A CHECKLIST OF MEDICINLLY IMPORTANT PLANTS AND THEIR CONSERVATION STATUS IN DARDYAL VALLEY, SWAT, PAKISTAN.

Shariat Ullah*[1], Hazrat Ullah[2], Wahid Hussain[3]

[1]Department of Botany, University of Malakand, Chakdara 18800, Dir Lower, KP, Pakistan

[2]Department of Chemical and Life Sciences, Qurtaba University of Science and Technology Peshawar 25000, Pakistan

[4]Department of Botany, GPGC Parachinar, Kurram, Pakistan

ABSTRACT

The main objective of the study was to gathered information about medicinally important wild plants and their conservation status in the targeted area. Semi-structured questionnaire was used to enlist plants of highly medicinal values by interviewing informants especially elders of the area. Conservation status was determined by adopting IUCN (International Union for Conservation of Nature) standard criteria (2001). Results revealed that majority of the plants were utilized as whole 50 (27.3%), followed by fruits 41 (22.4%), leaves 34 (18.6%), seeds 15 (8.1%), roots 10 (5.4%), bark 8(4.3%) and flower 7 (3.9%) for the treatment of various ailments. Common mode of administration was found to be decoction. FIV (family importance value) highest family importance value was recorded for Lamiaceae (97.5%) followed by Rosaceae (96.25%) and Asteraceae (95%) while, lowest FIV (family importance value) was noted for Myrtaceae (3.7%). The results of RFC (relative frequency of citation) indicated highest value for *Berberis pseudumbellata (*0.37%) followed by *Skimmia laureola* and *Juglans regia* (0.35%) each while; lowest RFC (relative frequency of citation) was noted for *Ocimum bacilicum* (0.01%). Conservation status revealed that 94 species (58.8%) were rare, vulnerable 48 species (30%), infrequent 15 species (9.37%) and 3 species (1.9%) were endangered.

Key words: Ethnomedicinal flora; Conservation status; RFC; FIV; Dardyal valley; Swat.

Introduction

The valley is located between 34.9358 N latitude and72.2073E longitudes at distance of 37km from capital city Saidu Sharif Swat. Union council of Dardyal is divided into four sub village

councils viz. Dardyal-1, Dardyal-2, Barasamai and Tall. The valley is guarded by upper Dir in the North and West, Gat Pewchar (Matta) and Shadherai in North East and Qalagai in South West (Fig.1).

Plants occupy a central position in human society and the survival of human being on this planet has become possible because of the plants. Majority of rural people utilizing plants resources for medicinal purposes from time immemorial [1]. Plants not only provide shelter and food to human and animals but also possess a large quantity of certain phytochemicals which are used as pharmaceutical, fragrance, dyes and insecticides. Medicinal plants are the primary source of medicines globally due to the presence of active chemical constituents in their tissues and organs; this active chemical can modify the physiological functions and respond in the treatment of different ailments of man and their livestock [2].

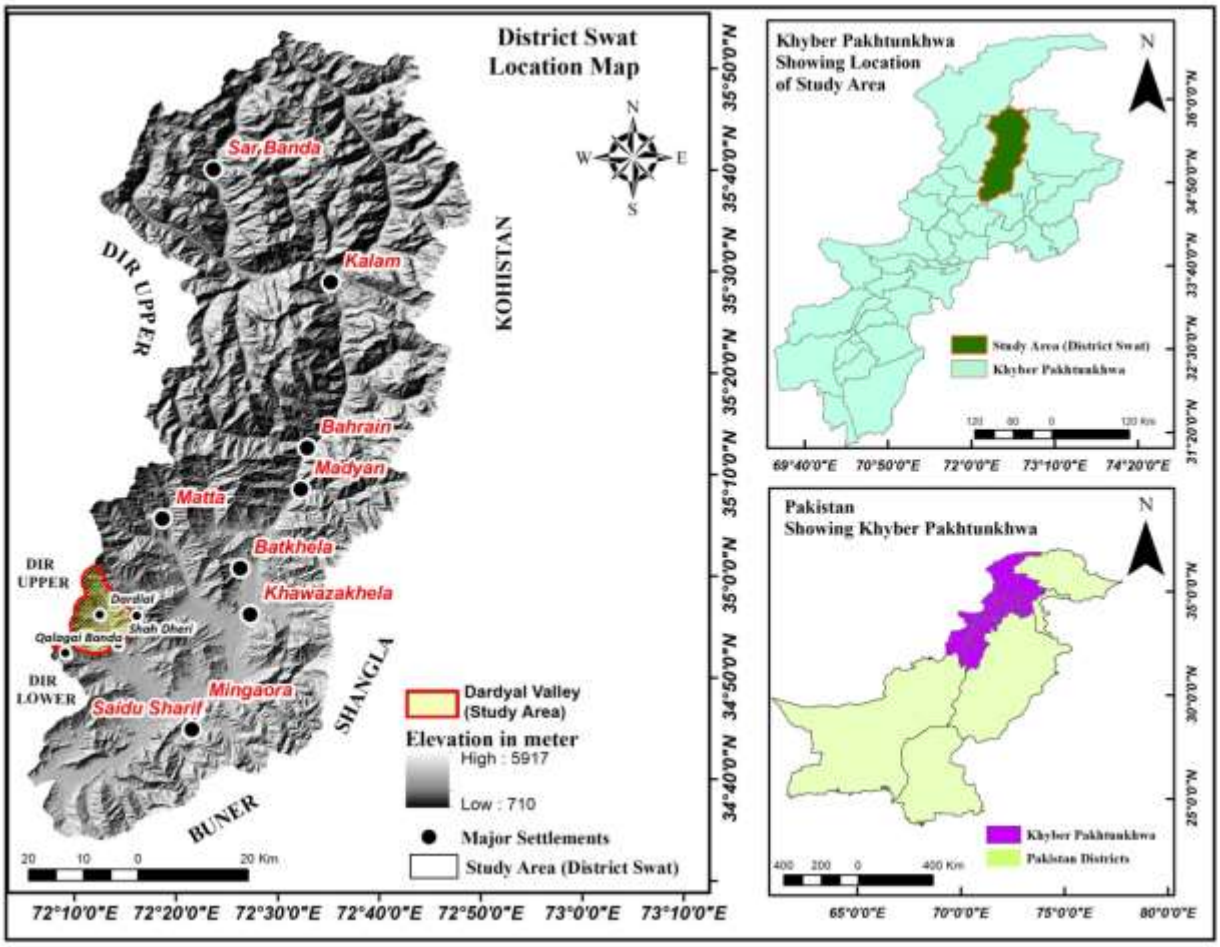


Fig.1. Map of the study area

Thus, the study of inter- relationship between peoples and plants of an area in which they exist and the use of local flora of a region or culture by native people is termed as ethnobotany [3].

Rural peoples have a lot of knowledge about medicinally important plants and its role in treatment of certain diseases by using the specific part of plants directly or indirectly with suitable supplement [4].In Pakistan a large number of people are living in rural areas where, medicinal plants are easily available and these people have a limited access to the modern health care (BHU) (Bed Head Unit) approaches and the use of synthetic medicines [5] and there are a large number of Unani Dawakhana in Pakistan with more than 50,000 registered native healers (Hakims) performing health care practices [6].

Conservation

Conservation status characterize and reflict the feature of plant in an area. It depends on certain factors like deforestation, rate of reproduction, population explosion, climate changes, overgrazing and diseases are some of the tremendous threatsfacing by plants [7]. All life form depends on plants directly or indirectly which need sustainable use, proper attention and conservation in order to control unscientific collection of medicinal plants for obtaining crude drug and its supplies to market by inhabitants [8].

Earleir researchers worked on ethnobotany to document medicinally important flora and their conservation status from different regions of the country. [9] documented ethnobotanical appraisal and conservation status of 174 medicinal plants. Of them (107 species) were rare, vulnerable (42 species) and infrequent (24 species) in Hindukush Range, district Swat, [10] reported conservation status of 80 wild medicinal plants out of which 7 species were endangered, 34 species were vulnerable, 29 species were rare, 9 species were infrequent, and only 1 species was dominant from Koh-e-Safaid Range, Northern borders, [11] carried out the conservation status of plant resources of 77 species belonging to 42 families , it was noted that 20 species were found to be endangered, 23 species vulnerable, 15 species rare and 19 species were infrequent from Hazar Nao Hills, district Malakand, Pakistan, [12] recorded total of 198 plants, used for miscellaneous purposes from Darazinda, Takht-e-Suleman range F.R D.I.(Frontier Region Dera Ismail) Khan, Pakistan, [13] documented conservation status of 34 plants.Of them11 species were found to be vulnerable, 12 species rare, endangered (9 species) and2 species were infrequent from Takht Bhai district Mardan, [14] reported 25 medicinal plant species among these 6species were rare, 3 were infrequent, 5species were vulnarable and 4 species were threatened from district Shangla, Khyber Pakhtunkhwa, Pakistan, [15] enlisted 91 species belonging to 81 genera and 66 families, among these 36 species were rare, vulnerable (30

species), infrequent (13 species), endangered (8 species) and 4 species were dominant from tehsil Banda Daud Shah. However, there is no report yet have to be found against ethno-medicinal and conservation status of plant resources of Dardyal valley Swat. Therefore, it is imperative to determine the flora as well as medicinal and conservation status of the valley.

Materials and Methods

Data collection and identification

Ethnobotanical informations were gathered through semi-structured proforma by interviewing informants from different settlements of the valley during 2020-2021. They were requested to enlist the plants of highly medicinal value, known to knowledgeable especially elders of the valley. 80 questionnaires were distributed the information thus gained were further managed following [16, 17]. All the collected plant species were dried and mounted on herbarium sheets and identified with help of available literature [18, 19] and were deposited in the Herbarium of Department of Botany, University of Malakand for future reference.

Conservation status

Conservation status of the medicinal flora were enumerated following IUCN (International Union for Conservation of Nature) standards [20].

Family importance value (FIV)

FIV (Family importance value) was measured with the help of the following formula;

$$\mathrm{FIV} = \frac{\mathrm{FC}}{\mathrm{N}} \times 100$$

FC is the frequency of citation of the plant family and N is the total number of informants.

Relative frequency of citation (RFC)

RFC (Relative frequency of citation) was calculated with the help of the following formula;

$$\mathrm{RFC} = \frac{\mathrm{FC}}{\mathrm{N}} \; (0 < \mathrm{RFC} < 1)$$

Here FC is the frequency of the informants who cited the plant species and N is the total number of informants. The value of RFC (Relative frequency of citation) is less than 1 and greater than zero.

Results and discussion

Family importance value

Family importance values reflects the number of locally important species belong to that particular plant's family, while, RFC (Relative frequency of citation) index tells us the local importance of that particular plants found in the area. The results revealed that the best represented used family based on number of species was Lamiaceae with (97.5%) followed by Rosaceae (96.25%), Astraceae with (95%), Rutaceae (88.7%), Chenopodiaceae (87.5%), Brassicaceae (86.28%), Solanaceae and Apiaceae each with (81.2%) (Fig. 2, Table 1). Our findings agreed with [21] who found Lamiaceae, Apiaceae and Ranunculaceae the best represented families in terms of FIV (family importance value) in Chail Valley, Swat. Our results are also in line with previous studies on ethno flora reported by [22, 23, 24] in different areas of the world.

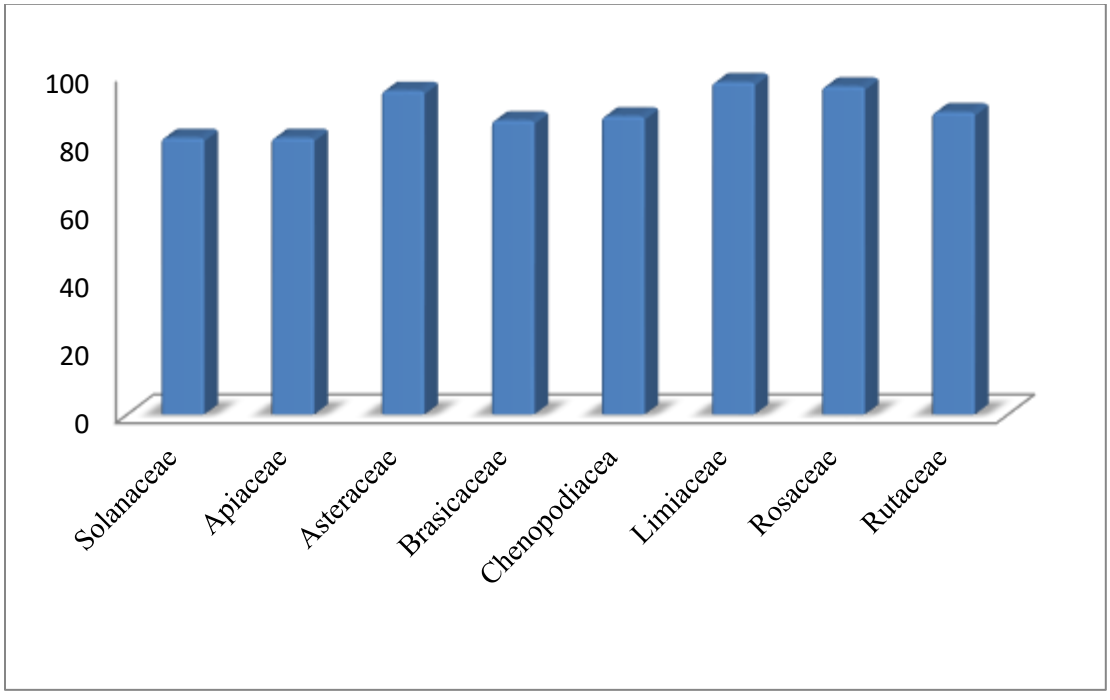


Fig.2: Families with highest FIV value

Relative frequency of citation

Relative frequency of citation provides us knowledge about the indigenous importance of the specific plant species for the treatment of different types of ailments. The RFC (relative frequency of citation) values also signify the importance of species with respect to the number of local informers taking part in this study as well as reflecting the strong and long-term association of inhabitants with local plants (Ahmad et al. 2014). The present study depicted that the highest RFC (relative frequency of citation) was recorded for *Berberis pseudumbellata* (0.37%) followed by *Juglans regia*, *Skimmia leureola* (0.35%) each, *Dysphania botrys*, *Diospyros lotus*, *Olea ferruginea* and *Papever somniferum* (0.31%) each. *Ammi visnaga*, *Brassica campestris*, *Oxalis acetosella*, *Punica granatum* and *Vitis venifera* (0.25%) each. *Cidrus deodara* and *Foeniculum vulgare* (0.23%) each. *Chenopodiumambrosioides*, *Diospyros kaki* and *Viola canances* (0.22%) each. *Onosma hespidum*, *Melia azedarach* and *Colchicum leutum* (0.21%) each and *Sarcococca pruniformis*, *Ajuga parviflora*, *Zanthoxylum armatum* had (0.2%) RFC (relative frequency of citation) value (Fig. 3, Table. 1). [21] carried out study on the ethno-botanical information of Chail valley and noted the highest RFC (relative frequency of citation)) values for *Origanum vulgare*, *Geranium wallichianum* and *Skimmia laureola*. Similarly, [9] reported the highest RFC (Relative frequency of citation) for *Skimmia laureola* (0.321), *Juglans regia*, *Olea ferruginea* and *Papaver somniferum* in Chail valley (Swat).

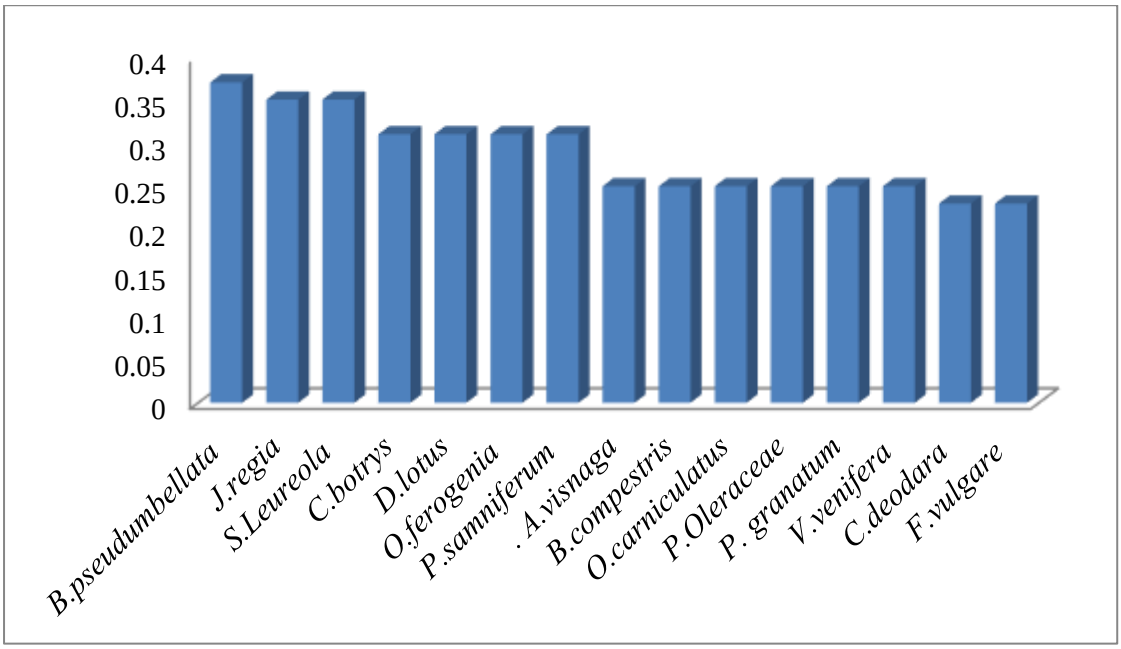


Fig.3: Species with highest RFC value

Usage and administration

In the current study 50 (27.3%) plants were used as a whole, areal parts of 3 (1.6%) species, seeds of 15 (8.1%) plants, leaves of 34 (18.6%), rhizome of 5 (2.2%), fruits of 41 (22.4%), roots of 10 (5.4%), bark of 8 (4.3%), flower of 7 (3.9%), stem and wood of 2 (1.09%), acorn of 3 (1.7%), gum and resin of 4 (2.1%) plants were used for the treatment of various diseases (Fig. 4, Table. 1). Major plant families Adiantaceae, Berberidaceae, Cuscutaceae and Poaceae are mostly used for Hepatitis; Equisitaceae, Cupressusaceae, Brassicaceae, Geraniaceae and Voilaceae are used as diuretics; Taxacaceae, Amarathaceae and Scrophulariaceae are used for pulmonary diseases viz; branchitus, asthma and whooping cough; Cupressusaceae, Salicaceae, Convolulaceae and Juglandaceae are used as vermifuge; Pinaceae, Cactaceae and Anacardiaceae are used for skin disorder; Asteraceae, Chenopodiaceae, Limiaceae, Caryophylaceae, Cucurbitaceae, Fabaceae mostly used as purgative, carminative, stomach disorder, gut disorder, typhoid,uterine disease, antispasmodics (Table .1).

Common method of administration was decoction (70%) among the other (21%) were administered in a dry powdered form, 1% usage were in boiled tea form and the other 9% were administered after grinding and mixed with pure water in the form of green crude syrup. Our study agreed with the findings of [25] who document 62 species from Tehsil Kotli Sattian, district Rawalpindi, [9] explored 174 plants from Hindukush Range, District Swat, Pakistan, [26] enlisted 92 species from Mera, District Charsadda, [27] carried out 71 herb species from Kashmir Himalayas in which the most common method of administration was decoction and revealed that most of the medicinal plants have multiple uses in the treatment of diseases.

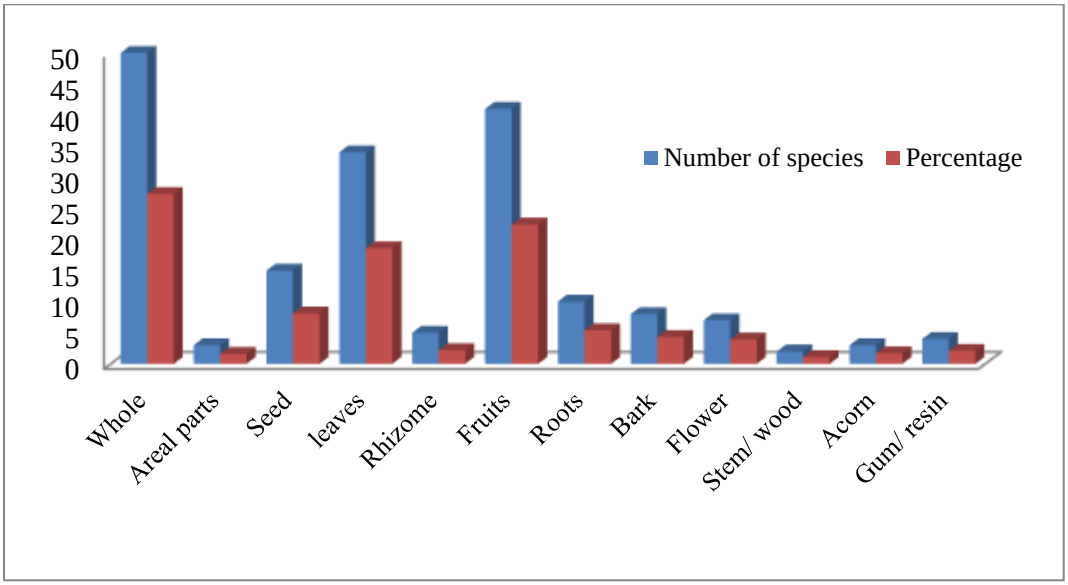


Fig.4: Medicinal plant parts used by inhibitants

Conservation status

In the present study conservation status of 160 medicinal plants belonging 80 families were studied by applying IUCN (International Union for Conservation and Nature) red list [20]. The results showed that only 3 species viz; *Cedrus deodara, Taxus wallichiana* and *Morus macroura* were found endangered, 94 species (58.8%) were rare, 48 species (30%) were vulnerable, 15 species (9.37%) were infrequent (Fig. 9, Table. 1). The result also revealed that no species fulfilled the IUCN (International Union for Conservation and Nature) criteria of dominance. Some of the rare species were *Adiantum capillus-veneris, Equisetum arvense, Abies pindrow, Pinus roxburghii, Viburnum grandiflorum, Achyranthes aspera, Foeniculum vulgare, Artimisia scoparia* and *Ulnus nitida.* Majority of the rare species were used as fuel, forage for cattle, as vegetable and for medicinal purposes. The rare species need special care for their conservation otherwise; they will be endangered in the coming future.

Some of the vulnerable species found in the study area were *Juniperus communis, Thuja orientalis, Pinus wallichiana, Platanus orientalis, Pistacia chinensis, Juglans regia*, have low regeneration capacity, use excessively for timber wood, furniture and medicinal purposes. *Morus alba, Melia azedarach, Berberis lyceum, Berberis pseudumbellata, Diospyros lotus, Punica granatum, Ziziphus mauritiana, Olea ferruginea, Acacia nilotica, Quercus dilatata* (Table. 1) were harvested for fuel wood and agricultural puposes. The anthropogenic activities were found

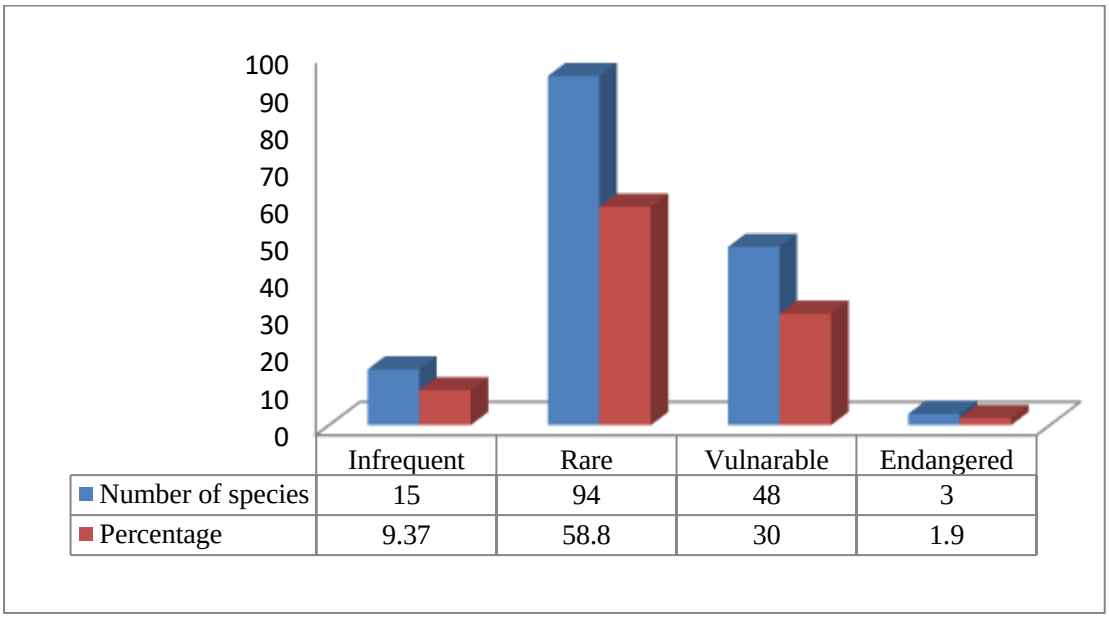
to be at alrming rate and threatening the biodiversity. Several factors are involved to threaten biodiversity such as habitat fragmentation and habitat loss [28, 29] fuels demand, over collection, over grazing and abiotic stress. While, in the present study the major threat to biodiversity was marketed values of medicinal plants, fuels demand, overgrazing, soil erosion and conversion of land to farming and agriculture. (Fig.5-8).

Fig.5: Sheep graze upon herbaceous flora grasses

Fig.6: Cow graze upon

Fig.7: Land Sliding

Fig.8: Soil erosion due to water



	Infrequent	Rare	Vulnarable	Endangered
Number of species	15	94	48	3
Percentage	9.37	58.8	30	1.9

Fig.9: Conservation status of plant resources

Endanger species of the study area


Cedrus deodara (Roxb.) G. Don


Taxus wallichiana (Zucc.) Pilger


Morus macroura Miq.

Vulnerable species


Punica granatum L


Bergenia ciliate (Haw.) Sternb.


Ammi visnaga (L.) Lam.

Rare species


Potentilla reptans L


Teucrium stocksianum Bioss


Colchicum luteum Baker

Conclusion

Ethnobotany of medicinal plants revealed that most of the species were used as a whole while; the common mode of administration was decoction. Highest FIV (family importance value) was recorded for family Limiaceae followed by Rosaceae and Asteracea while, the highest RFC (relative frequency of citation) value was recorded for *Berberis pseudumbellata* followed by

Juglans regia and *Skimmia leureola.* Based on IUCN (International Union for Conservation and Nature) criteria for conservation 3 species were endangered, 94 species were rare, 48 were vulnerableand 15 species were infrequent. The flora was under severe biotic pressure because there was no any dominant species in the study area. Major threats to the flora in the area were fuel demand, uprooting due to snow fall, construction, agricultural purposes, overgrazing, soil erosion, timbers and unwise medicinal collection which contributing in destruction of vegetation.

Table 1: List of Ethnomedicinal plants along with their uses and conservation status

S.No	Division/Family/Specie	Local name	Part used	Uses	C	RFC	FIV	1	2	3	4	5	C.S
	A. Pteredophytes												
	1.Adiantaceae						12.5						
1	*Adiantum capillus-veneris* L.	Sumbal	Whole plant	Used for hapititis and as a blood purifier	10	0.12		3	3	3	0	9	Rare
	2.Equisitaceae						6.2						
2	*Equisetum arvense* L.	Bandakay	Shoots	Use as a bone and teeth tonic and diuretic	5	0.06		3	3	4	2	12	Rare
	B. Gymnosperms												
	3. Cupressusaceae						18.8						
3	*Juniperus communis* L.	Gogarh	Fruits	Used as stimulant, carminative and diuretic	6	0.07		1	3	0	2	5	Vulnerable
4	*Platycladusorientalis* (L.) Franco.	Sarwa	Shoots	Diuretic, vermifuge and uterine stimulant	9	0.11		2	3	0	2	7	Vulnerable
	4.Pinaceae						66.2						
5	*Abies pindrow* (Royle ex D. Don) Royle.	Achar	Leaves	Carminative, expectorant and against spasm	12	0.15		2	3	0	4	9	Rare
6	*Cedrus deodara* (Roxb.ex D. Don) G. Don.	Ranzra	Oil and Wood	Hair tonic, antipyretic, laxative and diaphoretic	19	0.23		0	2	0	2	4	Endanger
7	*Pinus roxburghii* Sarg.	Nakhtar	Leaves & Resin	Used as blood purifier and for skin warts	13	0.16		3	3	0	4	10	Rare
8	*Pinus wallichiana* A.B. Jacks.	Kachal	Resin & Wood	Wood is diuretic and resin used for skin warts & purification of blood	9	0.11		2	3	0	2	7	Vulnerable

	5. Taxacaceae						18.8						
9	*Taxus wallichiana* Zucc.	Banrya	Leaves, Bark & Fruit	Leaves and barks used for bronchitis, asthma and fruit is poisonous	15	0.18		0	2	0	2	4	Endanger
	C. Angiosperms (Dicot)												
	6. Adoxaceae						13.8						
10	*Viburnum grandiflorum* Wall. ex DC.	Shangro	Fruit & Leaves	Antispasmodic, astringent and used against constipation	11	0.13		2	3	3	2	10	Rare
	7. Amaranthaceae						23.7						
11	*Achyranthes aspera* L.	Putkanda	Whole plant	Used for asthma, pile and mild purgative	4	0.05		3	3	4	0	10	Rare
12	*Amaranthus spinosus* L.	Chalwaye	Whole plant	Remedy for colic pain and gonorrhoea	7	0.08		3	3	4	0	10	Rare
13	*Amaranthus viridis* L.	Ganrhar	Whole plant	Astringent, emollient and cardiovascular diseases	5	0.06		3	3	4	0	10	Rare
14	*Celosia argentea* L.	Sorgwaly	Seed	Mix with sugar and milk used as aphrodisiac	3	0.03		3	3	4	2	13	Infrequent
	8. Anacardiaceae						20						
15	*Pistacia chinensis* Bunge.	Shnai	Leaves &Bark	Extract is used as antiseptic and anti hepatic	7	0.08		2	2	0	1	5	Vulnerable
16	*Rhus punjabensis* J.L. Stewart ex Brandis.	Azkharpunch	Leaves	Leaf juice are poisonous causes skin blisters	9	0.11		1	3	0	4	8	Rare
	9. Apiaceae						81.2						
17	*Ammi visnaga* (L.) Lam.	Sperkai	Whole plant	Antipyretic, very effective against typhoid & bronchitis	20	0.25		2	2	4	0	8	Vulnerable
18	*Coriandrum sativum* L.	Dhanya	Leaves	Carminative, stimulant and as a	15	0.18		3	0	4	4	11	Rare

			&Fruit	flavoring agent									
19	*Foeniculum vulgare* Mill.	Kaga	Leaves & Fruit	Laxative, carminative & very effective for stomachache	20	0.25		2	0	4	4	10	Rare
20	*Heracleum candicans* Wall. ex DC.	Skhwara	Whole plant	Used for cold, flue, sore throat & rheumatism	10	0.12		3	2	3	0	8	Vulnerable
	10. Araliaceae						16.2						
21	*Hedera nepalensis* K. Koch	Zelai	Leaves	Used for chronic whooping cough	13	0.16		3	3	4	4	14	Infrequent
	11. Asteraceae						95						
22	*Artemisia absinthium* L.	Tarkha	Flwer& Leaves	Antiasthamatic and vermifuge	7	0.08		3	3	3	4	13	Infrequent
23	*Artemisia scoparia* Waldst. & Kitam.	Jawky	Shoots	Infusion is effective against otitis & as a mild purgative	11	0.13		3	3	4	2	12	Rare
24	*Calendula arvensis* M. Bieb.	ZiarGwaly	Flower	Used for treatment of ulcer as carminative	9	0.11		3	3	4	4	14	Infrequent
25	*Carthamus oxyacantha* M. Bieb.	Kariza	Seed	Seed oil is useful for mouth ulcer and skin itchiness	3	0.03		2	2	3	2	9	Rare
26	*Cirsium arvense* (L.) Scop.	Han	Whole plant	Helpful in bile secretion and used as digestive tonic	10	0.12		3	3	4	0	10	Rare
27	*Hilianthus annuus* L.	Nwrparast	Seed	Used for pulmonary disorder, excessive use causes liver disorder	4	0.05		2	3	4	2	11	Rare
28	*Senecio chrysanthemoides* DC.	Abi Guly	Whole plant	Poisonous for all cattle	11	0.13		3	3	4	0	10	Rare
29	*Silybum marianum* (L.) Gaertn.	Azghakay	Whole plant	Plant is very effective against hepatitis	9	0.11		2	2	4	0	8	Vulnerable
30	*Sonchus asper* (L.) Hill.	Shawdafai	Whole plant	Increase lactation in cattle & dry powder used for wound healing	5	0.06		3	3	4	0	10	Rare

31	*Tagetes erecta* L.	Hameesha	Flower	Flower is used in opthalmia, ulcer and pile	7	0.08		3	3	4	4	14	Infrequent
	12. Berberidaceae						56.2						
32	*Berberis lyceum* Royle.	Kwary	Fruit & Root	Fruit is used for chronic diarrhoea& root bark for hepatitis	15	0.18		3	1	2	2	8	Vulnerable
33	*Berberis pseudumbellata* R. Parker.	Kwary	Rootbark	Diurretic, antihepatic& for reduction of internal body heat	30	0.37		2	1	2	0	5	Vulnerable
	13. Betulaceae						8.7						
34	*Alnus nitida* (Spach.) Endl.	Geray	Leaves & Bark	Used as expectorant, sedative and diuretic	7	0.08		3	3	0	4	10	Rare
	14. Boraginaceae						47.5						
35	*Cynoglossum lanceolatum* Forssk.	Jeshky	Whole plant	Used as a mild laxative	4	0.05		3	3	4	0	10	Rare
36	*Cynoglossum wallichii* G.Don.	Jeshky	Whole plant	Antidiuretic, and promote evacuation of bowel	6	0.07		3	3	4	0	10	Rare
37	*Heliotropium bacciferum* Forssk.	Shenaky	Whole plant	Used for the treatment of eyes irritation	11	0.13		3	3	4	0	10	Rare
38	*Onosmahispida* Wall. ex G. Don.	Gwazoban	Root & Flower	Root is purgative, flower used for rheumatism & heart palpitation	17	0.21		3	3	4	1	11	Rare
	15. Brassicaceae						86.3						
39	*Alliaria petiolate* (M. Bieb.) Cavara & Grande.	Spengwaly	Whole plant	Used for healing of cut, expectorant & diuretic	10	0.11		2	3	4	0	9	Rare
40	*Brassica campistris* L.	Sharshm	Seed	Seed oil is used for skin irritation, hair restorer& antispasmodic	20	0.25		3	2	4	2	11	Rare
41	*Capsella bursa-pastoris* (L.) Medik.	Bambesa	Seed	Used as astringent, stimulant and in lowering of blood pressure	12	0.15		3	3	4	2	12	Rare

42	*Nasturtium officinale* R.Br.	Tarmera	Whole plant	diuretic, expectorant, purgative and best tonic for anemia	12	0.15		3	2	4	0	10	Rare
43	*Sisymbrium irio*L.	Awry	Seed	Used for the treatment of asthma and laxative	15	0.18		2	2	4	2	10	Rare
	16. Buxaceae						37.5						
44	*Buxus wallichiana* Baill.	Shamshad	Leaves	Used as purgative and effective for syphilis & rheumatism	14	0.18		1	2	2	4	9	Rare
45	*Sarcococca pruniformis* Lindl.	Bycand	Leaves	Used as stomachic and for the treatment of digestive disorder	16	0.2		2	3	2	4	10	Rare
	17. Cactaceae						11.2						
46	*Opuntia monacantha* (Willd.) Haw.	Zuqam	Stem	Used for ripening and breaking of wart	9	0.11		1	3	3	1	8	Vulnerable
	18. Ceasalpinaceae						5						
47	*Caesalpinia decapetala* (Roth.) Alston.	Relan/Jara	Leaves & Root	Leaves powder used for treatment of burn & root is purgative	4	0.05		1	3	0	4	7	Vulnerable
	19. Cannabaceae						17.5						
48	*Cannabis sativa* L.	Bhang	Leaves	Used for otitis & as appetize stimulant and sedative	14	0.17		3	3	4	4	14	Infrequent
	20. Caryophylaceae						22.5						
49	*Silene conoidea* L.	Bashka	Whole plant	Used as astringent, demulcent and anti rheumatic	12	0.15		3	3	4	0	10	Rare
50	*Stellaria media* (L.) Vill.	Chichra	Whole plant	Used for the treatment of pile and constipation	6	0.07		3	3	4	0	10	Rare
	21. Chenopodiaceae						87.5						
51	*Chenopodium album* L.	Sarmy	Whole plant	Anti hepatic, antidiabtic and laxative	14	0.17		3	3	4	0	10	Rare

52	*Dysphania ambrosioides* (L.) Mosyakin & Clemants	Bennak ay	Whole plant	Anthelmintic, powder mix with oil used for muscle spasm	18	0.22		3	3	4	0	10	Rare
53	*Dysphania botrys* (L.) Mosyakin & Clemants	Skhakharwa	Whole plant	Colic pain, antihepatic, diarrhoea, typhoid and blood purifier	25	0.31		3	2	4	0	9	Rare
54	*Chenopodium murale* L.	Skaboty	Aerial part	Extract is used for skin blisters	13	0.16		2	3	4	2	11	Rare
	22. Convolvulaceae						35						
55	*Convolvulus arvensis* L.	Priwatkai	Whole plant	Root is purgative and for skin trouble	3	0.04		3	3	4	0	9	Rare
56	*Ipomoea eriocarpa* R.Br.	Tora dana	Seed	Anthelmintic, laxative and as diuretics	10	0.12		2	2	4	2	10	Rare
57	*Ipomoea purpurea* (L.) Roth.	Prewata	Root & seed	Poisonous drug causes nausea and hallucination	15	0.18		2	2	4	0	8	Rare
	23. Cucurbitaceae						65						
58	*Cucurbita maxima* Duchesne.	Halwykado	Fruit	Used as a tonic, purgative and best for constipation	9	0.11		3	2	4	2	11	Rare
59	*Cucurbita pepo* L.	Khar kado	Fruit	Used as diuretic, best food for diabetic patient and laxative	11	0.13		3	2	4	2	11	Rare
60	*Cucumis sativus* L	Badrang	Fruit	Carminative, nutritive and demulcent	7	0.08		3	1	4	2	10	Rare
61	*Lagenaria siceraria* (Molina.) Standl.	Ghrangykado	Fruit	Used as heart tonic, purgatives and anticonstipation	15	0.18		3	2	4	2	11	Rare
62	*Luffa cylindrica* (L.) M. Roem.	Toorai	Fruit	Very effective for uterine bleeding and dysentery	10	0.12		3	2	4	2	11	Rare
	24. Cuscutaceae						17.5						
63	*Cuscuta reflexa* Roxb.	Zelai	Stem	Boiled in water used for diabetes, hepatitis and as purgatives	14	0.17		3	2	4	1	10	Rare

	25. Ebenaceae						53.7						
64	*Diospyros kaki* L.f.	Sor amlok	Fruit	Used as a mild laxative	18	0.22		3	1	0	2	6	Vulnerable
65	*Diospyros lotus* L.	Tor amlok	Fruit	Used for the treatment of dysentery as a fiber	25	0.31		3	1	0	2	6	Vulnerable
	26. Euphorbiaceae						47.5						
66	*Andrachne cordifolia (*Decne.) Mull. Arg.	Krachy	Whole plant	Poisonous plant	14	0.17		3	3	4	0	10	Rare
67	*Euphorbia helioscopia* L.	Mandanro	Whole plant	Milky juice causes skin poison	12	0.15		3	3	4	0	10	Rare
68	*Euphorbia prostrata* Aiton.	Warmagboty	Whole plant	Used as best expectorant & milky juice for ringworm	12	0.15		3	3	4	0	10	Rare
	27. Fabaceae						32.5						
69	*Indigofera heterantha* Brandis.	Ghwrijo	Whole plant	Stomach ulcer, wound healer and powder for whooping cough	13	0.16		3	3	4	0	10	Rare
70	*Lens culinaris* Medik.	Nask	Seed	Seeds are mucilaginous used as laxative & for intestinal affection	8	0.1		1	3	4	2	10	Rare
71	*Phaseolus lunatus* L.	Lobya	Seed	Used for reduction of cholesterol level in blood & astringent	5	0.06		3	3	4	2	12	Rare
72	*Pisum sativum* L.	Mattar	Seed	Flour of seeds are used as resolvent & emollient	10	0.12		3	3	4	2	12	Rare
	28. Fagaceae						25						
73	*Quercus baloot* Griff.	Serrai	Acorn	Used as antidiuretic & for diarrhea	14	0.17		3	3	0	2	8	Vulnerable
74	*Quercus floribunda* Lindl. ex A. Camus.	Spenbanj	Acorn & bark	Bark and roasted acorns are used for chronic dysentery	4	0.05		3	3	0	1	7	Vulnerable
75	*Quercus incana* Bartram.	tor banj	Acorn	Roasted acorns are used for asthma & digestive trouble	2	0.02		3	3	0	2	8	Vulnerable

	29. Fumaraceae						18.7						
76	*Fumaria indica* (Huausskn.) Pugsley.	Paprha	Whole plant	Powder is used for purification of blood, stomachic & leprosy	15	0.18		3	2	0	4	9	Rare
	30. Geraniaceae						11.2						
77	*Erodium cicutarium* (L.) L .Her.	Bhanda	Whole plant	Renal affection & leaf juice causes skin inflammation	7	0.08		3	3	4	0	10	Rare
78	*Geranium mescatense* Boiss.	Bhanda	Whole plant	Diuretic & astringent	2	0.02		3	3	4	0	10	Rare
	31. Juglandaceae						35						
79	*Juglans regia* L.	Ghoz	Bark & Fruit	Bark are used as vermifuge & mouthwash fruit is used as a tonic	28	0.35		2	2	0	2	6	Vulnerable
	32. Lamiaceae						97.5						
80	*Ajuga integrifolia* Buch. Ham.	Boti	Leaves	Used for purification of blood Hepatitis & dermatitis	10	0.12		3	2	4	4	13	Infrequent
81	*Ajuga parviflora* Benth.	Zangaliboti	Whole plant	Antipyretic, very effective against tonsillitis & hepatitis	16	0.2		3	3	4	0	10	Rare
82	*Mentha arvensis* L.	Podina	Leaves	Carminative, stomachic, stimulant & flavoring agent	12	0.14		3	3	4	4	14	Infrequent
83	*Mentha longifolia* (L.) L.	Venaly	Leaves	Used as antiseptic, in diarrhoea, dysentery & colic pain	15	0.18		3	2	4	4	13	Infrequent
84	*Teucrium stocksianum* Bioss.	Sperbotay	Whole plant	Stomachic, carminative, antidiuretic & congestive headache	3	0.03		3	2	4	0	9	Rare
85	*Ocimum bacilicum* L.	Tolsy/Kshmaly	Leaves & Flower	Leaf juice is effective for otitis flowers are used for diarrhea	1	0.01		3	3	3	4	13	Infrequent
86	*Isodon rugosus* (Wall. ex Benth.) Codd.	Sperky	Leaves	Fresh leaves relief toothache & also used for digestive troubles	3	0.03		3	3	3	4	13	Infrequent

87	*Salvia moorcroftiana* Wall. ex Benth.	Khardag	Whole plant	Leaves are used as poultice for warts, root for dysentery& as stomachic	5	0.06		3	3	4	0	10	Rare
88	*Thymus linearis* Benth.	Shamky	Whole plant	Very effective for flue in tea and also used as carminative	4	0.05		3	3	4	0	10	Rare
89	*Scutellariaedelbergii* Rech. f.	Odigwly	Leaves	As best expectorant & its juice is effective against sinuses	8	0.1		2	3	3	4	12	Rare
	33. Malvaceae						20						
90	*Abelmoschus esculentus* (L.) Moench.	Bendai	Fruit	Used as demulcent, emollient & diuretic	11	0.13		3	3	4	2	12	Rare
91	*Malva neglecta* Waller.	Panerak	Whole plant	Used as a mild purgative & also used for ulceration of bladder	4	0.05		3	3	4	0	10	Rare
	34. Meliaceae						21.2						
92	*Melia azedarach* L.	Tora Bekanra	Whole plant	Used in scrofulous, leprosy & leaves are used as vermifuge for cattle,	17	0.21		2	3	0	0	5	Vulnerable
	35. Mimosaceae						6.2						
93	*Acacia Nilotica* (L.) Delile.	Kikar	Bark	Used for diarrhoea, dysentery & astringent	5	0.06		2	3	0	1	6	Vulnerable
	36. Moraceae						55						
94	*Ficus carica* L.	Inzar	Fruit	Very affective against constipation and pile	9	0.11		3	3	0	2	8	Vulnerable
95	*Morus alba* L.	Baidana	Fruit	Used for sore throat, laxative & excessive uses cause dysentery	13	0.16		1	2	0	2	5	Vulnerable
96	*Morus macroura* Miq.	Shatoot	Fruit & Bark	Bark used as vermifuge & fruits are nutritive & purgative	15	0.18		1	2	0	1	4	Endanger

97	*Morus nigra* L.	Tor toot	Fruit	Expectorant, purgative and as diuretic	7	0.08		3	3	0	2	8	Vulnerable
	37. Myrtaceae						3.7						
98	*Eucalyptus camaldulensis* Dehnh.	Lachi	Dry gum	Used as antiseptic & astringent in laryngitis	3	0.03		3	3	0	4	10	Rare
	38. Nyctaginaceae						8.7						
99	*Mirabilis jalapa* L.	Gulbadi	Root & leaves	Root used as purgative, leaves juice for abnormal uterine bleeding	7	0.08		3	3	4	4	14	Infrequent
	39. Oleaceae						37.5						
100	*Jasminiumhumile* L.	Rambilchambil	Root & Flower	Flower is used as heart tonic & root juice for ringworm & scabies	5	0.06		1	3	3	0	7	Vulnerable
101	*Olea ferruginea* Wall. Ex Aitch.	Khona	Leaves & Fruit	Leaves are used for fever; gonorrhea & toothache fruit is purgative	25	0.22		2	3	0	2	7	Vulnerable
	40. Oxalidaceae						20						
102	*Oxalis acetosella* L.	nenzakintroky	Whole plant	Used for blood clotting and scurvy	20	0.25		3	2	4	0	9	Rare
	41. Papaveraceae						31.2						
103	*papaversomniferum* L.	Apume	Capsule	Very effective for diarrhoea, dysentery, flue, cough & headache	25	0.31		2	2	3	2	9	Rare
	42. Plantaginaceae						38.7						
104	*Plantago major* L.	Ghwijabai	Whole plant	Used for fever, dysentery & candidiasis	18	0.22		3	3	4	0	10	Rare
105	*Plantago lanceolata* L.	Jabai	Leaves	Used for bronchitis & as mild purgative	13	0.16		3	3	4	4	14	Infrequent
	43. Platanaceae						17.5						
106	*Platanus orientalis* L.	Chinar	Leaves	Leaves are used for opthalmia, bark	14	0.17		2	3	0	2	7	Vulnerable

			&Bark	for hernia, toothache & dysentery									
	44. Polygonaceae						30						
107	*Rumex dentatus* L.	Shalkhy	Root & leaves	Used as emollient and laxative for cattle	14	0.17		3	3	3	0	9	Rare
108	*Rumex hastatus* D. Don	Taroky	Whole plant	Used for scurvy & as diuretic	10	0.12		3	3	3	0	9	Rare
	45. Portulaceae						25						
109	*Portulaca oleracea* L.	Warkhary	Whole plant	very effective for hepatic and renal disorder seeds are demulcent	20	0.25		2	2	4	0	8	Vulnerable
	46. Punicaceae						25						
110	*Punica granatum* L.	Anar	Fruit	Rind powder are used for dysentery, stomachache & antidiuretic	20	0.25		1	2	0	2	5	Vulnerable
	47. Renunculaceae						12.5						
111	*Anemone obtusiloba* D. Don.	Ratanjog	Whole plant	Plant is highly poisonous can causes blister of skin and brain disorder	10	0.12		2	3	3	0	8	Vulnerable
	48. Rhamnaceae						32.5						
112	*Sageretia thea* (Osbeck.) M.C. Johnst.	Neenibadri	Fruit & Bark	Fruit is purgative, bark is used for diarrhoea& as poultice to wound	12	0.14		1	2	0	2	5	Vulnerable
113	*Ziziphus jujuba* Mill.	Markhanry	Fruit & Leaves	Fruits are used as emollient and as a blood purifier	14	0.17		1	2	0	2	5	Vulnerable
	49. Rosaceae						96.3						
114	*Cotoneaster microphyllus* Wall. ex Lindl.	Kharawa	Leaves & Fruit	Used for digestive trouble and astringent	2	0.02		3	3	3	4	13	Infrequent
115	*Cotoneaster nummularia* Fisch. & C.A. Mey.	Mamanra	Fruit	Used as purgative, astringent and stomachic	5	0.06		2	3	3	2	10	Rare
116	*Duchesnea indica* (Jacks.)	Da zmaky tot	Fruit	Astringent in diarrhoea and as a	7	0.08		3	3	4	2	12	Rare

	Focke.			mild laxative									
117	*Fragaria nubicola* (Lindl. ex Hook.f.)	Da zmaky tot	Fruit	Decoction with hydrastine used against chronic diarrhoea& dysentery	6	0.07		3	3	4	2	12	Rare
118	*Potentilla reptans* L.	ZiarGwaly	Whole plant	Used for the treatment of uterine and intestinal infection	2	0.02		3	3	4	0	10	Rare
119	*Prunus armeniaca* L.	Khobanai	Fruit	Used as laxative, antipyretic & skin disorder overuse causes dysentery	5	0.06		2	2	0	2	6	Vulnerable
120	*Prunus domestica* L.	Alocha	Fruit	Used as refrigerant, laxative & diuretic	2	0.02		3	2	0	2	7	Vulnerable
121	*Prunus dulcis* (Mill.) D.A. Webb.	Badam	Seed	Stimulant and used as nerve tonic, oil is effective against hair fall	9	0.11		1	2	0	2	5	Vulnerable
122	*Prunus persica* (L.) Batsch.	Shaltalo	Fruit	Used as stomachic, effective appetizer, purgative and antidiabetic	7	0.08		3	2	0	2	7	Vulnerable
123	*Pyrus communis* L.	Nashpatai	Fruit	Used as mild purgative, diuretic and febrifuge	6	0.07		2	2	0	2	6	Vulnerable
124	*Malus domestica* Borkh.	Manra	Fruit	Used for increasement of blood and mild purgative	7	0.12		2	1	0	2	5	Vulnerable
125	*Pyrus pashia* Buch.-Ham. ex D.Don.	Kidar tanga	Fruit	Used as astringent & sedative	2	0.02		2	2	0	2	6	Vulnerable
126	*Rosa webbiana* Wall.ex Royle.	Khorach	Flower	Used as a mild astringent	7	0.08		3	3	3	3	12	Rare
127	*Rubus ellipticus* Sm.	Karwara	Fruit	Fruit juice are used for dysetery and diarrhea	5	0.06		3	3	3	2	11	Rare
128	*Rubus fruticosus* L.	Baganra	Fruit & Leaves	Fruit is used for diarrhoea& leaf used as a poultice for skin wart	3	0.03		2	2	3	2	9	Rare

	50. Rubiaceae						13.8						
129	*Galium aparine* L.	Karghamakukha	Whole plant	Used as antiscorbic, diuretic & for complaint of bladder & kidneys	11	0.13		3	3	4	0	10	Rare
	51. Rutaceae						88.7						
130	*Citrus aurentium* L.	Naranj	Fruit	Used as laxative and for skin & urinary problem	5	0.06		0	3	3	2	8	Vulnerable
131	*Citrus limon* (L.) Osbeck.	Limo	Fruit	With tea used for throat infection& fresh juice used for urinary problems	10	0.12		0	1	3	2	6	Vulnerable
132	*Citrus sinensis* (L.) Osbeck.	Malta	Fruit	very effective against flue and used to increase blood & purgative	12	0.14		0	0	3	2	5	Vulnerable
133	*Skimmialaureola*Franch.	Nazarpanra	Leaves	Decrease pulsation and antiseptic & burn smoke used for bade sight	28	0.35		2	2	3	4	11	Rare
134	*Zanthoxylum armatum* DC.	Dambara	Leaves & Fruit	Antipyretic, antiseptic, stomachic & leaves for Heat cycle of cattle	16	0.2		2	2	3	2	9	Rare
	52. Salicaceae						12.5						
135	*Salix babylonica* L.	Wala	Leaves & Bark	Used in remittent fever and anthelmintic & astringent	10	0.12		3	3	0	4	10	Rare
	53. Saxifragaceae						18.8						
136	*Bergenia ciliata* (Haw.) Sternb.	Kamar panra	Rhizome	Use for brokenness of kidney stone & as demulcent	15	0.18		0	3	3	1	7	Vulnerable
	54. Scrophulariaceae						51.3						
137	*Scrophularia nodosa* L.	Zagzagy	Aerial part	Used as skin poisoning	11	0.13		3	3	4	4	14	Infrequent
138	*Veronica persica* Poir.	Wolalai	Whole plant	Extract is used for eye inflammation, hay fever, flue & cough	15	0.18		3	3	4	0	10	Rare

139	*Verbascum thapsus* L.	Khardag	Whole plant	Used for pulmonary & skin diseases and also used to treat otitis media	15	0.18		3	3	4	0	10	Rare
	55. Simaroubaceae						16.2						
140	*Ailanthus altissima* (Mill.) Swingle.	Bikanra	Fruit & Bark	Bark used for gastrointestinal problem, fruit used for opthalmia	13	0.16		2	3	0	2	7	Vulnerable
	56. Solanaceae						82.5						
141	*Capsicum frutescens* L.	Marchaky	Fruit	Used as food flavoring agent and as skin & gastrointestinal irritant	9	0.11		3	3	4	2	12	Rare
142	*Datura stramonium* L.	Batura	Leaves & Seed	Sedative, anodyne, antispasmodic & poisonous over use causes death	15	0.18		3	3	4	2	12	Rare
143	*Solanum peruvianum* L.	Kachmacho	Whole plant	Diuretic, best expectorant, fresh leaf juice used for skin rushes	18	0.22		3	3	4	0	10	Rare
144	*Solanum tuberosum* L.	Alo	Tuber	Juice of raw potato used for stomach , intestine disorder & constipation	7	0.08		3	3	4	2	12	Rare
	57. Thymelaceae						11.2						
145	*Daphne mucronata* Royle.	Neghony	Whole plant	Leaves used as poultice for warts & rheumatism, root & fruit is purgative	9	0.11		3	3	3	0	9	Rare
	58. Ulmaceae						5						
146	*Celtis australis* L.	Tagha	Fruit & Bark	Used as remedy for urticaria and as a poultice for swelling	4	0.05		2	3	0	2	7	Vulnerable
	59. Urticaceae						30						
147	*Debregeasia saeneb* (Forssk.) Hepper & J.R.I. Wood.	Ajlai	Aerial part	Decoction is used for urticaria and jaundice	10	0.12		2	3	0	2	7	Vulnerable

148	*Urtica dioica* L.	Sezonky	Whole plant	Used as astringent, nephrites, diuretic & against jaundice	14	0.17		3	3	4	0	10	Rare
	60. Valarianaceae						11.2						
149	*Valeriana jatamansi* Jones.	Muskbala	Root	Antispasmodic, carminative and habitual constipation	9	0.11		1	2	3	0	6	Vulnerable
	61. Verbenaceae						16.2						
150	*Verbena officinalis* L.	Shamaky	Whole plant	Used as antiseptic, rheumatism & as a nerve tonic	13	0.16		3	3	4	0	10	Rare
	62. Violaceae						22.5						
151	*Viola canescens* Wall.	Banafsha	Whole plant	Antipyretic, tonic, purgative & diuretic	18	0.22		3	3	4	0	10	Rare
	63. Vitaceae						25						
152	*Vitis vinifera* L.	Angor	Fruit	Used for increasement of blood, laxative, demulcent, heart palpitation	20	0.25		0	1	3	2	5	Vulnerable
	Monocots												
	64. Alismataceae						28.8						
153	*Alisma plantago-aquatica* L.	Jabai	Rhizome	Used for diabetes, diuretic and kidney disorder	13	0.16		3	3	4	1	11	Rare
154	*Sagittaria guyanensis* Kunth.	Chotokut	Rhizome	Used for skin diseases	10	0.12		2	3	4	1	10	Rare
	65. Araceae						21.2						
155	*Acorus calamus* L.	Skhawaja	Rhizome	Used for constipation & in child colic pain	7	0.08		1	3	3	0	7	Vulnerable
156	*Arum jacquemontii*Blume.	Marjarai	Tuberousroot& Seed	Root used as vermifuge for cattle & seed for chronic human colic pain	10	0.12		1	3	4	0	8	Vulnerable

	66. Colchicaceae						21.2						
157	*Colchicum luteum* Baker	ZiarGwly	Corm	Used as laxative, aphrodisiac & rheumatism	17	0.21		3	3	3	0	9	Rare
	67. Commelinaceae						6.2						
158	*Commelinabenghalensis*L.	Taqy	Whole plant	Plant sap is used for opthalmia, sore throat & eye complaint	5	0.06		3	3	4	0	10	Rare
	68. Poaceae						26.2						
159	*Cynodon dactylon* (L.) Pers.	Kabal	Whole plant	Very effective against hepatitis, nose bleeding and as poultice for wound	6	0.07		3	3	4	0	10	Rare
160	*Zea mays* L.	Jwar	Grain & Stigma	Grain is valuable diet in constipation, stigma used for kidney stone	15	0.18		3	3	3	2	11	Rare

Abbreviations:

1. Availability

0 = Uncommon or very rare,**1** = Less common or rare, **2** = Occasional, **3** = Abundant

2. Collection

0 = Consumed more than 1000 kg/yr, **1** = Consumed from 500-1000 kg/yr, **2** = Consumed from 300-500 kg/yr, **3** = Consumed from 100-200 kg/yr

3. Growth behavior

0= Regrowth in more **3** years, **1** = Regrowth within **3** years, **2** = Regrowth within 2 years, **3** = Regrowth within 1 year, **4** = Regrowth in a season

4. Part used

0 = Root/Whole plant, **1** = Bark, 2 = Seeds/ Fruits, **3**= Flowers, **4**= Leaves/Gum/Latex

5. Total Score for plant conservation

0-4 = Endangered**, 5-8** = Vulnerable, **9-12** = Rare, **13-14** = Infrequent,**5-16** = Dominant

C.S= Conservation status, **FIV=** Family important value,

RFC= Relative frequency of citation, **C =** Number of people citing the plant

Acknowledgment

We are thankfull to the inhabitants of the area for their support and providing a lot of informations about the plant resources during the field work.

Author's Contributions

Hazrat Ullah (Did field work), Dr. Shariat Ullah and Dr. Wahid Hussain (Wrote and review the manuscript)

Conflicts of Intersts

The authors declare that they have no conflicts of interest.

Authors Funding

The author received no specific funding for this research project.

REFERENCES

1. Shinwari ZK, 2010. Medicinal plants research in Pakistan. *J. Med. Plant Res*. 4: 161-176.

2. Shinwari ZK, Khan AA, Nakaike T, Kyōkai NSH, 2003. Medicinal and other useful Plants of district Swat, Pakistan. P. 187.

3. Allem AC, 2000. Ethnobotanical testimony on the ancestors of cassava (*Manihot esculenta* Crantz subsp. *esculenta*). *Agris*. 123: 19-22.

4. Nadeem M, Shinwari ZK, Qaiser M, 2013. Screening of folk remedies by genus *Artemisia* based on ethnomedicinal surveys and traditional knowledge of native communities of Pakistan. *Pak. J. Bot*. 4: 111-117.

5. Zaidi SH, 1998. Existing indigenous medicinal plant resources of Pakistan and their prospects for utilization. *Pak. J. Fores*. 48: 5-9.

6. William JT, Ahmad Z, 1999. Priorities for medicinal plants research and development in Pakistan. National Plant Genetic Resources Institute PARC-NARC. p. 1-59.

7. Khan M, Hussain F, Musharaf S, 2103. Ethnobotanical profile of Tehsil Takht-e-Nasratti, District Karak, Pakistan. *J. Med. Plant Res*. 7: 1636-1651.

8. Hamilton A, Shengji P, Kessy J, Khan AA, Lagos-Witte S, Shinwari ZK, 2003. The purposes and teaching of applied ethno-botany. People and Plants working paper 11. WWF, Godalming, UK. P. 1-71.

9. Ali A, Badshah L, Hussain F, 2018. Ethnobotanical Appraisal and Conservation Status of Medicinal Plants in Hindukush Range, District Swat, Pakistan. *J. Herbs Spices Med. Plants*. 24: 332-355.

10. Hussain W, Badshah L, Ullah M, Ali M, Ali A, Hussain F, 2018. Quantitative study of medicinal plants used by the communities residing in Koh-e-Safaid Range, northern Pakistani-Afghan borders. *J. Ethnobiol. Ethnomed*. 14:1-18.

11. Muhammad Z, Ali H, Khan WM, Rehmanullah GJ, Majeed A, 2018. Conservation status of plant resources of Hazar Nao hills, district Malakand, Pakistan. *Pure Appl. Biol*. 7: 931-945.

12. Samreen U., Ibrar M, Badshah L, Naveed S, Imran, Khatak I, 2016. Ethnobotanical study of subtropical hills of Darazinda, Takht-e-Suleman range F.R.D.I Khan, Pakistan. *Pure Appl. Biol*. 5: 149-164.

13. Khan M, Musharaf S, 2015. Ethnomedicinal and conservation status of plant species in Tehsil Takht Bhai, District Mardan, Pakistan. *Int. lett. Nat. Sci*. 37: 18-29.

14. Razzaq A, Hadi F, Rashid A, Ibrar M, Ali U, 2015 Exploration of medicinal plants and their conservation status at higher altitude of district Shangla, Khyber Pakhtunkhwa, Pakistan. *Am. Eurasian J. Agric. Environ. Sci*. 15: 328-331.

15. Khan M, Hussain F, Shinwari ZK, Musharaf S, 2014. Ethnomedicinal and conservation status of herbs in tehsil Banda Daud Shah, District Karak, Pakistan. *Int. lett. Nat. Sci*. 20: 190-197.

16. Hussain F, Shah SM, Badshah L, Durrani MJ, 2015. Diversity and ecological characteristics of flora of Mastuj valley, district Chitral, Hindukush range, Pakistan. *Pak. J. Bot*. 47: 495-510.

17. Badshah L, Hussain F, Mohammad Z, 1996. Floristic and ethnobotanical study of some plants of Pirgarh hills, South Waziristan Agency, Pakistan. *Pak. J. Plant Sci*.; 2: 167-177.

18. Ali SI, Qaiser M. (Eds.), 1995-2015. Flora of Pakistan. Department of Botany, University of Karachi.

19. Ali SI, Nasir YJ (Eds.), 1989-1992. Flora of Pakistan. Islamabad, Karachi.

20. IUCN, 2001. IUCN Red List Categories and Criteria: Version 3.1. IUCN Species Survival Commission, Vol. 2. IUCN, Gland, Switzerland and Cambridge, UK. 30.

21. Ahmad M, Sultana S, Hadi SFI, Hadda TB, Rashid S, Zafar M, Khan MA, Khan MPZ, Yaseen G, 2014. An ethno-botanical study of medicinal plants in high mountainous region of Chail valley district Swat, Pakistan. *J. Ethnobiol. Ethnomed*. 10: 01-18.

22. Guarrera PM, Forti G, Marignoli S, 2005. Ethno-botanical and ethnomedicinal uses of plants in the district of Acquapendente (Latium, Central Italy). *J. Ethnopharmacol*. 96: 429–444.

23. Hamayun M, 2007. Traditional uses of some medicinal plants of Swat valley, Pakistan. Indian J. Tradit. Knowl. 6: 636–641.

24. Hong L, Guo Z, Huang K, Wei S, Liu B, Meng S, Long C, 2015. Ethno-botanical study on medicinal plants used by Maonan people in China. *J. Ethnobiol. Ethnomed*. 11: 01-34.

25. Zarif M, Ahmed K, Ahmed M, Altaf M, Zarif S, 2018. Ethnobotany of medicinal plants of Tehsil Kotli Sattian, District Rawalpindi. *Int. J. Biosci.* 13: 387-400.

26. Ullah A, Hassan N, Amin R, Khan A, Shi L, Li M, 2018. Quantitative ethnobotanical survey of medicinal plants used as remedy in Mera, District Charsadda, KP, Pakistan. *J. Biodivers. Environ. Sci*. 12: 163-173.

27. Shaheen H, Shinwari ZK, Qureshi RA, Ullah Z, 2012. Indigenous plant resources and their utilization practices in village populations of Kashmir Himalayas. *Pak. J. Bot*. 44: 739-745.

28. Corlett RT, 2013. Westcott DA. Will plant movements keep up with climate change? Trends *Ecol. Evol*. 28: 482-488.

29. Corlett RT, 2016. Plant diversity in a changing world: status, trends and conservation need. *Plant Divers*. 38: 10-16.