Ethnobotanical uses of the Flora of Banrgai, Talash Valley, District Lower Dir, Khyber Pakhtunkhwa, Pakistan

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Ethnobotany Research and Applications 32:10 (2025) - http://dx.doi.org/10.32859/era.32.10.1-15
Manuscript received: 28/12/2024 - Revised manuscript received: 25/09/2025 - Published: 26/09/2025

Research

Abstract

Background: The present study was carried out in the region of Banrgai, Talash Valley District Dir Lower North, Pakistan. The purpose of the study to explore the areas of Talash valley from all aspects regarding diversity of medicinal plants and folk medicinal knowledge. Traditional knowledge about medicinal plants used for various health problems was collected from the study area.

Methods: Comprehensive field work was carried out in Banrgai valley, Talash district Dir Lower KP, Pakistan starts from, March to September 2014. The data obtained from informants were analyzed through various statistical techniques such as Use value (UV), Relative frequency citation (RFC), Relative popularity level (RPL) and Rank order priority (ROP).

Results: The present study revealed that in Banrgai Valley has 39 plant families comprising of 63 species and 59 genera which were utilized by local inhabitants for various purposes. The Use Value (UV) ranged from 0.01 to 0.19, with the highest UV recorded for *Verbascum thapsus* (0.19) and *Amaranthus viridis* (0.19). The Relative Frequency of Citation (RFC) values varied from 0.05 to 0.71, with the highest RFC documented for *Sonchus oleraceus* (0.71). The Fidelity Level (FL) ranged from 7.58% to 91%, with the highest FL recorded for *Saccharum bengalense* (91%). The Relative Popularity Level (RPL) ranged from 0.13 to 0.98, with the highest RPL values observed for *Capsella bursa-pastoris* and *Chenopodium ambrosioides* (both 0.98). The analysis revealed that the most commonly used plant portion for medicinal purposes is the leaves, underscoring their importance in traditional healing practices

Conclusions: The Region of Banrgai, Talash Valley have rich diversity of medicinal flora. The several causes for this decreasing resource were, unsuitable agriculture applies, over grazing, over exploitation, deforestation occur for many uses such as fuel and timber in the investigation area.

Keywords: Ethnobotany, Plant diversity, Banrgai, Talash valley, Pakistan

Background

Human beings have been using plants for various livelihood purposes since time of origin, and this information is as old as human civilization (Qureshi *et al.* 2007). Later in 1895 "John Harsh Berger" For the first time used the term ethnobotany which deals the study of plants used by the earliest people (Mahmoud *et al.* 2012). Ethnobotany is the discipline which plays a great role in understanding the relationship between plants and human beings (Rahman, 2013). The Plants play a key role in supporting life on Earth. Since prehistoric times, people have used medicinal plants to treat various diseases. Medicinal plants have traditionally been used by local communities due to their therapeutic importance. Consequently, the marketing of these plants has predominantly involved villagers, who rely on native species for medicinal purposes (Marwat *et al.* 2011). Ethnomedicinal plants remain under-researched and poorly documented in many developing countries. While traditional hakims retain much of this knowledge, their associated materials have largely been lost or orally transmitted (Amiri & Joharchi, 2013). Enormous efforts have been made to document ethnobotanical and ethnomedicinal information in various regions, including adjacent countries (Gupta *et al.* 1997; Singh *et al.* 1997; Vedavathy & Khan, 1999; Mustafa *et al.* 2000; Ghimire *et al.* 1999; Siddiqui *et al.* 2000).

Research in Pakistan has identified between 400 - 600 medicinally valuable species among its 5,834 wild plants (Hamayun, 2005). About 700 plant species were used in the Himalayan region for aromatic and medicinal purposes (Peshengji, 1992). Similar efforts have been undertaken to document traditional knowledge concerning local medicinal flora. In Margalla Hills National Park, 160 plant species have been catalogued for both conservation status and traditional applications (Shinwari & Khan, 2000) Similarly, from Ayubia National Park (Shah, 2001) recorded about 58 medicinal plants species. Qureshi & Khan (2001) reported native information and the uses of around 25 medicinal herbs from Kahuta, district Rawalpindi. In the Malakand division, the most important economic activity is the gathering and trade of medicinal plants and in this area 5000 families were elaborated in the assortment and processing of medicinal plants (Sher & Hussain, 1998; Sher *et al.* 2023; Rehman *et al.* 2023a). In many traditional societies the women's and children's are the primary collectors and processors of medicinal plants, playing a vital role in sustaining both household livelihoods and local herbal trade networks. Despite their indispensable contributions, they remain the most economically disadvantaged participants in the medicinal plant value chain, receiving minimal compensation for their labor (Sher & Shakespeare, 2000; Iftikhar *et al.* 2019; Musa *et al.* 2022). This disparity is particularly evident in Swat District, Khyber Pakhtunkhwa (KP), Pakistan, where ethnobotanical studies, such as those by Husain & Mustafa (1995), Sher & Hussain (1998), and later works by Sher *et al.* (2003, 2004) and Husain *et al.* (2004) have extensively documented the reliance on wild flora for subsistence and income. These studies not only show the ecological knowledge held by local communities but also show the gendered and age-based dynamics of plant gathering. About of 40,000 registered practitioners of traditional medicine are there in Pakistan and majority of the population, especially villages depend on local medicinal herbs to cure different diseases. An estimated 60% of people used herbal medications for traditional purposes (Haq 1983; Rehman *et al.* 2023b).

Similarly, the ethnobotanical study was conducted in Banrgai valley district Dir Lower KP, Pakistan. This study documents the ethnobotanical uses of the flora of Bangrai, Talash Valley, Lower Dir, Khyber Pakhtunkhwa, Pakistan, with particular focus on its conservation status and traditional uses among local Pashtun communities. This study examines medicinal plant use through ethno botanical surveys and interviews with Hakims (traditional healers), focusing on population status of key species, preservation of Islamic and pre-Islamic phototherapy knowledge and ecological threats to high-value plants. By linking ecological and cultural dimensions, we aim to support bio cultural conservation in rapidly changing environments.

Materials and Methods

Study area

The present study was carried out in Banrgai village, Talash valley, district Lower Dir, Khyber Pakhtunkhwa, Pakistan. Bangrai village (34.7511510°N, 71.8798190°E) is situated in the Talash Valley, Lower Dir District, Khyber Pakhtunkhwa, Pakistan (Figure 1). The region has a temperate climate, with seasonal temperatures ranging from 24°C (75°F) in September to 8°C (46°F) in winter. Spring begins in February, transforming the valleys into lush greenery by March. Agriculture here revolves

around staple crops like wheat and maize, alongside secondary crops such as beans, millet, and tomatoes. Onions, however, serve as the key cash crop due to their higher market value. Crop selection depends heavily on water access, with farmers relying on dug wells or rainfall for irrigation.

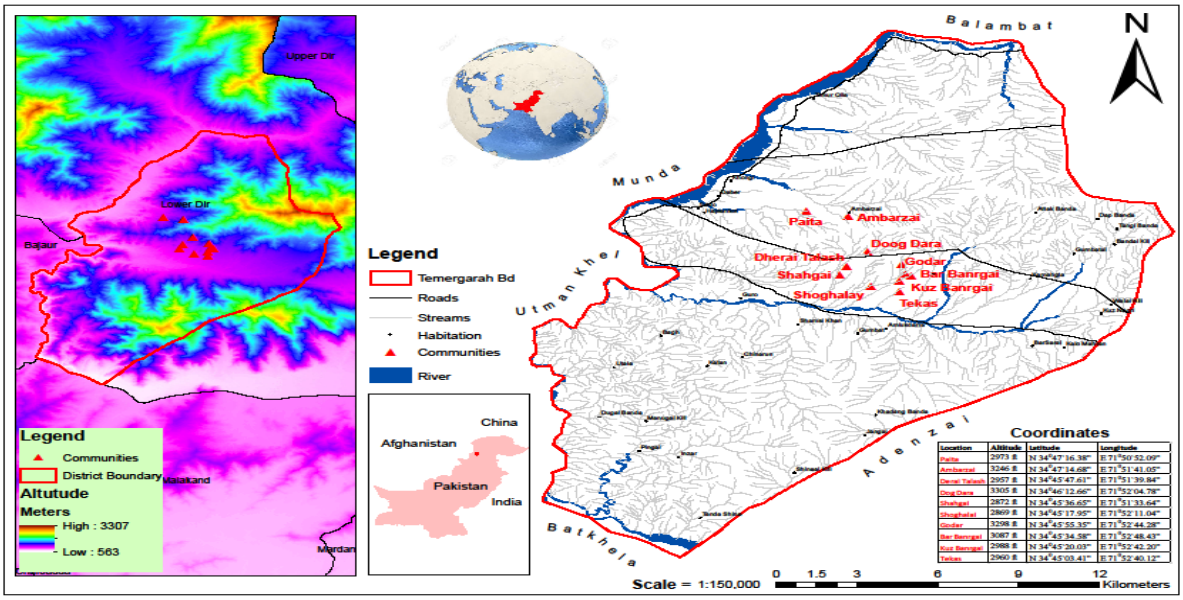

Figure 1. Map of Banrgai, Talash valley district Lower Dir, Khyber Pakhtunkhwa, Pakistan.

Collection and preservation

Field surveys were conducted from March to September 2014 across Bangrai Valley, Lower Dir, Pakistan, covering the complete growing season. Medicinal plant specimens were collected with full documentation of GPS coordinates, phonological status, and habitat characteristics. Ethno-botanical data were recorded through structured interviews of Hakims. Specimens were immediately pressed in the field using botanical presses with acid-free paper, then dried at 42°C for 72 hours. The preserved specimens were mounted on standard 29 × 42 cm herbarium sheets and stored with naphthalene treatment for pest control. The complete collection of specimens was deposited to the herbarium of Islamic college Peshawar, Pakistan.

Ethnobotanical information

For the data collection, a questionnaire was developed for obtaining ethnobotanical information. The age of the informant generally varied from 25-80 years. The information collected from the people was based on different criteria like age, education, gender, occupation, and tribe (Table 1).

Table 1. Socio-Demographic Profile of Ethnomedicinal Knowledge Holders in Bamgai, Talash Valley, Pakistan

Demographic Category	Sub-Category	Count	Percentage	Notes
Gender	Male	110	34%	
	Female	213	66%	All >50 years old
Education	Educated	90	28%	All male (30% of male total)
	Uneducated	233	72%	All female
Age Distribution	Females >50 yrs	213	66%	Primary knowledge holders
	Males (all ages)	110	34%	Age range not specified
Location	Bamgai Village	323	100%	Rural, temperate valley

Plant identification

Plants specimens were identified with the help of flora of Pakistan (Nasir & Ali, 1970-1979; Nasir and Ali, 1980-1989; Ali and Nasir, 1989-1992; Ali and Qaiser, 1993-2013). The specimens were submitted to the herbarium of Islamia College Peshawar, Pakistan.

Quantitative Ethnobotanical Indices

Use value (UV)

For finding the relative importance of medicinal plants within the area, the species were indexed through Use value (UV). Which was calculated by the following equation:

$$\sum Ui/N=UV \quad \text{(1)}.$$

In the given formula "UV" representing the frequencies of individuals who has reported the use of plant, "Ui" is the frequencies of the recorded use of particular plant taxa, and "N" is indicating the overall frequency of informants (Mahomoodally *et al.* 2016).

Relative frequency citation (RFC)

In order to anticipate each taxon's relevance and resident vitality, the RFC parameters were computed using the above citation. The formula was used to calculate the index (Ali-Shtayeh *et al.* 2008) below

$$(0<RFC<1)\ FC/N=RFC \quad \text{(2)}.$$

"FC" is representing the frequency of informer's reports about used of a particular taxon and "N" is the total frequency of informants for a specific plant species.

Fidelity level (FL)

It indicates the informant's percent, which identified the plant for particular diseases. The following equation was used for fidelity calculations:

$$100\times Np/N=FL \quad \text{(3)}.$$

In give formula the "NP" represents the number of informant's which provide information about the plant use for certain disease while "N" represents the total number of informants (Mahomoodally *et al.* 2016).

Relative popularity level (RPL)

RPL is a measure that estimates the ratio of the total number of informants of any condition to the number of diseases healed by a particular plant. A prior analysis of the index based on popular and unpopular categories was used (Ali-Shtayeh *et al.* 2008).

Results

Socio-Demographic Data

A total of 323 indigenous people were interviewed, among which 110 (34%) were male and 213 (66%) were female, theses interrogated belonged to various communities. It was observed that the entire female informants were above the age of 50 years old and uneducated, whereas 90 (30%) of the male informant were educated (Figure 2).

Family Importance Values (FIV)

The present study revealed that in Banrgai Valley, a total of 63 plant species belonging to 59 genera and 39 families were utilized by local residents for various purposes, highlighting their significant ethnobotanical value (table 1). Among the identified families, Asteraceae was the most dominant, comprising 9 species (14.3%), followed by Poaceae (6 species, 9.5%) and Fabaceae (4 species, 6.3%). Families such as Solanaceae, Lamiaceae, Apocynaceae, and Rosaceae were represented by 3 species each (4.8%), while Euphorbiaceae, Moraceae, Brassicaceae, and Amaranthaceae included 2 species each (3.2%). The remaining 29 families, including Acoraceae, Amaryllidaceae, Araliaceae, Berberidaceae, Cactaceae, Cannabaceae, Gentianaceae, Meliaceae, Myrtaceae, Nyctaginaceae, Oleaceae, Oxalidaceae, Papaveraceae, Pinaceae, Plantaginaceae, Portulacaceae, Rutaceae, Sapindaceae, Scrophulariaceae, Simaroubaceae, Violaceae, Vitaceae, and others were represented by only one species each, collectively contributing 46.0% of the total species diversity.

The local community relied on these plants for medicinal treatments, food (vegetables, fruits, and spices), fodder, fuel wood, and construction materials. Additionally, species like *Zanthoxylum armatum* (toothbrushes/"miswak"), Rosa moschata (ornamental/fencing), and *Saccharum bengalense* (thatching/basketry) played specialized roles in daily life and cultural practices. This study underscores the deep interdependence between the Banrgai Valley community and its native flora, emphasizing the urgent need for conservation strategies to protect these irreplaceable plant resources and traditional knowledge (Table 2).

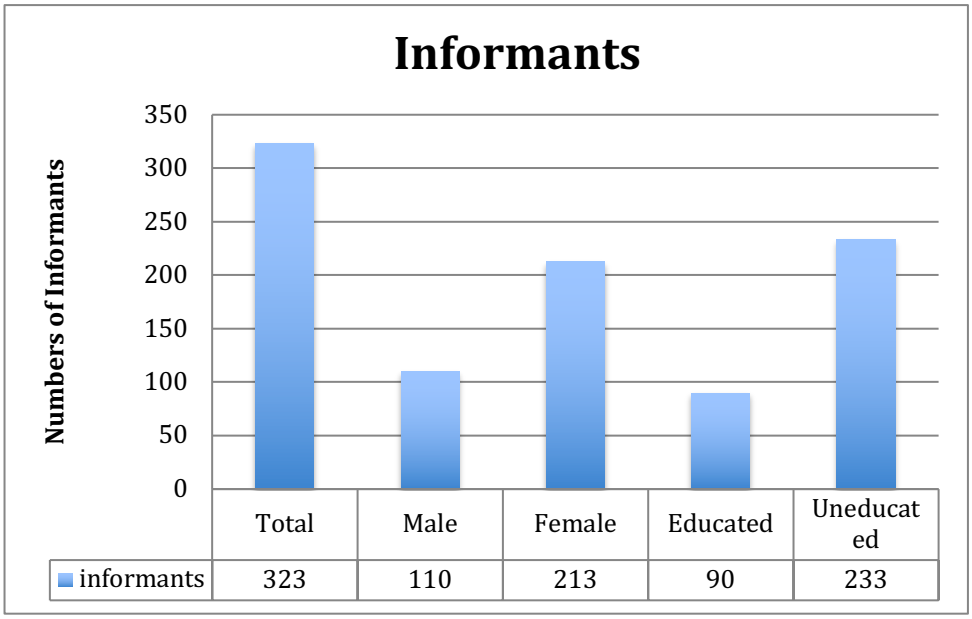

Figure 2. Informant details of Banrgai, Talash valley, district lower Dir, Khyber Pakhtunkhwa, Pakistan

Parts Used

As per analysis of the ethnobotanical data, 6 (15%) of the plants were used for stomachache, 6 (15%) were used for Pain killer, 3 (7%) were used for fever, 3 (7%) were used for kidney treatment, 4 (10%) were used for controlling blood pressure, 6 (15%) were used for wound treatment, 5 (12%) used for diarrhea and 8 (19%) for other various treatments (.Figure 3).

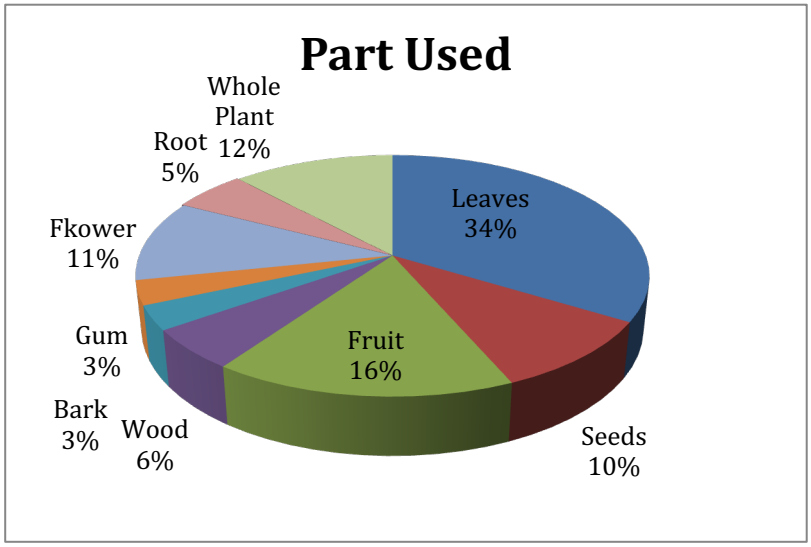

Figure 3. Part used of the total identified species in Banrgai, Talash valley, district lower Dir, Khyber Pakhtunkhwa, Pakistan.

Habit

Among these (06) 9 % taxa were annual herbs, (34) 53 % were perennial herbs, (10) 16 % were shrub and (14) 22 % were trees species (Figure 4).

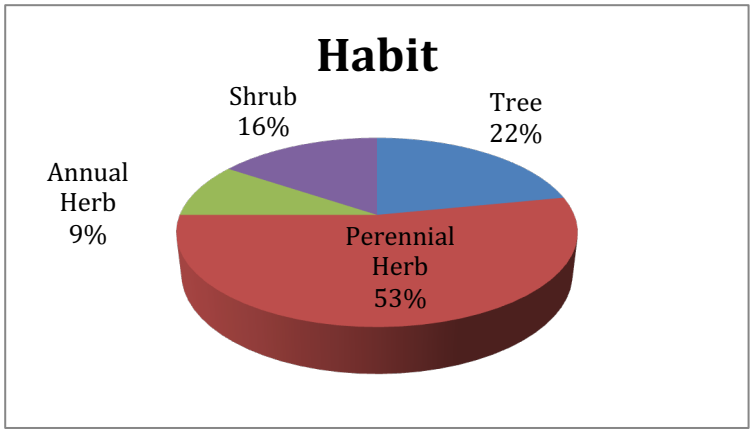

Figure 4. Habit of the total identified species in Banrgai, Talash valley, district lower Dir, Khyber Pakhtunkhwa, Pakistan.

Quantitative Ethnobotanical Indices

Relative Frequency of Citation (RFC)

The Relative Frequency of Citation (RFC) values ranged from 0.05 to 0.71, reflecting significant variations in the cultural and medicinal importance of plant species. The top 10 species with the highest RFC values were *Sonchus oleraceus* (0.71), *Dodonaea viscosa* (0.68), *Cotoneaster nummularia* (0.61), *Hedera nepalensis* (0.61), *Mentha spicata* (0.62), *Melia azedarach* (0.65), *Portulaca oleracea* (0.56), *Mirabilis jalapa* (0.56), *Pinus roxburghii* (0.52), and *Solanum surattense* (0.52). On the other hand, the species with the lowest RFC values included *Acorus calamus* (0.06), *Centaurium centaurioides* (0.05), *Artemisia scoparia* (0.07), *Calendula officinalis* (0.21), and *Ricinus communis* (0.36). These findings indicate that the cultural relevance of these plants varies widely, with some species being highly valued and others having limited recognition in traditional practices (Table 2).

Use Value (UV)

The Use Value (UV) analysis ranged from 0.01 to 0.19, demonstrating significant variation in the frequency and versatility of plant use among the studied species. The top 10 species with the highest UV included *Verbascum thapsus* (0.19), *Amaranthus viridis* (0.19), *Calendula arvensis* (0.18), *Centaurium centaurioides* (0.17), *Melia azedarach* (0.16), *Plantago lanceolata* (0.16), *Carthamus oxyacantha* (0.15), *Papaver rhoeas* (0.15), *Acacia modesta* (0.13), and *Berberis lycium* (0.12). In contrast, the species with the lowest UV values were *Calendula officinalis* (0.01), *Cannabis sativa* (0.01), *Ricinus communis* (0.02), *Olea ferruginea* (0.02), and *Caralluma tuberculata* (0.03). These results highlight the extensive ethnobotanical applications of the most valued species, while the low-ranking species show more limited traditional uses (Table 2).

Fidelity Level (FL)

The Fidelity Level (FL) values, indicating the specificity of plant use for particular ailments, ranged from 7.58% to 91%. The species with the highest FL values were *Saccharum bengalense* (91%), *Dodonaea viscosa* (89.7%), *Viola canescens* (89.9%), *Capsella bursapastoris* (83.3%), *Cotoneaster nummularia* (83.3%), *Solanum surattense* (86.7%), *Celtis caucasica* (85.9%), *Acacia nilotica* (86.1%), *Mentha spicata* (88.4%), and *Pinus roxburghii* (85.43%). Conversely, species with the lowest FL values were *Artemisia scoparia* (7.58%), *Verbascum thapsus* (51.1%), *Calendula arvensis* (54.76%), *Jasminum officinale* (56.68%), and *Amaranthus viridis* (57.4%). These findings demonstrate that certain species are highly specialized for specific medicinal applications, while others have more generalized uses in traditional medicine (Table 2).

Relative Popularity Level (RPL)

The Relative Popularity Level (RPL) ranged from 0.12 to 0.98, reflecting the acceptance and recognition of plant species among the local communities. The most popular species included Chenopodium ambrosioides (0.98), Capsella bursa-pastoris (0.96), *Dodonaea viscosa* (0.95), *Cynodon dactylon* (0.93), *Berberis lycium* (0.90), *Mentha arvensis* (0.88), *Acacia modesta* (0.85), *Withania somnifera* (0.82), *Achyranthes aspera* (0.80), and *Ziziphus nummularia* (0.78). In contrast, the species with the lowest RPL values were *Ailanthus altissima* (0.12), *Eucalyptus camaldulensis* (0.15), *Amaranthus viridis* (0.16), *Oxalis corniculata* (0.18), and *Cannabis sativa* (0.20). The results illustrate the widespread recognition of highly popular species and the limited acceptance of less popular ones (Table 2).

Table 2. Checklist of the Ethnobotanical Plants of Banrgai, Talash Valley, District Dir Lower, Khyber Pakhtunkhwa, Pakistan.

Specimen Voucher	Botanical Name	Family Name	Local Name	Habit	Part Used	Disease Treated	UV	RFC	FL	RPL	ROP
ICP 103	*Acacia modesta* Wall.	Fabaceae	Palosa	Tree	Gum	Backbone pain, restorative sexual tonic, pain killer (especially backache)	0.13	0.46	67.6	0.56	37.8
ICP 104	*Andrachne cordifolia* (Muell. Arg.)	Phyllanthaceae	Krachay	Perennial herb	Leaves, fruits	Vermifuge for cattle; applied for swellings	0.1	0.46	70.1	0.43	30.1
ICP 105	*Amaranthus viridis* L.	Amaranthaceae	Chalwaey	Annual herb	Whole plant	Common potherb; vegetable food and fodder	0.19	0.19	57.4	0.21	12.05
ICP 106	*Acorus calamus* L.	Acoraceae	Skhawaja	Perennial herb	Rhizome	Severe diarrhea, dysentery; teething aid for children	0.09	0.06	68.2	0.47	32.9
ICP 107	*Artemisia scoparia* Waldst. & Kit.	Asteraceae	Jaukay	Perennial herb	Leaves, shoots, seeds	Ear pain; sweltering purpose; shoots for brush manufacture	0.08	0.07	7.58	0.75	5.68
ICP 108	*Acacia nilotica* (L.) Delile	Fabaceae	Kikar	Tree	Wood, leaves, gum	Fodder, construction, agricultural tools; gum as tonic for dysentery/diarrhea	0.07	0.21	86.1	0.5	43.05
ICP 109	*Avena sativa* L.	Poaceae	Jamdaray	Perennial herb	Fruit	General body tonic (flour with sugar, ghee, milk); fodder	0.06	0.45	69.4	0.44	30.53
ICP 110	*Aristida abnormis* Chiov.	Poaceae	Wakha	Perennial herb	Whole plant	Fodder (fresh/dry)	0.05	0.35	80	0.34	27.2
ICP 111	*Ailanthus altissima* (Mill.) Swingle	Simaroubaceae	Bakhyana	Tree	Wood, leaves, bark, gum resin	Fodder, construction, furniture; resin mixed with milk for dysentery/diarrhea	0.06	0.45	69.4	0.44	30.53
ICP 112	*Berberis lycium* Royle	Berberidaceae	Kwaray	Shrub	Root	Body tonic; internal wounds, piles, liver disorders, jaundice; fencing	0.1	0.39	77.5	0.82	63.55
ICP 113	*Canadanthus modestus* (Lindl.) G.L. Nesom	Asteraceae	Shamaky	Perennial herb	Vegetative portion	Tooth/ear pain; washing apparatuses; beehive odor enhancer	0.06	0.29	81.1	0.89	72.17
ICP 114	*Calendula officinalis* L.	Asteraceae	Zairgulae	Perennial herb	Flowers, leaves	Wound treatment	0.01	0.21	69.99	0.67	46.83
ICP 115	*Carthamus oxyacantha* M.Bieb.	Asteraceae	Kareza	Perennial herb	Seeds oil	Dressing ulcers, scaly skin	0.15	0.25	74	0.21	15.54
ICP 116	*Calendula arvensis* L.	Asteraceae	Zairgulae	Annual wild herb	Leaves, flowers	Honeybee species; edible	0.18	0.45	54.76	0.82	44.9
ICP 117	*Calotropis procera* (Aiton) W.T.Aiton	Apocynaceae	Spalmai	Perennial herb	Whole plant	Wounds, dysentery treatment	0.04	0.25	69.99	0.87	88.8

ICP 118	*Caralluma tuberculata* N.E.Br.	Apocynaceae	Pamankay	Perennial herb	Whole plant	Stomachache, rheumatism, blood disorders	0.03	0.45	73.98	0.57	60.89
ICP 119	*Capsella bursa-pastoris* (L.) Medik.	Brassicaceae	Bambaisa	Annual herb	Leaves, flowering tops, seeds	Blood pressure reduction; hematuria, dropsy, diarrhea treatment	0.04	0.29	83.3	0.98	81.63
ICP 120	*Cannabis sativa* L.	Cannabaceae	Bung	Shrub	Leaves, flowering tips	Narcotic ("Chars"); anodyne agent; Mergi treatment	0.01	0.32	72.2	0.38	27.43
ICP 121	*Centaurium centaurioides* (Roxb.) R.Rao	Gentianaceae	Mai	Perennial herb	Whole plant	Kidney stone removal; vegetable	0.17	0.05	87.4	0.51	44.57
ICP 122	*Chenopodium ambrosioides* L.	Amaranthaceae	Skhabotay	Perennial herb	Whole plant	Malarial fever; cooling agent	0.04	0.29	79.9	0.98	78.3
ICP 123	*Cynodon dactylon* (L.) Pers.	Poaceae	Kabal	Perennial herb	Whole plant	Bleeding piles, vomiting; fodder	0.09	0.41	70	0.53	37.1
ICP 124	*Cotoneaster nummularia* Fisch. & C.A.Mey.	Rosaceae	Kharawa	Shrub	Whole plant	Walking sticks, agricultural tools	0.08	0.61	83.3	0.42	34.98
ICP 125	*Celtis caucasica* Willd.	Cannabaceae	Tagha	Tree	Wood, leaves, fruits	Fodder; agricultural tools; amenorrhea, allergy treatment	0.08	0.46	85.9	0.78	67
ICP 126	*Dryopteris juxtaposita* Christ	Dryopteridaceae	Kwanjay	Perennial herb	Young shoot	Digestive enhancer; vegetable	0.12	0.55	73.4	0.38	27.89
ICP 127	*Datura innoxia* Mill.	Solanaceae	Datura	Shrub	Leaves, seeds	Fever reduction (especially malaria)	0.08	0.46	85.9	0.78	67
ICP 128	*Dodonaea viscosa* (L.) Jacq.	Sapindaceae	Ghwaraskay	Shrub	Leaves, seeds, wood	Antirheumatic; fencing, thatching; fodder	0.04	0.68	89.7	0.83	74.4
ICP 129	*Euphorbia helioscopa* L.	Euphorbiaceae	Mandanro	Annual herb	Root, milky juice	Poisonous; applied to skin eruptions	0.03	0.16	68.75	0.45	30.93
ICP 130	*Eucalyptus camaldulensis* Dehnh.	Myrtaceae	Lachi	Tree	Leaves, oil, stem	Fuel, furniture; soil erosion control; honeybee species	0.05	0.38	77.6	0.47	36.47
ICP 131	*Euphorbia japonica* Lindl.	Euphorbiaceae	Alokat	Shrub	Fruits, flowers	Expectorant; sedative (excessive use causes diarrhea)	0.11	0.45	65.2	0.5	32.6
ICP 132	*Ficus carica* Forssk.	Moraceae	Inzar	Tree	Fruit	Spine/thorn removal; latex used for skin; fodder	0.1	0.31	75.3	0.8	60.24
ICP 133	*Fragaria indica* Andrews	Rosaceae	Da Zamki Toot	Perennial herb	Fruits	Edible fruit; fodder	0.7	0.26	73.99	0.19	14.05
ICP 134	*Hedera nepalensis* K.Koch	Araliaceae	Prewatkai	Perennial herb	Leaves	Diuretic; urinary troubles	0.03	0.61	80.7	0.21	16.94
ICP 135	*Heteropogon contortus* (L.) P.Beauv.	Poaceae	Barwaza	Perennial herb	Leaves	Floor mats; fodder	0.08	0.41	86.57	0.67	85.5
ICP 136	*Jasminum officinale* L.	Oleaceae	Rambail chambail	Shrub	Root	Ornamental; anthelmintic	0.04	0.46	56.68	0.45	25.5

ICP 137	*Mentha longifolia* (L.) L.	Lamiaceae	Villanay	Perennial herb	Whole plant	Carminative; stomach disorders; blood pressure reduction	0.08	0.43	86.1	0.16	13.77
ICP 138	*Mentha spicata* L.	Lamiaceae	Podina	Perennial herb	Leaves	Salad; mouth wash	0.05	0.62	88.4	0.71	62.76
ICP 139	*Melia azedarach* L.	Meliaceae	Torabakanra	Tree	Leaves, seeds	Hysteria treatment; antiseptic (ash); fodder; seed garlands	0.16	0.65	81.2	0.38	30.85
ICP 140	*Morus alba* L.	Moraceae	Spin toot	Tree	Fruit	Edible fruit; furniture, fuel wood	0.05	0.36	90	0.56	50.4
ICP 141	*Mirabilis jalapa* L.	Nyctaginaceae	Gul-e-Bada	Perennial herb	Leaves	Poultice for boils (pus release)	0.08	0.56	82.3	0.67	55.1
ICP 142	*Narcissus tazetta* L.	Amaryllidaceae	Gul-e-Nargis	Perennial herb	Flowers	Ornamental; honeybee species	0.06	0.22	74.66	0.83	61.96
ICP 143	*Nasturtium officinale* R.Br.	Brassicaceae	Talmeera	Perennial herb	Vegetative portion	Stomachic; diuretic	0.8	0.46	75.5	0.69	52.9
ICP 144	*Oxalis corniculata* L.	Oxalidaceae	Tarookay	Perennial herb	Leaves	Stomach problems; taste enhancer	0.09	0.41	71.44	0.45	52.09
ICP 145	*Opuntia dillenii* (Ker Gawl.) Haw.	Cactaceae	Zuqam	Shrub	Phylloclades, fruit	Worm treatment (children); edible fruit; expectorant	0.07	0.26	87.21	0.81	70.64
ICP 146	*Olea ferruginea* Royle	Oleaceae	Khoona	Tree	Wood, leaves, bark	Agricultural tools; fuel; toothache treatment	0.02	0.19	74.65	0.51	38.07
ICP 147	*Plantago lanceolata* L.	Plantaginaceae	Jabai	Annual herb	Leaves, fruits, seeds	Wound treatment; dysentery, mouth diseases	0.16	0.29	88.8	0.38	28.4
ICP 148	*Portulaca Oleracea* L.	Portulacaceae	Warkharae	Perennial herb	Vegetative portion	Kidney, liver, urinary bladder, lung problems	0.03	0.56	76.9	0.56	43.06
ICP 149	*Papaver rhoeas* L.	Papaveraceae	AlakJanaey	Annual herb	Flowering tops, fruits	Sedative; gum treatment for children	0.15	0.26	75.99	0.84	63.83
ICP 150	*Pinus roxburghii* Sarg.	Pinaceae	Nakhtar	Tree	Leaves	Fuel wood, furniture; gum for worm removal	0.04	0.52	85.43	0.51	43.56
ICP 151	*Punica granatum* L.	Lythraceae	Ananghorai	Tree	Fruit, bark, leaves	Blood purifier; whooping cough treatment; spices	0.05	0.46	77.5	0.78	60.4
ICP 152	*Ricinus communis* L.	Euphorbiaceae	Harhanda	Shrub	Leaves, seeds, oil	Poisonous; narcotic; poultice for blood pressure reduction	0.8	0.36	69.89	0.45	31.45
ICP 153	*Rosa moschata* J.Herm.	Rosaceae	Zangaley Gulab	Perennial shrub	Flowers, branches	Ornamental; fencing; honeybee species	0.08	0.32	66.6	0.51	33.96
ICP 154	*Sonchus oleraceus* L.	Asteraceae	Shawdapai	Perennial herb	Whole plant	Fodder (enhances milk production); potherb	0.09	0.71	82.99	0.76	55.6
ICP 155	*Saccharum bengalense* Retz.	Poaceae	Sharghashay	Perennial herb	Leaves, stem	Thatching; baskets, brooms; kite-making	0.04	0.45	91	0.69	62.79
ICP 156	*Salvia moorcroftiana* Wall. ex Benth.	Lamiaceae	Khardag	Perennial herb	Leaves, stem	Boil treatment (pus removal); fodder	0.11	0.35	73.6	0.5	36.08
ICP 157	*Solanum virginianum* L.	Solanaceae	Kachmachu	Perennial herb	Berries, leaves	Vegetable; wound cleaning; jaundice treatment	0.09	0.39	70.7	0.23	16.26

ICP 158	*Solanum surattense* Burm.f.	Solanaceae	Karkunday	Perennial herb	Seeds	Diuretics: gout, rheumatism, cough, asthma, sore throat treatment	0.02	0.52	86.7	0.56	48.55
ICP 159	*Tagetes minuta* L.	Asteraceae	Zangaley Hamisha	Perennial herb	Flowers	Ornamental; fragrance	0.07	0.42	77	0.67	51.59
ICP 160	*Viola canescens* Wall. ex Roxb.	Violaceae	Banafsha	Perennial herb	Whole plant, flowers	Diaphoretic; antipyretic; nervous disorders treatment	0.09	0.24	89.9	0.13	11.68
ICP 161	*Verbascum thapsus* L.	Scrophulariaceae	Kharghwag	Perennial herb	Leaves	Antiseptic; pain killer (boiled leaves)	19	0.12	51.1	0.95	48.54
ICP 162	*Vitis jacquemontii* R.Parker	Vitaceae	Gedar Kwar	Tree	Fruit	Edible fruit; fodder	0.07	0.22	81.89	0.47	38.48
ICP 163	*Xanthium strumarium* L.	Asteraceae	Ghut Ghiskay	Perennial herb	Leaves	Fever treatment (powder mixed with water)	0.06	0.51	76	0.87	66.12
ICP 164	*Zanthoxylum armatum* DC.	Rutaceae	Dambara	Shrub	Bark, fruit, stem, seeds	Flavoring agent; cholera treatment; toothbrushes (miswak)	0.12	0.31	86.45	0.55	47.54
ICP 165	*Ziziphus jujuba* Mill.	Rhamnaceae	Markhanaey	Tree	Fruits, branches	Edible fruit; fuel, fencing; antidiuretic; fodder	0.09	0.35	80.7	0.87	70.2

Discussion

The use of plants is old as human origin. Plants are mainly used for medicinal purposes, and for our cattle fodder, timber for construction, wood fuel and heating purposes, flowers for ornamental, fragrant and numerous other purposes. Plants also reduce soil destruction and have a main impact on climatology. Ethnobotany has a broad branch of science in medicines biochemistry, physics, forestry and economics. It's described by the methods which associate environment and society. The interactions is a symbolic, religious, social artistic and commercial (Aumeeruddy, 1996). The Banrgai, Talash valley comprise 39 plant families under 63species, and 59 genera used for different purposes by the native people. The Ethno medicinally important plants species were documented with their families, including local name, botanical name, part used, habit and local uses. The people of the Banrgai Talash valley use the plant resources for a variety of purposes. Previously Ahmad *et al.*, (2006) carried out research on Pakistan's Booni Valley in the Swat district reported 75 plant species adjacent to the Talash valley. Among these reported species the 70 plant species were dicots, 2 species of monocots, 2 species of gymnosperms, and 1 species of fungi. Similarly, Bakhsh *et al.* (2010) documented the Khuzar and Kalat region in Pakistan. A total of 34 families and 61 species were recorded. In the research area 61 species of medicinal plant belonging to 34 plant families were described. The Lamiaceae was major family which consists of 9 plant species as dominant family of current study. They stated that women employ these species to treat a variety of illnesses, including fever, liver disease, diabetes, stomach issues, illnesses of children, and issues associated to childbirth. Furthermore, Hadi *et al.* (2013) conducted research on the woody plants in Pakistan's Rech Valley adjacent to assessed valley, Torkhow district, Chitral Hindu Kush range. They listed 29 therapeutic plants from 16 families and 21 genera. According to reports, these plants are utilized locally for a variety of illnesses and other traditional purposes. However, the young generation lacks information about these studies while integration of technological developments with young generation will play a key role in the field of ethno medicines studies, which will influence human life aspects for better future. By the help of modern technology, the students' learning capabilities would significantly increase and made them capable to understand ethnomedicinal knowledge (Arif *et al.* 2021). Additionally, advance technology can help students to access promotion, collaborative action, traditional practice and preservation (Mahmood *et al.* 2011; Ullah *et al.* 2023). It increases the learning process and helps to preserve culture, biodiversity and inherent ecological wisdom through ethnobotanical knowledge (Yebouk *et al.* 2020; Irfan *et al.* 2021; Khan et al. 2023). A developer who builds based learning technology must consider the student's access to technology, especially remote or backward areas. Therefore, incorporating technology into the learning process can benefit the student.

According to recent study, it indicated that in a younger generation ethnomedicinal knowledge to be decreased, while more knowledge to be acquired about medicinal plants for older generations. It seems that socio-cultural elements like globalization and modernization have an impact on traditional knowledge of medicinal plants around the world (Irfan *et al.* 2017; Irfan *et al.* 2019). It gradually decreases the harvesting and cultivation of medicinal plants, endangering the sustainability of potential remedies (Ayub *et al.* 2023; Jan *et al.* 2020). Furthermore, ethno medicines knowledge is tightly linked to cultural identity and heritage; losing it may intensely decrease a sense of indigenous cultural connection (Adnan *et al.* 2015; Ashfaq *et al.* 2019; Ullah *et al.* 2022a; Ullah *et al.* 2022b).

Our approaching area for the first time was explored through a quantitative assessment which captured the proper image of the area. Previous research conducted in the same region by (Irfan *et al.*, 2017; Ullah *et al.* 2018) in the tehsil Lalqilla of district Dir lower documented the diverse traditional knowledge of 50 taxa having 47 genera belonging to 34 families, the dicotyledons were dominant with (98.0%) which showing that the area had well adaptation in trees (Ali et al. 2017; Irfan *et al.*, 2018a; Ali *et al.* 2023). In short, all the statistical indices were analyzed with another recent study of Irfan *et al.* (2023) which were all correlated with each other showed the similarity with current study results with slight differences. The fidelity level values in this study differs from 62% to 100% that showed excessive use of plants by the native inhabitants in frequent way because of its remedial prospective not only in study area but in further areas of Pakistan as well (Ahmad *et al.* 2006; Irfan *et*

al. 2018b; Irfan *et al.* 2018c; Irfan *et al.* 2018d; Irfan *et al.* 2023). Plant species having high FL are seen as particularly interesting for biological, phytochemical, and pharmacological studies to evaluate and prove their validity to introduce novel drugs and herbal products (Jan *et al.* 2021; Shuaib *et al.* 2021; Irfan *et al.* 2018e; Irfan *et al.* 2018f).

Conclusion

Upon completion of the research work it is concluded that the region is floristically rich. There are many important plants growing in the region, but we are close to losing these natural resources due to many reasons including deforestation, pollution, negligence and other human disturbances. We have lost significant forests because of forester corruption and police corruption. So, maintaining our natural resources is critical. This research is intended to provide basic information about plant uses in a safe manner for the study area. In addition, a nationwide survey of medicinal flora should be carried out to investigate and update the inventory of the area's existing natural plant resources, especially in agricultural countries such as Pakistan. Given the abundance of plant species in Talash valley and its immediate vicinity, it is suggested that the Pakistan Industrial Development Corporation may be persuaded to prepare a comprehensive report for the creation of small-scale processing units for the valued drugs.

Declarations

Ethics approval and consent to participate: Prior to the survey, we obtained oral informed consent from each participant.
Consent for publication: Not applicable
Availability of data and materials: Not applicable
Competing interests: Not applicable
Funding: Not applicable
Author contributions: SA collected the data, analyzed, and wrote the text. MI designed the study conception and framework, FU interpreted the results, SK1 and SK2 performed data analysis, MS & RZ participated in the theoretical background, monitoring data collection, YA helped with discussions, RU & UL wrote the final version of the text. (SK1 -Saeed Khalil, SK2 - Shazia Khatoon).

Acknowledgements

We would like to thank each healer who contributed to this research and shared their precious knowledge with us in Banrgai, Talash Valley, District Lower Dir, Khyber Pakhtunkhwa, Pakistan.

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