetable (Saag) and used as a healing agent.
51-	<i>Rabdosia rugosa (Wlich ex. Benth) Hara</i>	Lamiaceae	Spearkhy	Herb	WP	Vermicide and insecticide.
52-	<i>Rumex hastatus L.</i>	Polygoniaceae	Tarokhy	Herb	WP	Used in Snup (Locally called Naswar), and as a cooling agent.
53-	<i>Solanum nigrum L.</i>	Solanaceae	Kachmacho	Herb	Fr	Used for treatment of liver, heart and skin problems.
54-	<i>Sorghum helipense (L) Pers</i>	Poaceae	Ddum	Herb	WP	Fodder
55-	<i>Taraxacum officinale Webber.</i>	Asteraceae	Zair gulae	Herb	Fr, L & R	Used for diabetes, snake bite and kidney problem.
56-	<i>Trifolium repens L.</i>	Papilionaceae	Shautal	Herb	Se & L	Fodder.
57-	<i>Urtica dioica L.</i>	Urticaceae	Seezonkey	Herb	Sh	Vegetable and used for treatment of jaundice.
58-	<i>Voila canescens Wall.</i>	Violaceae	Benofsha	Herb	L	Used as anticancer and for treatment fever, flu.
59-	<i>Voila biflora L.</i>	Violaceae	Benofsha	Herb	L	Used for treatment of fever.
60-	<i>Withania somnifera (L.) Dunal</i>	Solanaceae	Koti Lal	Herb	Fr & L	Used in fever and in rheumatism, tonic
61-	<i>Xanthium stramarium L.</i>	Asteraceae	Geshkey	Herb	WP	Pain killer and fodder.
62-	<i>Zizyphus jujube Mill.</i>	Rhamnaceae	Baira	Tree	Fr	Fruits are edible, wood as a source of fuel and blood purifier.
63-	<i>Zanthoxylum armatum DC.</i>	Ructaceae	Dambara	Shrub	Se, St & Ba	Used as a cooling agent, carminative and tonic.
64-	<i>Zizyphus oxyphylla Edgew</i>	Rhamnaceae	Elanai	Tree	Fr, L, R & Wd	Antidiabetic, heart tonic and wood as a source of fuel.
65-	<i>Zizyphus mauritiana L.</i>	Rhamnaceae	Markhanai	Tree	Fr, L & Wd	Fruits are edible, wood as source of fuel, leaves as a fodder and treatment of flu.
66-	<i>Agaricus compestris L.</i>	Agaricaceae	Kharerhai	Mushroom	WP	Cooked as food.
67-	<i>Morchella esculenta</i>	Helveliaceae	Kharerhai	Mushroom	WP	Used as a delicious food and body tonic.

Wd = Wood, L = Leaves, Gu = Gum, Wp = Whole Plant, Rhi = Rhizome, R = Root, Fl = Flower, Fr = Fruit, Se = Seed, Ba = Bark, St = Stem, Sh =Shoot, Co = Cone, Re = Resin, La = Latex.